Flora of China



Asteraceae

20–21

Flora of China

The Chinese flora, with an estimated 31,500 species, is of immense scientific and horticultural importance. Noteworthy, too, is Chinese traditional medicine, which is based on the remarkable plant resources of the country. Descriptions and identification keys for this diverse flora, until now unavailable in English, have been published over the past 18 years in the *Flora of China*, in conjunction with a separate series, the *Flora of China Illustrations*. Forty of the total of 47 text and illustration volumes have already been published, thanks to an unprecedented and long-standing collaboration between Western and Chinese scientists.

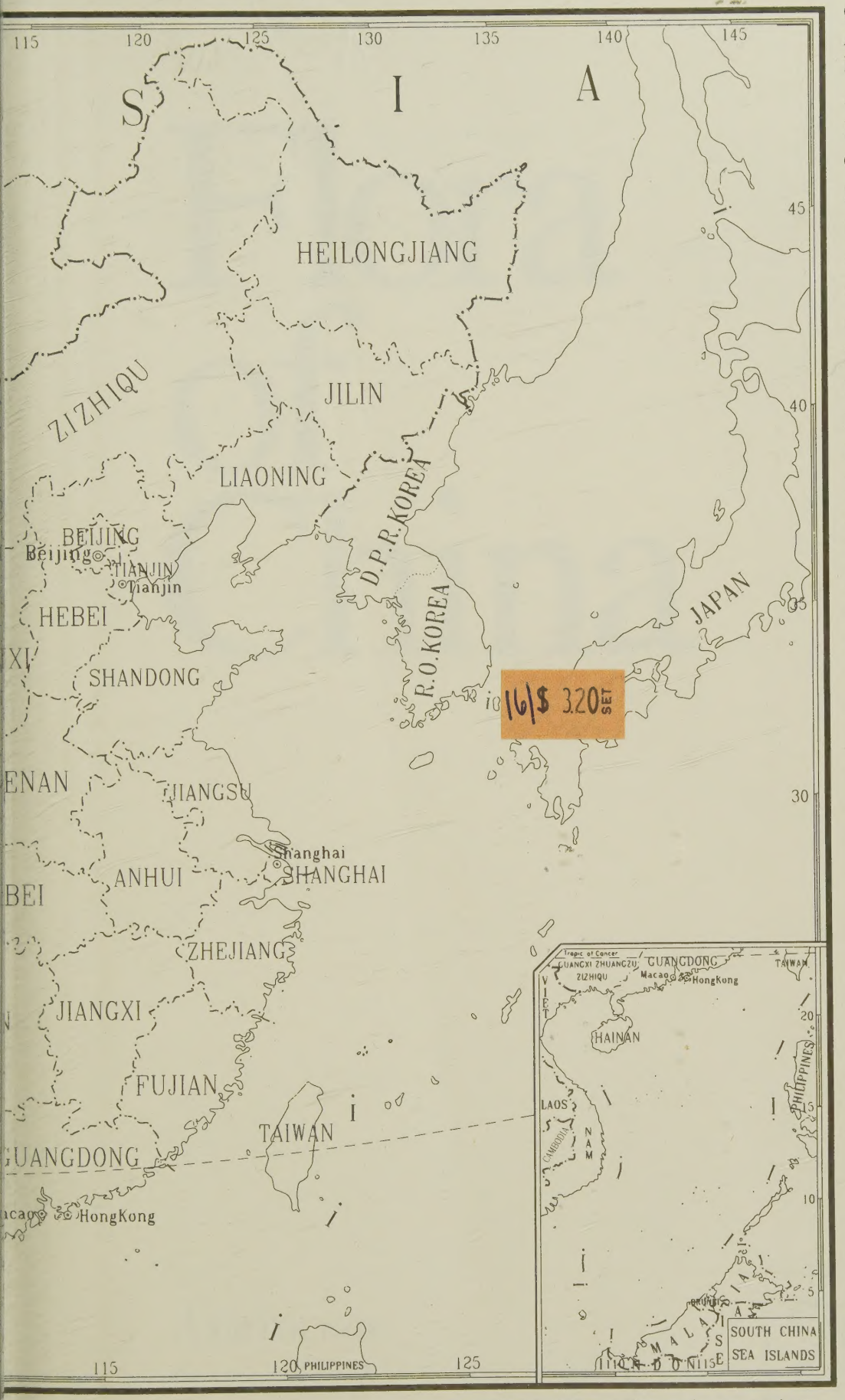
This is the largest single volume of the *Flora of China*, entirely devoted to the daisy family (Asteraceae, or Compositae), with more than 2,300 species described in 248 genera and 15 tribes. Among these, the largest genera are the dandelions (*Taraxacum*, 116 species), the asters (*Aster*, 123 species), *Ligularia* (123 species), the wormwoods (*Artemisia*, 186 species), and the saw-worts and snow-lotuses (*Saussurea*, 289 species). Eighteen genera and 49% of the species of Asteraceae are endemic to China. This corresponds closely with the overall percentage—50.5%—of endemic seed plants in China.

To find out more about the *Flora of China* project, visit the website at http://flora.huh.harvard.edu/china/

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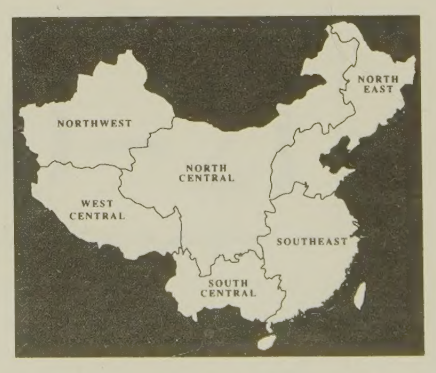
16/$ 3.20 SET

The national boundaries of China on this map are drawn after the 1:4M Relief Map of People's Republic of China published by China Cartographic Publishing House in 1989

kilometer

CHINA'S ADMINISTRATIVE DIVISIONS

ANHUI – Southeast
BEIJING – Northeast
CHONGQING – North Central
FUJIAN – Southeast
GANSU – North Central
GUANGDONG – Southeast
GUANGXI – South Central
GUIZHOU – South Central
HAINAN – South Central
HEBEI – Northeast
HEILONGJIANG – Northeast
HENAN – Southeast
HONG KONG – Southeast
HUBEI – Southeast
HUNAN – Southeast
JIANGSU – Southeast
JIANGXI – Southeast
JILIN – Northeast
LIAONING – Northeast
MACAO – Southeast
NEI MONGOL – North Central
NINGXIA – North Central
QINGHAI – North Central
SHAANXI – North Central
SHANDONG – Northeast
SHANGHAI – Southeast
SHANXI – Northeast
SICHUAN – North Central
SOUTH CHINA SEA ISLANDS – Southeast
TAIWAN – Southeast
TIANJIN – Northeast
XINJIANG – Northwest
XIZANG – West Central
YUNNAN – South Central
ZHEJIANG – Southeast



Flora of China

Asteraceae

20–21

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Flora of China

Asteraceae

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20–21

Flora of China

Volume 20–21

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The *Flora of China* logo (above) is a composite image, derived from the outlines of leaf shapes from genera of woody plants occurring in both China and the U.S.A., that symbolizes the collaboration between the two nations. It was designed by Charles P. Reay.

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Preface

Volume 20–21 of the *Flora of China* is vols. 20 and 21 combined into a single volume; hence it is the 21st of the now 23 text volumes in the series. It includes one family, the Asteraceae (or Compositae), with 15 tribes, 248 genera, and 2,336 species, among which 18 genera and 1,145 species (49%) are endemic to China, and one tribe, 49 genera, and 109 species (4.7%) are introduced to China.

Volume 20–21 is formatted in the same manner as the first 20 volumes of the series: vol. 17 (1994), vol. 16 (1995), vol. 15 (1996), vol. 18 (1998), vol. 4 (1999), vol. 24 (2000), vol. 8 (2001), vol. 6 (2001), vol. 9 (2003), vol. 5 (2003), vol. 14 (2005), vol. 22 (2006), vol. 13 (2007), vol. 12 (2007), vol. 11 (2008), vol. 7 (2008), vol. 25 (2009), vol. 10 (2010), vol. 23 (2010), and vol. 19 (2011)[1]. The following 19 accompanying volumes of the *Flora of China Illustrations* have been published to date: vol. 17 (1998), vol. 16 (1999), vol. 15 (2000), vol. 18 (2000), vol. 4 (2001), vol. 24 (2002), vol. 8 (2003), vol. 6 (2003), vol. 9 (2004), vol. 5 (2004), vol. 14 (2006), vol. 22 (2007), vol. 13 (2008), vol. 12 (2008), vol. 11 (2009), vol. 7 (2009), vol. 25 (2010), vol. 10 (2011), and vol. 23 (2011).

Bruce Bartholomew edited the Cardueae, Carlineae, Cichorieae, and Echinopeae. Anthony R. Brach edited the Anthemideae, Eupatorieae, and Senecioneae and assisted with the editing of *Aster*. Michael G. Gilbert edited and co-authored the Anthemideae and Vernonieae. Nicholas J. Turland and Lisa J. Pepper edited the Astereae, Athroismeae, Calenduleae, Gnaphalieae, Heliantheae, Inuleae, and Mutisieae. Lisa J. Pepper carried out the final editing of the whole volume. Nicholas J. Turland checked the nomenclature. Zhang Libing (张丽兵) corrected errors and omissions in the Chinese and pinyin names. Anthony R. Brach and Lisa J. Pepper proofread the volume. Nicholas J. Turland and Lisa J. Pepper compiled the indexes. Allison M. Brock helped with the production of the introductory pages. Rosemary Tanaka typeset the volume for publication.

The remaining two text volumes in the series (vols. 2 and 3) will comprise the pteridophytes, with ca. 2,350 species.

Wu Zhengyi (吴征镒)
Peter H. Raven
Hong Deyuan (洪德元)

[1] On the copyright page of *Flora of China* vol. 19, the date of printing was omitted in error. It should have read February 28, 2011.

Introduction

The *Flora of China* will be published in 23 volumes of text and will account for all known vascular plants of China. The taxa treated in the Flora include all native and naturalized plants, as well as economically important exotics, such as crops or plantation plants. Each text volume will be followed by an accompanying volume of the *Flora of China Illustrations,* which will provide detailed line drawings of approximately 60% of the species treated in the text volumes. A list of the volumes published to date is provided at the end of this book. An introductory volume will complete the Flora.

The Flora generally follows the same sequence of families as in *Flora Reipublicae Popularis Sinicae* (FRPS), i.e., a modified Englerian system that treats the monocotyledons last. However, the circumscription of some families reflects the present understanding of the groups. For example, the Menyanthaceae and Gentianaceae are both recognized, instead of combining them as the Gentianaceae, whereas the Lythraceae, Punicaceae, and Sonneratiaceae are combined as the Lythraceae. Genera and species are arranged taxonomically or in the order in which they appear in the keys, or occasionally alphabetically.

Taxonomic treatments are presented from the level of family to species and infraspecific ranks. Although intermediate ranks (e.g., subfamily, tribe, subtribe, subgenus, section, series) are useful in the taxonomy of certain large families (e.g., Asteraceae) and genera (e.g., *Saussurea*), they are used only sparingly. Accepted names are cited with authors, bibliographic citations, and synonyms, except above the rank of genus when only the name is cited. Each recognized taxon has a description as well as an indication of the number of subordinate taxa and the distribution worldwide. For infraspecific taxa, either subspecies or varieties are recognized. Forms are not treated. All keys are dichotomous, indented, and generally artificial.

The synonymy given is based on close examination of accepted names and synonyms listed in major East Asian floras. At the generic level, synonyms widely used in the literature are included. At the specific and infraspecific levels, only the main synonyms, especially those listed in the floras of neighboring countries, are included. All names based on Chinese material are included. The complete bibliographic citation of synonyms is given only for basionyms or replaced synonyms of accepted names; only the authors' names are provided for other synonyms. The basionym or replaced synonym of an accepted name is listed before other synonyms, which are arranged alphabetically. As far as possible, the nomenclatural status of names, their spellings, authorship, and bibliographic citations have been verified. Names not validly published or names misapplied in major East Asian and local Chinese floras are not included in synonymy. Discussions relating to such names are dealt with as notes. Differences of opinion among authors in the circumscription of taxa are mentioned as notes.

Except where no material was available to the authors, all descriptions are based on Chinese plants. Normally, the description of a given taxon does not exceed 130 words. Descriptions of families are followed by the number of genera and species, distribution, and usually other comments, including reference to FRPS accounts. If a species is represented in China by more than one infraspecific taxon, a full description is provided for the species, and only diagnostic features are listed under the infraspecific taxa. If only one infraspecific taxon of a species occurs in China, a full description is given under the infraspecific taxon. Flowering (fl.) and fruiting (fr.) times are usually given by month using the first three letters of the month.

If a single measurement is used, it indicates length. When both length and width are used, the measurements are given as length × width. A range of measurements is separated by an en-dash (–). Discontinuous states within a taxon are separated by the word "or." Exceptional measurements or character states are in parentheses ( ) or, when applicable only to material from outside of China, in brackets [ ].

The distribution in China is given at the provincial level, listed alphabetically as follows: Anhui, Beijing, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanghai, Shanxi, Sichuan, Taiwan, Tianjin, Xinjiang, Xizang, Yunnan, and Zhejiang. Distributions may also include the special districts of Hong Kong and Macau, but only if the taxon is absent from Guangdong Province. Similarly, Beijing and Tianjin are listed only if the taxon is otherwise absent from Hebei Province, and Shanghai is listed only if the taxon is otherwise absent from Jiangsu Province. The provincial map is provided on the front- and endpapers of this volume. The distributions are sometimes modified by using the directions C(entral), E(ast), N(orth), S(outh), W(est), or intermediate directions, e.g., NW, SC. A taxon endemic to China is marked with a bullet (•) at the beginning of the paragraph on habitat and distribution. Where a taxon is very local, the exact distribution may be given in parentheses. However, localities are not given below the level of *xian* (equivalent to county) or mountain (e.g., Tian Shan). Elevations are rounded off to the nearest 100 m.

The distribution by country, continent, or area is given alphabetically in brackets [ ] for taxa extending beyond China. Only the countries adjacent to China are explicitly listed, as well as the other countries of tropical Asia from India eastward. These include Afghanistan, Bangladesh, Bhutan, Cambodia, East Timor, India, Indonesia, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Laos, Malaysia, Mongolia, Myanmar (formerly Burma), Nepal, Pakistan, Papua New Guinea, the Philippines, Russia, Singapore, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan, and Vietnam. When the distribution extends beyond these countries, a generalized range (including Africa, SW Asia, Australia, Europe, North America, the Pacific islands, and South America) is given.

Whenever available, somatic chromosome numbers are included at the end of descriptions of specific and infraspecific taxa; an asterisk (*) indicates counts made from Chinese material. Basic chromosome numbers may be included at the end of descriptions of genera.

A question mark (?) placed immediately before a synonym, character state in a description, or territory within a distribution indicates that confirmation is required.

Each recognized taxon in the *Flora of China* has one Chinese name, followed by its pinyin transliteration. Three indexes are included at the end of each volume: one for Chinese plant names, another for the pinyin transliterations, and the third for scientific names.

The family names of authors of plant names are written out in full. When it is necessary to use initials to differentiate authors who have the same family name, the initials (if any) of the abbreviation published by Brummitt and Powell in *Authors of Plant Names* (Royal Botanic Gardens, Kew, 1992) and its continuously updated online supplement (http://www.ipni.org/ipni/authorsearchpage.do) are used. The abbreviation "f." is not used for the Latin *filius,* but the son's initials are used (e.g., "J. D. Hooker" rather than "Hook. f."), except when the names of the parent and descendant are identical (e.g., "Linnaeus" and "Linnaeus f.").

Abbreviations of periodicals are according to Bridson's *BPH-2* (*Botanico-Periodicum-Huntianum,* ed. 2; Pittsburgh: Hunt Institute for Botanical Documentation, 2004), and abbreviations for books follow Stafleu and Cowan's *Taxonomic Literature,* ed. 2 (*TL-2*; Utrecht/Antwerpen: Bohn, Scheltema and Holkema; The Hague/Boston: dr. W. Junk b.v., 1976–1988) and its supplements. Books and periodicals not included in these two works are abbreviated according to the recommendations in the Appendix of *BPH-2*.

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ASTERACEAE (COMPOSITAE)

菊科 ju ke

Shi Zhu (石铸 Shih Chu)[1], Chen Yilin (陈艺林 Chen Yi-ling)[1], Chen Yousheng (陈又生)[2], Lin Yourun (林有润 Ling Yeou-ruenn, Ling Yuou-ruen)[3], Liu Shangwu (刘尚武)[4], Ge Xuejun (葛学军)[5], Gao Tiangang (高天刚)[2], Zhu Shixin (朱世新)[6], Liu Ying (刘莹)[7], Yang Qiner (杨亲二)[5], Christopher J. Humphries[8], Eckhard von Raab-Straube[9], Michael G. Gilbert[10], Bertil Nordenstam[11], Norbert Kilian[9], Luc Brouillet[12], Irina D. Illarionova[13], D. J. Nicholas Hind[14], Charles Jeffrey[15], Randall J. Bayer[16], Jan Kirschner[17], Werner Greuter[18], Arne A. Anderberg[11], John C. Semple[19], Jan Štěpánek[17], Susana Edith Freire[20], Ludwig Martins[21], Hiroshige Koyama[22], Takayuki Kawahara[23], Leszek Vincent[24], Alexander P. Sukhorukov[25], Evgeny V. Mavrodiev[26], Günter Gottschlich[27]

Herbs, subshrubs, or shrubs, rarely trees or climbers, bisexual, monoecious, or sometimes dioecious, many with laticiferous cells or canals and/or resinous ducts. Leaves often in a basal rosette; cauline leaves usually alternate, more rarely (in China) opposite or whorled, sessile or petiolate, without stipules; petiole sometimes auriculate at base; leaf blade entire to variously lobed or divided. Florets bisexual (perfect), female (pistillate), or functionally male (functionally staminate), solitary or few to many enclosed in an involucre of 1- to many-seriate phyllaries (involucral bracts) to form a capitulum; calyculus of outer bracts sometimes present and often differing markedly from phyllaries. Capitula solitary or few to many arranged in variously formed synflorescences, homogamous or heterogamous, discoid, disciform, radiate, subradiate, radiant, or ligulate; receptacle usually flattened, sometimes slightly concave or convex, rarely conical, smooth or alveolate, paleate (scaly) or epaleate, with bristles, scales, hairs, or naked. Corolla (3–)5-merous, gamopetalous, tubular or tubular-filiform, and regular, bilabiate, radiate, or ligulate. Stamens (4 or)5, inserted within corolla tube; filaments adnate to proximal part of corolla; anthers basifixed or dorsifixed, usually coalescent into a tube, base caudate or not, apex with (rarely without) a sterile, ovate or lanceolate appendage; pollen grains usually tricolporate, echinate or sometimes lophate or spinulate, often caveate. Style apically bifid (rarely entire); style branches variously shaped, with or without an apical appendage, hairs, or papillae. Ovary inferior, 1-loculed; ovule 1, basal, anatropous. Fruit an achene (cypsela). Pappus consisting of 1 to many rows of scales or bristles, or absent. Seed erect; endosperm scanty; embryo straight.

Between 1,600 and 1,700 genera and ca. 24,000 species: cosmopolitan (except Antarctica); 15 tribes (one introduced), 248 genera (18 endemic, 49 introduced), and 2,336 species (1,145 endemic, 109 introduced) in China.

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Taxonomic discussion on the Asteraceae is included under the relevant tribes. The following notes apply to the whole family. Modes of reproduction in the Chinese Asteraceae are known only fragmentarily. As regards the world diversity of the family, only about 12% of genera have been studied using cytoembryology to identify the reproduction system. In 3%, agamospermy was found to occur. Probably the most common reproduction system is allogamy with a sporophytic self-incompatibility; occasional selfing is also possible (stigma ageing or mentor effect). More or less obligate autogamy is relatively rare. Other uncommon reproduction systems include gynodioecy, a very rare dioecy (with heterogametic females). Asexual reproduction is a widespread phenomenon in the Asteraceae, with a wide range of mechanisms. In addition to the rare adventitious embryony, there are common types of autonomous apomixis, agamospermy (apospory, diplospory) associated with various forms of embryogenesis (parthenogenesis, apogamety). All the types of reproduction are to be considered in the evaluation of population variation and for taxonomic conclusions because the prevailing type of reproduction substantially influences the variation limits of taxa.

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Glossary of botanical terms used in the Asteraceae

Accepted terms are indicated by **boldface**. Within the definitions, *italics* (when not names of genera) indicate terms that are defined in this glossary.

achene – the fruit of Asteraceae; a usually dry, indehiscent, 1-locular, 1-seeded fruit derived from a 2-carpellate, inferior ovary. Some authors prefer to use the term cypsela for the fruit of Asteraceae and restrict the term achene to a dry, 1-seeded fruit derived from a 1-carpellate, superior ovary (e.g., in *Ranunculus* in Ranunculaceae).

alveolate – honeycombed; usually referring to a ± pitted *receptacle*, in which the pits or sockets may be round or ± polygonal in cross section, socket margins may be entire, erose, fimbriate, or lacerate; cf. *foveolate*.

anther appendage – sterile tissue extending distally beyond pollen sacs as a continuation of an anther connective.

anther collar – see *antheropodium*.

antheropodium (plural **antheropodia**) – literally "anther foot"; a region of usually thick-walled cells in a staminal filament just proximal to its anther; the collar may be *balusterform* (as in *Senecio*), i.e., proximally with enlarged cells, or straight and (semi)cylindric and made up of uniformly sized cells (as in *Ligularia* and *Parasenecio*).

anther tails – sterile tissue extending from the base of a pollen sac; anther tails may be simple or ± branched and often have a characteristic form within taxa; some tribes of Asteraceae characteristically have tailed (also called caudate) anthers.

anther tube – in Asteraceae, the five anthers are joined laterally into a tube through which the style emerges.

antrorse – directed toward the apex; lateral elements of *barbellate* or *plumose* awns or bristles of a *pappus* may be described as antrorse; cf. *retrorse*.

apical anther appendage – see *anther appendage*.

apical plate – the apical *achene* area on the periphery of which the *pappus* is inserted; sometimes also called pappus disk.

apical rim – a ± salient ring outside the *pappus* insertion, surrounding the *apical plate* (characteristic of Cardueae).

aristate scale – see *pappus*.

attachment scar – the area near the base of the *achene* where it was attached to the *receptacle*.

awn – see *pappus*.

balusterform – referring to an *antheropodium* that is proximally markedly dilated with enlarged cells (as in some Senecioneae).

barbellate (diminutive **barbellulate**) – usually refers to a *pappus* awn or bristle with lengths of lateral elements (free cell ends, usually called barbs) less than or subequaling the diameter of the shaft of the awn or bristle; see also *plumose* and *scabrid*.

basal anther appendages – see *anther tails*.

beak – see *rostrum*.

bilabiate corolla – a corolla with 2 lips, usually an outer lip with 3 lobes or teeth and an inner lip with 2 often linear lobes (e.g., in some Mutisieae).

bisexual floret (sometimes referred to as hermaphroditic floret or perfect floret) – florets possessing both an anther cylinder and a style, usually both fertile although in some taxa florets may be *functionally male* or *female*.

bristle – see *pappus*.

calathium or *calathidium* (plural *calathia* or *calathidia*) – see *capitulum*.

calcarate anthers – anthers with the filaments inserted ± abaxially on the connective, distal to (above) the bases of the paired pollen sacs (e.g., in *Vernonia*).

calycular bracts – the individual bracts making up the *calyculus*.

calyculate – bearing a *calyculus*.

calyculus (plural **calyculi**) – collectively, 1 or more bracts or bracteoles subtending an *involucre*, usually readily distinguished from the *phyllaries* (e.g., in *Senecio* and *Taraxacum*).

capitulescence – see *synflorescence*.

capitulum (plural **capitula**) – the inflorescence in Asteraceae and certain other families; sometimes called a head; a capitulum comprises an *involucre* of *phyllaries* (sometimes subtended by a *calyculus*), a *receptacle*, and (1–)5–100(–1000 or more) *florets*; the florets are borne on the face of the receptacle.

carpopodium (plural **carpopodia**) – literally "fruit foot"; the basal, sterile portion of an *achene* at its point of attachment to a *receptacle*; carpopodia are sometimes diagnostic in shape and cellular form (e.g., in some Eupatorieae) and sometimes negligible or essentially absent.

caudate anthers – tailed anthers; see *anther tails*.

chaff – *paleae*; see *receptacle*.

compressed achene – usually, cross sections of *achenes* are ± circular or polygonal and isodiametric; sometimes, achenes are compressed or ± flattened either (1) laterally with the longer dimension of the cross section of each achene parallel to a radius of the *capitulum* (as in *Helianthus*) or (2) dorsiventrally with the longer dimension of the cross section of each achene perpendicular to a radius of the capitulum (as in *Coreopsis*).

corolla limb – in a *disk floret*, the corolla limb is the portion of the corolla distal to the insertion of the staminal filaments (i.e., corolla limb = *corolla throat* + *corolla lobes* of a *disk corolla*); in a *ligulate floret*, the corolla limb is called a *ligule*; in a *ray floret*, it is called a *lamina*.

corolla lobes – the lobes of a corolla.

corolla throat – usually, throat refers to the portion of a corolla distal to insertion of staminal filaments (i.e., distal to the *corolla tube*) and proximal to the *corolla lobes*; the throat may be gradually or abruptly ampliate (enlarged) relative to the tube.

corolla tube – usually, the portion of a corolla proximal to insertion of the staminal filaments; also, the ± cylindric portion of a corolla proximal to the ± flat *corolla limb* in a *ligulate floret* or a *ray floret*.

corona – a crown-shaped *pappus*; or, in Anthemideae (which lack a true pappus), the apex of the *achene* may be produced into an entire to deeply divided, crown-shaped, sometimes pappuslike structure.

cypsela (plural *cypselae*) – see *achene*.

disk corolla – corolla of a *disk floret*.

disk florets – central *florets* of a *disciform capitulum*, *radiant capitulum*, or *radiate capitulum*, or all florets of a *discoid capitulum*; disk florets usually have actinomorphic corollas; disk florets may be *bisexual* (most common), *functionally male* (moderately common), or *female* (relatively rare, e.g., in *Antennaria*, and in *Cavea* when dioecious).

disciform capitulum – a *heterogamous capitulum* with actinomorphic corollas in all *florets*, with *marginal florets* that are *female* or *neuter* (and usually with ± attenuate to filiform corollas), and with central florets usually *bisexual*, sometimes *functionally male*. By tradition, both the marginal, female florets and the central, bisexual or functionally male florets in disciform capitula have been referred to as *disk florets*.

discoid capitulum – a *homogamous capitulum* with actinomorphic corollas in all *florets* (similar in *marginal* and central florets) and all florets either *bisexual* or *functionally male* or *female*.

distant – in reference to Asteraceae, the opposite of *imbricate*, in an *involucre* where the *phyllaries* do not overlap but are clearly in more than one series.

ecalcarate anther – anthers not *calcarate*.

ecalyculate – lacking a *calyculus*.

ecaudate anthers – anthers not caudate or tailed; see *anther tails*.

endothecial tissue – wall structure of pollen sacs with cell thickenings; the endothecium is radial if the wall thickenings are restricted to vertical cell walls (e.g., in *Senecio*), and polarized if restricted to horizontal walls (e.g., in *Ligularia*); intermediate types occur (e.g., in some *Sinosenecio*).

epaleaceous – see *epaleate*.

epaleate – lacking *paleae*; see *receptacle*.

epappose – lacking a *pappus*.

female floret (sometimes referred to as pistillate floret) – describes a *floret* with a fertile, functional ovary and style (i.e., capable of producing a viable seed) and lacking stamens.

filament collar – see *antheropodium*.

filiform floret – a *marginal floret* of a *disciform capitulum* or sometimes a *discoid capitulum*; filiform florets are *female*, always without staminodes, and have narrowly tubular corollas apically subtruncate, or with 2 or 3 minute teeth or a minute *lamina*.

floret – an individual flower in a *capitulum*.

foveolate – shallowly pitted; cf. *alveolate*.

functionally male floret (sometimes referred to as functionally staminate floret) – a *floret* that has fertile anthers and a sterile ovary, i.e., a floret producing functional pollen and not capable of producing a viable seed; styles of functionally male florets usually are not branched and usually lack stigmatic papillae. Although strictly correct, the word "functionally" is often omitted.

gland-dotted – surfaces of Asteraceae, especially leaves and *phyllaries*, sometimes bear subsessile, sessile, or sunken, multicellular glandular hairs; such surfaces have been described as gland-dotted, glandular punctate, punctate, or punctate glandular; here, such surfaces are described as gland-dotted.

glandular punctate – see *gland-dotted*.

glomerule – a condensed, usually ± globose cluster of *capitula* (e.g., in *Eremanthus* Lessing, not in China, and *Gamochaeta*); cf. *pseudocephalium*.

head – see *capitulum*.

hermaphroditic floret – see *bisexual floret*.

heterogamous capitulum – a *capitulum* with *florets* of two or more sexual forms.

homogamous capitulum – a *capitulum* with all *florets* of one sexual form, usually all *bisexual*, all *functionally male*, or all *female*.

imbricate – partially and ± regularly overlapping, as shingles (tiles) of a roof; *phyllaries* of an *involucre* are often imbricate.

inflorescence – in Asteraceae, the primary inflorescence is a *capitulum*; in the sense of a compound inflorescence with multiple capitula, see *synflorescence*.

involucral bracts – see *phyllaries*.

involucre – *phyllaries* collectively; an involucre is the bracts or bracteoles borne at the periphery of a *receptacle*, exterior to the *florets* of a *capitulum*.

lamina (plural **laminae**) – in *ray florets*, the ± flat, ± strap-shaped *corolla limb* of the zygomorphic corolla; a lamina usually has 2 or 3 apical lobes or teeth; it is sometimes referred to as a ray and, incorrectly, as a *ligule*.

ligulate capitulum – a *capitulum* with all *florets bisexual* and *ligulate*; the *corolla limb* is called a *ligule*, is ± flat and ± strap-shaped, and is apically 5-lobed or 5-toothed; ligulate capitula are characteristic of Cichorieae.

ligulate floret – a floret in which the *corolla limb* is zygomorphic, ± flat, and ± strap-shaped with 5 apical lobes or teeth; the ± flat corolla limb of a *ray floret* has been called a *ligule*, whereas here it is called a *lamina*.

ligule – the ± flat, ± strap-shaped *corolla limb* of a *ligulate floret*.

male floret – see *functionally male floret*.

marginal florets – the single or multiple series of *florets* around the edge of a *capitulum* and surrounding the central *disk florets*; marginal florets may be (but are not necessarily) *ray florets*.

neuter floret – describes a *ray floret* that lacks a style.

palea (plural **paleae**) – bracts borne on a *receptacle* of a *capitulum*; usually, each palea subtends an individual *floret*; paleae are usually herbaceous, membranous, or scarious and may be persistent, ± caducous, or shed together with *achenes*; paleae have been called receptacular bracts or receptacular paleae; scales of the *pappus* also have been called paleae.

paleaceous – *palea*-like; for the sense of bearing paleae, see *paleate*.

paleate – bearing paleae; see *receptacle*.

pappose – bearing a *pappus*.

pappus (plural **pappi**) – collectively, awns and/or bristles and/or scales corresponding to a calyx borne apically on ovaries (ultimately *achenes*) of Asteraceae. A pappus may be ± persistent or ± caducous; when persistent it is sometimes involved in dispersal of achenes. A pappus may include more than one kind of element (e.g., awns, bristles, and/or scales); the elements may be distinct or ± connate and may occur in 1–5 or more series. Scales that are very narrow may be only arbitrarily distinguishable from awns or bristles. The distinction between awns and bristles is also sometimes arbitrary. Generally, cross sections of bristles and awns are ± circular or polygonal and have the longer diameter no more than 3 × the shorter diameter. Pappus elements with ± flat cross sections (i.e., longer diameter of cross section more than 3 × the shorter diameter) are called scales, regardless of relative lengths of the elements. As used here, subulate scale means much the same as flattened bristle. Bristles may be relatively pliable to relatively stiff. Bristles with diameters less than ca. 50 µm are usually called capillary or fine bristles; bristles with diameters greater than ca. 50 µm are usually called coarse bristles. Rigid pappus elements with ± circular or polygonal, isodiametric cross sections greater than 100 µm in diameter are usually called awns. Awns and/or bristles may be *barbellate*, *barbellulate*, or *plumose*. A pappus scale may terminate in one or more bristlelike or awnlike appendages; such scales are said to be aristate.

pappus disk – see *apical plate*.

pedicel – strictly referable to the stalk of an individual *floret*, such as may be found in many species of *Cotula*.

peduncle – a stalk (stem) supporting a single *capitulum*.

perfect floret – see *bisexual floret*.

peripheral florets – see *marginal florets*.

phyllaries (singular **phyllary**) – the bracts or bracteoles borne at periphery of a *receptacle*, exterior to the *florets* of a *capitulum*, collectively an *involucre*; in fruit, phyllaries are sometimes shed together with *achenes* (e.g., in *Acanthospermum*, *Parthenium*, and *Xanthium*).

pistillate floret – see *female floret*.

plumose – featherlike or bearing feathers; in reference to Asteraceae, plumose usually refers to a *pappus* bristle with lengths of lateral elements 1–3 or more × the diameter of the shaft of the bristle; see also *barbellate* and *scabrid*.

pseudobilabiate corolla – a corolla with a 4-lobed outer (abaxial) lip and a simple (not lobed) inner (adaxial) lip (e.g., in *Barnadesia* Mutis ex Linnaeus f., not in China).

pseudocephalium (plural **pseudocephalia**) – literally "false head"; an aggregation of *capitula* into a secondary, capitulum-like *synflorescence* (e.g., in *Echinops*, *Elephantopus*, and *Sphaeranthus*); cf. *glomerule*.

punctate – see *gland-dotted*.

punctate glandular – see *gland-dotted*.

radiant capitulum – a *heterogamous capitulum* with *marginal florets* usually *neuter* (sometimes *female*) with corollas usually 5-lobed, notably enlarged (relative to corollas of central florets), and actinomorphic to ± zygomorphic (e.g., in *Centaurea* s.l.) and with central florets usually *bisexual* with 5-lobed, actinomorphic corollas.

radiate capitulum – a *heterogamous capitulum* with marginal *ray florets* and central *disk florets*.

ray – see *lamina*.

ray corolla – the corolla of a *ray floret*.

ray florets – in a *radiate capitulum*, the *marginal florets* that are *neuter*, *female*, or *styliferous and sterile* with zygomorphic corollas. The *corolla limb* of a *ray corolla* is called a *lamina* and is ± flat, ± strap-shaped, and (0–)2- or 3(or 4)-lobed or -toothed; it has been called a *ligule*, but here ligule is used for the corolla limb of a *ligulate floret*.

receptacle (adjective **receptacular**) – in reference to Asteraceae, the portion of a *capitulum* that bears *phyllaries* peripherally and *florets* on its face; transition from apex of *peduncle* to receptacle is imperceptible and the distinction is arbitrary; faces of receptacles may be concave, flat, convex, conical, or cylindric and may be *paleate* or *epaleate* (epaleate receptacles are sometimes described as naked). Paleate receptacles are sometimes said to be chaffy and the *paleae*, collectively, are sometimes called chaff. Epaleate receptacles may bear ± subulate enations (e.g., in *Grindelia*) or bristles or subulate to linear scales (e.g., in some Cardueae) or hairs (e.g., in some Anthemideae) among florets, or epaleate receptacles may be ± *foveolate* with margins of sockets notably lacerate; such epaleate receptacles may be mistaken for paleate receptacles.

retrorse – directed toward the base; lateral elements of *barbellate* or *plumose* awns or bristles of a *pappus* may be described as retrorse; cf. *antrorse*.

rostrate – bearing a *rostrum*.

rostrum (plural **rostra**) – a distal, attenuated portion of an *achene* (e.g., in *Taraxacum*).

scabrid – used to describe capillary *pappus* bristles with lateral extensions that are shorter than those in *barbellate* bristles; see also *plumose*.

scale – see *pappus*.

scape – properly, a leafless and simple flowering stem of a plant that has leaves in basal rosettes; the *peduncle* of some Asteraceae (e.g., in *Taraxacum*) is sometimes called a scape.

scapiform – resembling a *scape*.

scrobiculate – refers to a *receptacle* covered with low mounds of tissue with furrows between, the top of each mound occupied by the remains of the vascular bundle.

seta (plural **setae**) – a bristle or bristlelike structure; with reference to Asteraceae, setae are usually elements of a *pappus*.

setiferous – bearing *setae*.

setula (plural **setulae**) – diminutive of *seta* (*setae*); small hairs usually on an *achene*, including *twin hairs*.

setuliferous – bearing *setulae*.

squamella (plural **squamellae**) – a relatively small scale; scales of a *pappus* are sometimes called squamellae.

staminate floret – see *functionally male floret*.

stereome – a central, ± hardened portion of a *phyllary*; individual stereomes may be undivided or divided into two lobes (e.g., in Gnaphalieae).

stigmatic area – area of a *style branch* covered with stigmatic papillae, present as areas covering the inside of the style branch or separated into two marginal bands that may sometimes fuse toward the apex of the style branch.

style arm – see *style branch*.

style branch – in reference to Asteraceae, one of the two branches of a style; usually, each style branch bears stigmatic papillae on the inner (adaxial) face, at least proximally; in *functionally male florets*, styles are usually not branched and usually lack stigmatic papillae.

style branch appendage – see *style branch tip*.

style branch tip – the portion of a *style branch* beyond the *stigmatic area* (sometimes termed style branch appendage); the forms of style branch tips are sometimes characteristic of tribes or subtribes.

styliferous and sterile – describes a *ray floret* that has a style but is seed-sterile, i.e., it has an infertile ovary, unable to produce a seed.

stylopodium (plural **stylopodia**) – literally "style foot"; usually, a nectary at the base of a style.

subimbricate – less than *imbricate*; weakly overlapping.

subinvolucral bracts – individual bracts surrounding or below an *involucre*, sometimes subtending individual *peduncles*, e.g., in *Mikania*.

subplumose – less than *plumose*.

subradiate capitulum – a *heterogamous capitulum* with the *ray florets* not exceeding the *phyllaries*.

sweeping hairs – dorsal projections from the abaxial side of the *style branches*. Their function is to collect pollen from the pollen sacs as the style grows up through the *anther tube*; the distribution and shape of sweeping hairs are often taxonomically useful.

syncalathium (plural *syncalathia*) – see *synflorescence*.

synflorescence – a compound inflorescence; any arrangement of multiple *capitula* on a capitulum-bearing shoot; a synflorescence can be corymbiform, paniculiform, racemiform, spiciform, etc., or capitulum-like; see also *glomerule* and *pseudocephalium*.

twin hairs – translation of the German *Zwillingshaare*, sometimes referred to as duplex hairs although usually 3-celled (2 parallel cells plus 1 smaller basal cell); twin hairs are often found on *achenes* of Asteraceae and are sometimes called *setulae*.

umbo – a ± conical or polyhedral projection or boss; in some Asteraceae, a usually waxy structure associated with a *pappus* (e.g., in *Jurinea*).

umbonate – bearing an *umbo*.

xylopodium (plural **xylopodia**) – literally, "wood foot"; a ± woody, subterranean caudex or rootstock that is derived from the hypocotyl and roots.

Systematic list of tribes, subdivisions of tribes, and genera

• Indicates endemic genus

1. Mutisieae (p. 9)
1. • *Nouelia*
2. *Leucomeris*
3. *Adenocaulon*
4. *Leibnitzia*
5. *Gerbera*
6. *Piloselloides*
7. *Ainsliaea*
8. *Pertya*
9. • *Myripnois*

2. Echinopeae (p. 33)
10. *Echinops*

3. Carlineae (p. 39)
11. *Carlina*
12. *Atractylodes*
13. *Tugarinovia*

4. Cardueae (p. 42)
1. Saussurea group
14. *Jurinea*
15. • *Diplazoptilon*
16. *Himalaiella*
17. *Dolomiaea*
18. • *Bolocephalus*
19. *Frolovia*
20. *Aucklandia*
21. *Hemisteptia*
22. *Saussurea*

2. Arctium group
23. *Cousinia*
24. *Schmalhausenia*
25. *Arctium*

3. Onopordum group
26. *Synurus*
27. *Alfredia*
28. *Olgaea*
29. • *Xanthopappus*
30. *Syreitschikovia*
31. *Onopordum*
32. *Ancathia*

4. Carduinae
33. *Cirsium*
34. *Carduus*

5. Centaureinae
35. *Rhaponticum*
36. *Oligochaeta*
37. *Klasea*
38. • *Archiserratula*
39. *Tricholepis*
40. *Amberboa*
41. *Plagiobasis*
42. *Russowia*
43. *Schischkinia*
44. *Serratula*
45. *Rhaponticoides*
46. *Psephellus*
47. *Crupina*
48. *Carthamus*
49. *Cyanus*
50. *Centaurea*

5. Cichorieae (p. 195)
51. *Scorzonera*
52. *Podospermum*
53. *Koelpinia*
54. *Epilasia*
55. *Tragopogon*
56. • *Faberia*
57. *Cicerbita*
58. *Melanoseris*
59. *Paraprenanthes*
60. *Notoseris*
61. *Lactuca*
62. *Launaea*
63. *Sonchus*
64. *Chondrilla*
65. *Crepis*
66. *Youngia*

67. *Lapsanastrum*
68. *Crepidiastrum*
69. *Heteracia*
70. *Garhadiolus*
71. *Taraxacum*
72. *Askellia*
73. *Ixeridium*
74. *Ixeris*
75. *Sonchella*
76. *Dubyaea*
77. • *Syncalathium*
78. *Hololeion*
79. *Nabalus*
80. *Soroseris*
81. *Hypochaeris*
82. *Picris*
83. *Cichorium*
84. *Hieracium*
85. *Pilosella*

6. Vernonieae (p. 354)

86. *Ethulia*
87. *Vernonia*
88. *Distephanus*
89. *Camchaya*
90. *Elephantopus*
91. *Pseudelephantopus*

7. Senecioneae (p. 371)

1. Tussilagininae

92. *Doronicum*
93. *Farfugium*
94. *Ligularia*
95. *Cremanthodium*
96. • *Sinacalia*
97. • *Dicercoclados*
98. *Parasenecio*
99. • *Ligulariopsis*
100. *Syneilesis*
101. *Tussilago*
102. *Petasites*

2. Tephroseridinae

103. *Sinosenecio*
104. *Tephroseris*
105. *Nemosenecio*

3. Senecioninae

106. *Synotis*
107. *Cissampelopsis*
108. *Senecio*
109. *Crassocephalum*
110. *Erechtites*
111. *Gynura*
112. *Emilia*
113. *Pericallis*
114. • *Hainanecio*

8. Astereae (p. 545)

115. *Nannoglottis*
116. *Dichrocephala*
117. *Cyathocline*
118. *Grangea*
119. *Myriactis*
120. *Thespis*
121. *Eschenbachia*
122. *Microglossa*
123. *Bellis*
124. *Tripolium*
125. *Galatella*
126. *Crinitina*
127. *Asterothamnus*
128. *Arctogeron*
129. *Turczaninovia*
130. *Lagenophora*
131. *Calotis*
132. *Callistephus*
133. • *Formania*
134. • *Heteroplexis*
135. *Psychrogeton*
136. *Neobrachyactis*
137. • *Sheareria*
138. *Rhinactinidia*
139. *Aster*
140. *Solidago*
141. *Erigeron*
142. *Eurybia*
143. *Grindelia*
144. *Symphyotrichum*

9. Anthemideae (p. 653)

145. *Cotula*
146. *Soliva*
147. *Ajania*
148. • *Ajaniopsis*
149. *Brachanthemum*
150. *Chrysanthemum*
151. *Artemisia*
152. *Seriphidium*
153. *Crossostephium*
154. *Filifolium*
155. *Neopallasia*
156. *Allardia*
157. *Cancrinia*
158. *Richteria*
159. *Handelia*
160. *Pseudohandelia*
161. *Hippolytia*
162. *Kaschgaria*
163. *Leucanthemella*
164. *Microcephala*
165. • *Opisthopappus*
166. *Stilpnolepis*
167. *Achillea*
168. *Anthemis*
169. *Tanacetum*
170. *Tripleurospermum*
171. *Matricaria*
172. *Glebionis*
173. *Leucanthemum*

10. Gnaphalieae (p. 774)

174. *Filago*
175. *Phagnalon*
176. *Gamochaeta*
177. *Leontopodium*
178. • *Sinoleontopodium*
179. *Antennaria*
180. *Gnomophalium*
181. *Gnaphalium*
182. *Anaphalis*
183. *Pseudognaphalium*
184. *Xerochrysum*
185. *Helichrysum*

11. Calenduleae (p. 819)

186. *Calendula*

12. Inuleae (p. 820)

187. *Buphthalmum*
188. *Carpesium*
189. *Pulicaria*
190. *Pentanema*
191. *Blumea*
192. *Inula*
193. *Duhaldea*
194. *Sphaeranthus*
195. *Pterocaulon*
196. *Epaltes*
197. *Pluchea*
198. *Karelinia*
199. *Laggera*
200. *Pseudoconyza*

13. Athroismeae (p. 851)

201. *Anisopappus*

14. Heliantheae (p. 852)

202. *Tagetes*
203. *Pectis*
204. *Flaveria*
205. *Glossocardia*
206. *Cosmos*
207. *Bidens*
208. *Coreopsis*
209. *Enydra*
210. *Acmella*
211. *Zinnia*
212. *Tridax*
213. *Galinsoga*
214. *Acanthospermum*
215. *Guizotia*
216. *Sigesbeckia*
217. *Smallanthus*
218. *Blainvillea*
219. *Synedrella*
220. *Calyptocarpus*
221. *Eleutheranthera*
222. *Eclipta*
223. *Clibadium*
224. *Sphagneticola*
225. *Melanthera*
226. *Wollastonia*
227. *Sclerocarpus*
228. *Lagascea*
229. *Rudbeckia*
230. *Tithonia*
231. *Helianthus*
232. *Xanthium*
233. *Ambrosia*
234. *Parthenium*
235. *Gaillardia*

15. Eupatorieae (p. 879)

236. *Ageratina*
237. *Mikania*
238. *Adenostemma*
239. *Gymnocoronis*
240. *Ageratum*
241. *Eupatorium*
242. *Austroeupatorium*
243. *Praxelis*
244. *Chromolaena*
245. *Conoclinium*

Genera incertae sedis (p. 892)

246. *Cavea*
247. *Centipeda*
248. *Symphyllocarpus*

Key to tribes

1a. Capitula of 2 kinds, either with only functionally male florets or with only female florets; flowering not precocious.
2a. Plants monoecious, with male and female capitula on same plant ..... 14. Heliantheae (p. 852)
2b. Plants dioecious, with male and female capitula on different plants.
3a. Leaves spiny ..... 3. Carlineae (*Tugarinovia*; p. 39)
3b. Leaves not spiny.
4a. Shrubs ..... 1. Mutisieae (*Myripnois*, rarely *Pertya*; p. 9)
4b. Herbs.
5a. Phyllaries papery; female florets filiform ..... 10. Gnaphalieae (*Antennaria*; p. 774)
5b. Phyllaries herbaceous; female florets tubular, apically 3- or 4-lobed ..... 246. *Cavea* (p. 892)
1b. Capitula all alike, homogamous or heterogamous, rarely plants subdioecious and then flowering precocious.
6a. Fertile achenes with conspicuous stipitate glands ..... 1. Mutisieae (*Adenocaulon*; p. 9)
6b. Fertile achenes without conspicuous stipitate glands.
7a. Capitula homogamous and all florets ligulate, i.e., corollas with an expanded abaxial, apically 5-toothed, 5-lobed, or 5-cleft limb; latex (milky juice) present ..... 5. Cichorieae (p. 195)
7b. Capitula heterogamous, or if homogamous then corollas tubular and 5-lobed or zygomorphic and pseudoligulate (5-lobed with one deeper cleft or sinus); plants without or rarely with latex.
8a. Capitula homogamous; corollas pseudoligulate, 5-lobed and zygomorphic.
9a. Capitula in bracteate glomerules; phyllaries 8, decussate; style branches long ..... 6. Vernonieae (*Elephantopus*, *Pseudelephantopus*; p. 354)
9b. Capitula not in bracteate glomerules; phyllaries not decussate; style branches very short or scarcely bilobed ..... 1. Mutisieae (*Ainsliaea*, *Pertya*; p. 9)
8b. Capitula heterogamous (marginal florets with a strap-shaped, entire or 2–4-toothed or 2–4-lobed outer limb) or homogamous and corollas 3–5-lobed, actinomorphic.
10a. Capitula with all or some florets bilabiate or pseudobilabiate (slightly zygomorphic) ..... 1. Mutisieae (*Gerbera*, *Leibnitzia*, *Nouelia*, *Piloselloides*; p. 9)
10b. Capitula lacking bilabiate florets.
11a. Capitula each with only 1 floret, aggregated into a terminal globose pseudocephalium; leaves spiny ..... 2. Echinopeae (p. 33)
11b. Capitula with more than 1 floret, or if with only 1 floret then leaves not spiny.
12a. Leaves at least below synflorescence opposite or mostly so.
13a. Style branch tips longer than stigmatic lines, prominent; capitula discoid; corollas never yellow ..... 15. Eupatorieae (p. 879)
13b. Style branch tips shorter than stigmatic lines, or absent; capitula radiate, disciform, or discoid; corollas often yellow ..... 14. Heliantheae (p. 852)
12b. Leaves all alternate.
14a. Style shaft and branches glabrous ..... 1. Mutisieae (*Leucomeris*; p. 9)
14b. Style shaft glabrous or with hairs or evident papillae in distal part and/or style branches with hairs or evident papillae abaxially or apically or on an apical appendage.
15a. Disk corollas 3- or 4-merous.
16a. Receptacle with scales ..... 248. *Symphyllocarpus* (p. 893)
16b. Receptacle without scales.
17a. Achenes dorsiventrally compressed, elliptic in cross section ..... 9. Anthemideae (p. 653)
17b. Achenes subterete, broadly ribbed ..... 247. *Centipeda* (p. 892)
15b. Disk corollas or all corollas 5-merous.
18a. Style shaft with a papillose-pilose thickening below branches; leaves spiny, at margin finely serrulate-spinulose, or not spiny.
19a. Achene densely hairy, capitula homogamous, plants biennial or perennial, and leaves never grasslike; pappus inserted directly on upper edge of achene, not surrounded by a rim ..... 3. Carlineae (p. 39)
19b. Achene glabrous or subglabrous, rarely densely hairy but then capitula radiant, plants annual, or leaves grasslike; pappus insertion surrounded by a ± conspicuous rim or crown ..... 4. Cardueae (p. 42)
18b. Style shaft without a papillose-pilose thickening below branches; leaves neither spiny nor at margin finely serrulate-spinulose.

20a. Achenes large, heteromorphic, outer cymbiform or curved, inner strongly curved to circular; receptacle epaleate; pappus absent ..... 11. Calenduleae (p. 819)
20b. Achenes small, columnar or compressed, straight or only slightly curved, homomorphic or only slightly heteromorphic, if large then receptacle paleate; pappus present or absent.
21a. Phyllaries rather dry, either with distinct scarious margin or papery, brownish, yellowish, or whitish, never herbaceous and green throughout.
22a. Anthers rounded at base; phyllaries with distinct pale or brownish scarious margin ..... 9. Anthemideae (p. 653)
22b. Anthers tailed at base; phyllaries papery, whitish, brownish, or yellowish, especially in distal part ..... 10. Gnaphalieae (p. 774)
21b. Phyllaries herbaceous, all or at least outer ones green throughout, except at very apex.
23a. Style branches long, slender, subulate, without an apical appendage, hairy abaxially and with stigmatic papillae over entire adaxial surface; capitula homogamous ..... 6. Vernonieae (p. 354)
23b. Style branches not with above combination of characters; capitula homogamous or heterogamous.
24a. Receptacle paleate.
25a. Achenes with a carbonized layer in pericarp, thereby black or streaked with black ..... 14. Heliantheae (p. 852)
25b. Achenes without a carbonized layer in pericarp, thereby usually not black.
26a. Phyllaries linear ..... 12. Inuleae (*Buphthalmum*; p. 820)
26b. Phyllaries broadly elliptic to oblanceolate ..... 13. Athroismeae (p. 851)
24b. Receptacle epaleate.
27a. Style branches terminating in a triangular to subulate appendage distal to stigmatic lines.
28a. Phyllaries uniseriate, but sometimes with an outer series of much shorter bracts (calyculus); involucre cylindric ..... 7. Senecioneae (p. 371)
28b. Phyllaries 2- to several seriate, if subuniseriate then involucre saucer-shaped to subglobose ..... 8. Astereae (p. 545)
27b. Style branches without an apical appendage distal to stigmatic lines, apically rounded or truncate.
29a. Phyllaries uniseriate, but sometimes with an outer series of much smaller bracts (calyculus); capitula never aggregated into a compact synflorescence ..... 7. Senecioneae (p. 371)
29b. Phyllaries 2- or 3-seriate or imbricate in several series; capitula sometimes aggregated into a compact synflorescence.
30a. Corolla bearing numerous robust uniseriate multicellular hairs ..... 246. *Cavea* (p. 892)
30b. Corolla without such hairs.
31a. Stigmatic papillae confined to 2 submarginal lines often confluent at apex ..... 12. Inuleae (p. 820)
31b. Stigmatic papillae covering entire adaxial surface of style branches ..... 7. Senecioneae (*Doronicum*; p. 371)

1. Tribe **MUTISIEAE**

帚菊木族 zhou ju mu zu

Gao Tiangang (高天刚), Chen Yousheng (陈又生); D. J. Nicholas Hind, Susana Edith Freire

Herbs, subshrubs, shrubs, trees, rarely climbers or ramblers, glabrous or with simple, glandular, malpighiaceous or stellate hairs, often glabrescent. Leaves usually evenly spaced, sometimes rosulate or densely spiraled, usually alternate, rarely opposite, lamina simple, variously shaped, usually herbaceous, venation trinervate, pinnate, sometimes parallel, or very rarely palmate, margin entire or lobed, serrate or denticulate, rarely spiny or pinnatisect, lamina rarely compound and paripinnate. Inflorescences scapose or scapiform, or synflorescences cymose or of corymbose or paniculate, axillary or terminal clusters, sometimes of glomerules, very rarely of pseudocephalia. Capitula small to very large, usually chasmogamous, very rarely cleistogamous, usually monoecious, homogamous or heterogamous, radiate, very rarely ligulate, rarely disciform or discoid, 1- to many flowered; involucres cylindric to globose or urceolate; phyllaries imbricate, few to many seriate, sometimes uniseriate, rarely calyculate, rarely distant, usually gradate, often papery or herbaceous, usually homomorphic; receptacles flat, convex or rarely conical, scrobiculate, foveolate, fimbrillate, or alveolate, glabrous or variously pubescent, usually epaleate. Florets rarely all actinomorphic, usually marginal and disk florets distinct; marginal florets usually variously bilabiate (2/3) or pseudobilabiate (1/4), and often distinctly radiate, sometimes ligulate (0/5), bisexual, female, or neuter, corollas glabrous or variously pubescent; staminodes rarely present; disk florets usually bilabiate (2/3), sometimes actinomorphic (5/0), usually fertile, corollas glabrous or variously pubescent, lobes short or long; stamens usually conspicuously exserted from corolla; filaments glabrous or rarely pubescent or papillate, antheropodia inconspicuous or sometimes distinct and variously enlarged or flattened; anther appendages usually acuminate or apiculate and several times as long as wide, sometimes thickened at apex and knoblike, sometimes truncate or rounded; anthers calcarate and caudate, rarely ecalcarate, tails usually long acute, entire or variously laciniate, sometimes conspicuously branched or pilose; styles usually well exserted from corolla and anther cylinder; style base sometimes with conspicuous nectary, with or without distinctive basal node, glabrous, style shaft usually glabrous, rarely papillose in upper part, style branches usually relatively short, apices acute, obtuse to rounded, or truncate and glabrous to papillose dorsally. Achenes fusiform or sometimes distinctly beaked, terete, ribbed or angled or very rarely flattened, glabrous or variously setuliferous, commonly with twin hairs, or rarely tomentose with long tortuous hairs, or appearing papillate, very rarely with stalked and sticky glands (*Adenocaulon*); carpopodium sometimes absent, more often usually a narrow annulus, sometimes cylindric; pappus sometimes absent but usually of uniseriate, sometimes biseriate to multiseriate, simple, barbellate, subplumose or plumose bristles, sometimes flattened or scalelike, persistent or deciduous, separate or sometimes basally connate.

About 80 genera and ca. 950 species: Africa, Asia, Australia, North and South America; nine genera (two endemic) and 73 species (50 endemic) in China.

Molecular evidence has proposed that a traditionally circumscribed Mutisieae is polyphyletic (Kim et al., Syst. Bot. 27: 598–609. 2002). The majority of the Mutisieae s.l. from China consists of *Ainsliaea*, *Myripnois*, and *Pertya*, and these genera form a distinct clade (recently recognized as the tribe Pertyeae) nested above the Cardueae and the African Mutisieae. *Gerbera* and its allies (*Leibnitzia* and *Piloselloides*) and *Adenocaulon* are nested in the Mutisieae s.s. clade along with other taxa mostly from South America. *Leucomeris* and *Nouelia* are apparently closely related to some South American Mutisieae, recently recognized as the tribe Hyalideae (Panero & Funk, Proc. Biol. Soc. Washington 115: 909–922. 2002; Panero & Funk, Molec. Phylogen. Evol. 47: 757–782. 2008). To allow easy comparison with FRPS, a conservative concept of the Mutisieae s.l. is followed in the treatment below.

Uechtritzia kokanica (Regel & Schmalhausen) Pobedimova (in Bobrov & Czerepanov, Fl. URSS 28: 597. 1963; *Gerbera kokanica* Regel & Schmalhausen, Izv. Imp. Obshch. Lyubit. Estestv. Moskovsk. Univ. 34(2): 53. 1882) was recorded from NW China by Pobedimova (loc. cit.) and H. V. Hansen (Nordic J. Bot. 8: 73. 1988). It is otherwise endemic to the Pamir-Altai and Tien Shan regions of C Asia, south to Afghanistan and Kashmir, at elevations of 1300–2000 m. It is not included in this treatment because no Chinese material could be traced.

1a. Shrubs or small trees; style branches glabrous.
2a. Capitula solitary; florets heteromorphic ..... 1. *Nouelia*
2b. Capitula in a dense terminal cyme or glomerule; florets homomorphic ..... 2. *Leucomeris*
1b. Shrubs, subshrubs, or perennial herbs; style branches with short hairs or papillae.
3a. Achenes apically stipitate glandular; pappus absent ..... 3. *Adenocaulon*
3b. Achenes never glandular; pappus usually present.
4a. Florets heteromorphic; perennial herbs.
5a. Dimorphic herbs, with two (vernal and autumnal) phases in one year ..... 4. *Leibnitzia*
5b. Monomorphic herbs, with only one phase in one year.
6a. Marginal female florets 1-seriate ..... 5. *Gerbera*
6b. Marginal female florets 2-seriate ..... 6. *Piloselloides*
4b. Florets homomorphic; shrubs or perennial herbs.
7a. Pappus of plumose bristles or sometimes absent; usually perennial herbs ..... 7. *Ainsliaea*
7b. Pappus of scabrid bristles; usually shrubs.
8a. Phyllaries many, more than 3-seriate, unequal ..... 8. *Pertya*
8b. Phyllaries few, 2- or 3-seriate, subequal ..... 9. *Myripnois*

1. NOUELIA Franchet, J. Bot. (Morot) 2: 66. 1888.

栌菊木属 lu ju mu shu

Gao Tiangang (高天刚); D. J. Nicholas Hind

Large shrubs to small trees. Leaves alternate, petiolate; leaf blade entire or minutely callosely serrulate. Capitula large, solitary, terminal, radiate, heterogamous; involucre campanulate; phyllaries multiseriate, leathery, imbricate, unequal; receptacle flat to convex, alveolate. Florets all bisexual, fertile; marginal florets uniseriate, bilabiate, outer lip 3-toothed to 3-lobed at apex, inner 2-lobed, lobes linear, revolute; central florets many, tubular or slightly bilabiate, deeply 5-lobed, regularly or slightly irregularly, lobes revolute; anther bases long tailed, apex appendaged; styles shallowly divided at apex, style branches short, glabrous, apices obtuse to rounded. Achene cylindric, ribbed, sericeous; pappus of scabrid bristles, numerous. $2n = 54$*.

• One species: China.

1. Nouelia insignis Franchet, J. Bot. (Morot) 2: 67. 1888.

栌菊木 lu ju mu

Large shrubs to small trees, 3–4 m. Leaves evenly alternate; petiole 2–4 cm; leaf blade oblong to elliptic, 8–26 × 3.5–12 cm, thinly leathery, abaxially tomentose, adaxially glabrous, base obtuse to rounded, margin minutely callosely serrulate, apex obtuse to acuminate. Capitula solitary, large, erect, terminal, radiate, ca. 5 cm in diam.; involucre 2–2.5 cm in diam.; phyllaries ca. 7-seriate, abaxially tomentulose, outer phyllaries shorter, ovate-triangular, 3–5 mm, median phyllaries oblong, ca. 1.5 cm, inner phyllaries lanceolate or linear, 2–2.5 cm. Marginal florets 1-seriate, corollas white, bilabiate, outer lip ca. 1.5 cm; central florets many, deeply 5-lobed, lobes ca. 8 mm; anther tails ca. 2 mm. Achenes 1.2–1.4 cm; pappus ca. 1.5 cm. Fl. Feb–Jun. $2n = 54$*.

• Forests, scrub, steep slopes in ravines; 1000–2900 m. SW Sichuan, Yunnan.

2. LEUCOMERIS D. Don, Prodr. Fl. Nepal. 169. 1825.

白菊木属 bai ju mu shu

Gao Tiangang (高天刚); D. J. Nicholas Hind

Shrubs or small trees. Leaves alternate, petiolate; leaf blade entire or sparsely serrulate. Capitula in a dense terminal cyme or in a dense many-headed terminal glomerule, homogamous; involucre obconic; phyllaries multiseriate, imbricate; receptacle flat. Florets few, all bisexual, fertile, tubular, corolla deeply 5-lobed, lobes equal or subequal, revolute; anther bases tailed, apex appendaged; styles shallowly divided at apex, style branches short, glabrous, apices obtuse. Achene cylindric, ribbed, sericeous; pappus of scabrid bristles, 2- or 3-seriate, outer shorter. $2n = 54$.

Two species: China, India, Myanmar, Nepal, Pakistan, Thailand, Vietnam; one species in China.

1. Leucomeris decora Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41: 317. 1872.

白菊木 bai ju mu

Gochnatia decora (Kurz) Cabrera.

Small trees, (1–)3–8(–10) m. Leaves alternate; petiole 1.5–4 cm; leaf blade elliptic or oblong-lanceolate, 6–26 × 2.5–10 cm, papery, abaxially tomentose, adaxially glabrate, base cuneate, often unequal, margin repand, with sparse minutely callose serrae, apex acute, obtuse, or mucronate. Capitula in a dense 6–14-headed terminal glomerule, 8–10 mm in diam.; involucre 4–7 mm in diam.; phyllaries 6–8-seriate, outer phyllaries ovate, shorter, 1.5–4 mm, lanuginous, median phyllaries broadly ovate or ovate-lanceolate, ca. 6 mm, sparsely lanuginous, inner phyllaries narrowly oblong or linear, 13–15 mm, glabrous. Hysteranthous florets 5–7, corollas white, deeply 5-lobed, lobes 7–8 mm; anther tails ca. 3 mm. Achenes 1–1.2 cm; pappus light red or straw-colored yellowish, 1.3–1.5 cm. Fl. Mar–Apr. $2n = 54$.

Forests, forest margins, scrub; 1000–1900 m. S and W Yunnan [Myanmar, Thailand, Vietnam].

3. ADENOCAULON Hooker, Bot. Misc. 1: 19. 1829.

和尚菜属 he shang cai shu

Chen Yousheng (陈又生); D. J. Nicholas Hind

Herbs, perennial, from creeping rhizomes, aerial stems usually proximally tomentose and distally stipitate glandular. Leaves simple, alternate, basal and cauline, petiolate (proximal) or sessile (distal); blades ovate to triangular or suborbicular, abaxially tomentose, adaxially glabrate, bases mostly truncate to cordate or hastate, margins coarsely dentate or lobulate to denticulate or entire. Synflorescences of lax panicles. Capitula disciform; involucre campanulate; phyllaries 5–7, 1- or 2-seriate, subequal, ovate to oblong, herbaceous, apices obtuse; receptacles convex, smooth, glabrous, epaleate. Marginal florets female, corollas white or ochroleucous, unequally and deeply 5-lobed; disk florets functionally male, corollas white or ochroleucous, 5-lobed, actinomorphic, corolla tube longer; anther basal appendages (relatively short) entire, apical appendages narrowly triangular; style undivided, style

branches papillate outside. Achenes clavate to obovoid, not beaked, obscurely ribbed, covered with stout red stipitate glands, glands densest in upper half, achenes of inner florets usually glabrous; carpopodium annular; pappus absent. $2n = 42, 46, 92$.

About five species: E Asia, Central, North, and South America; one species in China.

1. Adenocaulon himalaicum Edgeworth, Trans. Linn. Soc. London 20: 64. 1846.

和尚菜 he shang cai

Adenocaulon adhaerescens Maximowicz; *A. bicolor* Hooker var. *adhaerescens* (Maximowicz) Makino.

Herbs, perennial, from creeping rhizomes. Stems erect, 30–100 cm tall, arachnoid, with stipitate glands on upper portion. Leaves radical and cauline; radical leaves withering before flowering; lower leaf blade broadly ovate or reniform, 7–13 × 11–22 cm, whitish arachnoid abaxially, subglabrous adaxially, base deeply cordate, margin irregularly toothed, apex subacute or obtuse; petioles 10–20 cm, winged; median and upper leaves gradually smaller, winged petiolate; uppermost leaves broadly lanceolate, becoming bracteate. Capitula ca. 5 mm in diam.; peduncles 2–6 cm, stipitate glandular; involucre subglobose, ca. 2.5 × 5 mm; phyllaries 5–7, 1-seriate, ovate, 2.5–3 × 1.5–2.3 mm, reflexed after flowering; receptacle convex, glabrous. Marginal florets female, 6–12, corollas white, tubular, 1.1–1.5 mm, glabrous, 4- or 5-lobed at apex; disk florets male, 4–12(–22), corollas white, 1.7–2 mm, glabrous, 5-lobed at apex; anther connective rounded at apex, scarcely projecting. Achenes clavate-obovate, 6–7 mm, stipitate glandular. Fl. Jun–Aug, fr. Sep–Nov. $2n = 46$.

Forests, thickets, grassy slopes, streamsides; below 3400 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [India, Japan, Korea, Nepal, Russia].

4. LEIBNITZIA Cassini in F. Cuvier, Dict. Sci. Nat. 25: 420. 1822.

大丁草属 da ding cao shu

Gao Tiangang (高天刚); D. J. Nicholas Hind

Herbs, perennial. Leaves rosulate, appearing before or with first capitula; leaf blade entire, pinnatifid, or lyrate. Scapes 1–11, bracteate, slender throughout. Capitula terminal on scape, radiate, heterogamous, appearing twice (spring and autumn) in one year, dimorphic, chasmogamous or cleistogamous; involucres obconic, cylindric, or campanulate; phyllaries 3- or 4-seriate, imbricate; receptacles flat to slightly convex, foveolate to alveolate, glabrous, epaleate. Vernal florets chasmogamous, all fertile, marginal uniseriate, female, bilabiate, with obvious laminae, outer lip 3-toothed at apex, inner 2-lobed, lobes linear; central florets many, bisexual, bilabiate (tubular), laminae reduced. Autumnal florets cleistogamous, all fertile, marginal uniseriate, bilabiate (raylike), with obvious laminae, outer lip 3-toothed at apex, inner lobes strongly reduced; central florets many, bisexual, bilabiate, narrowly tubular, lobes very short, nearly actinomorphic; anther bases long tailed, apex appendages lanceolate; styles shallowly divided at apex, style branches short, abaxially pilose, apices rounded to truncate. Achenes fusiform, sometimes beaked, ribbed, strigose; pappus of fine bristles. $2n = 46$.

Six species: Bhutan, China, India, Japan, Korea, Nepal, Pakistan, Russia; Central and North America (Guatemala, Mexico, United States); four species in China.

1a. Pappus white to dark white or light brown, never violet-purple.
2a. Vernal capitula appearing simultaneously with leaves ..... 1. *L. anandria*
2b. Vernal capitula appearing shortly before leaves ..... 2. *L. pusilla*
1b. Pappus orange-colored to dark yellow or violet-purple, never white.
3a. Achenes rostrate ..... 3. *L. ruficoma*
3b. Achenes beakless ..... 4. *L. nepalensis*

1. Leibnitzia anandria (Linnaeus) Turczaninow in Schtscheglow, Ukaz. Otkryt. 8(1): 404. 1831.

大丁草 da ding cao

Tussilago anandria Linnaeus, Sp. Pl. 2: 865. 1753; *Anandria laevipes* Gandoger; *Gerbera anandria* (Linnaeus) Schultz Bipontinus; *G. anandria* var. *densifolia* Mattfeld; *G. anandria* var. *densiloba* Mattfeld; *G. anandria* var. *integripetala* (Hayata) Yamamoto; *G. bonatiana* (Beauverd) Beauverd f. *cavaleriei* (Vaniot & H. Léveillé) H. Léveillé; *G. cavaleriei* Vaniot & H. Léveillé; *G. integripetala* Hayata; *G. pterodonta* Y. C. Tseng; *Perdicium anandria* (Linnaeus) R. Brown; *P. tomentosum* Thunberg.

Herbs, perennial, dimorphic; rhizome covered by marcescent petiole. Vernal phase: leaves in basal rosette; petiole 2–4 cm, white lanuginous; leaf blade oblanceolate or obovate-oblong, 2–6 × 1–3 cm, papery, abaxially arachnoid lanate, adaxially subglabrous, base attenuate, obtuse, subtruncate, or shallowly cordate, margin denticulate, sinuate, runcinate, apex mucronate. Scapes 1 or tufted, 5–20 cm, arachnoid lanate; bracts many, subulate or linear, 6–7 mm. Capitula solitary, terminal, radiate, 1–1.5 cm in diam.; involucre obconic; phyllaries ca. 3-seriate, abaxially lanuginous, outer phyllaries linear, ca. 4 mm, inner phyllaries linear-lanceolate, ca. 8 mm. Marginal female florets bilabiate, outer lips oblong, adaxially white, abaxially pink, or both surfaces pink, 3–8 × 1–1.5 mm, inner lips filiform, 1.5–2 mm, coiled; central bisexual florets many, bilabiate, tubular, corolla 6–8 mm, outer lips oblong, ca. 3 mm, inner lips 2.5–3 mm. Achenes fusiform, 5–6 mm, hairy; pappus

dark white, 5–7 mm. Fl. Mar–Jul. Autumnal phase: leaves in basal rosette; petiole 2.5–8.5(–25) cm, arachnoid lignose; leaf blade ovate or ovate-lanceolate, 6–15 × 4–6.5 cm, papery, abaxially arachnoid lanate, adaxially subglabrous, base attenuate, subtruncate, or shallowly cordate, margin denticulate or sinuate, apex mucronate. Scapes 1 or tufted, 15–35 cm, arachnoid lanate; bracts many, subulate or linear, 1–1.5 cm. Capitula solitary, terminal, radiate, 1.5–2 cm in diam.; involucre campanulate; phyllaries ca. 3-seriate, abaxially lanuginous, outer phyllaries linear, 5–6 mm, inner phyllaries linear, 15–16 mm. Florets cleistogamous, closed, marginal florets female, 1-seriate, bilabiate, tubular, corolla ca. 8 mm; central bisexual florets many, bilabiate, tubular, corolla ca. 7 mm. Achenes fusiform, ca. 7 mm, hairy; pappus dark white, 11–12 mm. Fl. Aug–Nov. $2n = 46$.

Mountain slopes, summits, or valleys; 600–2600 m. Throughout China except Xinjiang and Xizang [Japan, Korea, Russia (Sakhalin, Siberia)].

This is a very variable species, especially in the leaf morphology.

2. Leibnitzia pusilla (Candolle) S. Gould in H. Hara et al., Enum. Fl. Pl. Nepal 3: 33. 1982.

灰岩大丁草 hui yan da ding cao

Oreoseris pusilla Candolle, Prodr. 7: 17. 1838; *Gerbera anandria* (Linnaeus) Schultz Bipontinus var. *bonatiana* Beauverd; *G. bonatiana* (Beauverd) Beauverd; *G. lanuginosa* (Candolle) Schultz Bipontinus var. *pusilla* (Candolle) J. D. Hooker; *G. lijiangensis* Y. C. Tseng, p.p. maj.; *G. pusilla* (Candolle) Schultz Bipontinus; *G. saxatilis* C. C. Chang ex Y. C. Tseng; *G. serotina* Beauverd; *Leibnitzia bonatiana* (Beauverd) Kitamura; *L. serotina* (Beauverd) Kitamura.

Herbs, perennial, dimorphic; rhizome covered by marcescent leaf sheath. Vernal phase: leaves in rosette, appearing after capitula, subsessile; leaf blade lanceolate, to 12 × 5 mm, papery, abaxially arachnoid lanate, adaxially glabrous, base attenuate or subtruncate, margin denticulate, repand, or runcinate, apex obtuse, rounded, or mucronate. Scapes 1 or tufted, 3–12 cm, arachnoid lanate; bracts many, narrowly lanceolate, 3–6 mm. Capitula solitary, terminal, radiate, 0.8–1.2 cm in diam.; involucre broadly campanulate; phyllaries ca. 3-seriate, oblong, abaxially lanuginous, outer phyllaries ca. 4 mm, inner phyllaries 8–11 mm. Marginal female florets bilabiate, outer lips oblong, ca. 5 mm, inner lips filiform, ca. 4 mm; central bisexual florets many, bilabiate, tubular, corolla 4.5–7 mm. Achenes terete, 3–6 mm, pubescent; pappus white or dark white, 4–6 mm. Fl. Apr–Jun. Autumnal phase: leaves in rosette, appearing after capitula; petiole 1.5–3.5 cm, lanuginous; leaf blade elliptic-oblong or ovate, 3–10 × 1.5–3.5 cm, base subcordate, subtruncate, or attenuate, margin sinuate or crenate, apex rounded or obtuse. Scapes 1 or tufted, 10–30 cm, lanuginous; bracts many, subulate, linear or filiform, 1–2 cm. Capitula solitary, terminal, ca. 2 cm in diam.; involucre campanulate; phyllaries 3- or 4-seriate, outer phyllaries subulate to linear, 7–13 mm, inner phyllaries lanceolate to oblong or filiform, 1.4–2 cm. Florets cleistogamous, closed, marginal florets female, 1-seriate, bilabiate, tubular, corolla 4–13 mm; central bisexual florets many, bilabiate, tubular, as long as female floret. Achenes fusiform, 6–7 mm; pappus dark white, 9–11 mm. Fl. Jul–Oct.

Forests, on rocks; 2400–3600 m. Guizhou, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, Nepal].

3. Leibnitzia ruficoma (Franchet) Kitamura, J. Jap. Bot. 14: 297. 1938.

红缨大丁草 hong ying da ding cao

Gerbera ruficoma Franchet, J. Bot. (Morot) 2: 68. 1888.

Herbs, perennial, dimorphic. Vernal phase: no specimens in good state were seen; most specimens are in autumnal phase. Autumnal phase: leaves in rosette, rhizome covered by marcescent fibrous leaf sheath; petiole 4–6 cm, narrowly winged, ± lanuginous; leaf blade oblong or spatulate-oblong, 7–11 × 2–3.5 cm, papery, abaxially densely white lanuginous, adaxially glabrescent, base attenuate, decurrent, margin undulate-runcinate, apex rounded or obtuse. Scapes 1 or sometimes 2, 30–52 cm, arachnoid lanuginous; bracts subulate, 0.5–2 cm. Capitula solitary, terminal, ca. 2 cm in diam.; involucre campanulate; phyllaries 2- or 3-seriate, outer phyllaries linear-subulate, 5–7 mm, inner phyllaries linear, ca. 2.2 cm. Florets cleistogamous, closed, marginal florets female, 1-seriate, bilabiate, outer lips oblong, ca. 1.5 mm, inner lips filiform, reduced; central bisexual florets many, bilabiate, tubular, corolla ca. 5 mm. Achenes fusiform, attenuate into long beak at apex, ca. 9 mm (including beak), pilose, ribbed; pappus orange-colored to dark yellow, ca. 9 mm. Fl. Aug–Sep.

Pinus forests, mountain slopes; 2200–2500 m. Sichuan, Xizang, Yunnan [Bhutan, Nepal].

4. Leibnitzia nepalensis (Kunze) Kitamura, J. Jap. Bot. 14: 297. 1938.

尼泊尔大丁草 ni bo er da ding cao

Cleistanthium nepalense Kunze, Bot. Zeitung (Berlin) 9: 350. 1851; *Gerbera connata* Y. C. Tseng; *G. curvisquama* Handel-Mazzetti; *G. kunzeana* A. Braun & Ascherson; *G. lijiangensis* Y. C. Tseng, p.p. min.; *Leibnitzia kunzeana* (A. Braun & Ascherson) Pobedimova.

Herbs, perennial, dimorphic; rhizome covered by marcescent leaf sheath. Vernal phase: puny, leaves in rosette, rhizome covered by marcescent fibrous leaf sheath; petiole 2–4 cm; leaf blade ovate, 0.8–2 × 1–1.5 cm, papery, abaxially densely white lanuginous, adaxially glabrous, base truncate or slightly decurrent, margin sparsely denticulate, apex rounded or mucronate. Scapes 1 or tufted, 4.5–7 cm, arachnoid; bracts 2 or 3, subulate, ca. 5 mm. Capitula solitary, terminal, ca. 1 cm in diam.; involucre campanulate; phyllaries ca. 3-seriate, outer phyllaries lanceolate, 4–5 mm, inner phyllaries ovate, 9–10 mm. Florets chasmogamous, marginal female florets 1-seriate, bilabiate, outer lips ovate-lanceolate to oblong, ca. 4.5 mm, inner lips filiform, reduced; central bisexual florets many, bilabiate, tubular. Achenes (immature) terete, ca. 6 mm, sparsely pubescent, ribbed; pappus dark purple, ca. 4 mm. Fl. Jun–Jul. Autumnal phase: larger than vernal phase, leaves in rosette, rhizome covered by marcescent fibrous leaf sheath; petiole 5–7 cm, ± lanuginous; leaf blade spatulate to oblong or lyrate, 6–7 × 2–3 cm, papery, abaxially white lanuginous, adaxially glabrous,

base decurrent, margin crenate or undulate, apex rounded or mucronate. Scapes 1 or tufted, 6–35 cm, lanuginous; bracts linear-subulate, ca. 2 cm. Capitula solitary, terminal, ca. 2 cm in diam.; involucre campanulate; phyllaries 3-seriate, outer phyllaries linear-subulate, ca. 6 mm, inner phyllaries oblong, 1.3–2.2 cm. Florets cleistogamous, closed, marginal florets female, 1-seriate, bilabiate, outer lips oblong, ca. 1 mm, inner lips filiform, reduced; central bisexual florets many, bilabiate, tubular, corolla as long as female florets. Achenes fusiform, ca. 5 mm, pilose, apex tapering; pappus violet-purple, 6–7 mm. Fl. Jul–Sep.

Grassy open areas, scrub, forest margins; 3200–4600 m. Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Pakistan].

5. GERBERA Linnaeus, Opera Var. 247. 1758, nom. cons.

火石花属 huo shi hua shu

Gao Tiangang (高天刚); D. J. Nicholas Hind

Berniera Candolle; *Lasiopus* Cassini; *Oreoseris* Candolle.

Herbs, perennial, rhizomatous. Leaves rosulate; leaf blade oblanceolate, oblong, obovate, ovate, or subcircular, papery, herbaceous, or leathery, serrulate, dentate, repand, pinnatilobate, pinnatifid, or pinnatisect. Scapes 1, rarely many, slender, ebracteate or with few to many bracts. Capitula terminal, radiate, heterogamous, chasmogamous; involucres obconic to broadly campanulate; phyllaries multiseriate, imbricate; receptacles flat, alveolate, glabrous, epaleate. Florets all fertile, marginal uniseriate, female, bilabiate, outer female florets with obvious limbs, rarely tubular (*Gerbera maxima*), outer lip 3-denticulate at apex, inner deeply 2-lobed, lobes filiform, coiled; central florets numerous, bisexual, bilabiate, outer lips 3-toothed at apex, inner deeply 2-lobed; anther bases long tailed, apex appendaged; styles shallowly divided at apex, style branches short, abaxially pilose, apices obtuse, rounded, or subacute. Achenes terete or fusiform, ribbed, pilose or glabrous; pappus of scabrid bristles. $2n = 46, 50$.

About 30 species: Africa, Asia; seven species (four endemic) in China.

There are no species of *Gerbera* in South America. The position of *G. hieracioides* (Kunth) Zardini is disputed. Based on *Onoseris hieracioides* Kunth, it probably belongs in *Leibnitzia* (known from both Asia and Central and North America) or *Chaptalia* Ventenat, having previously been transferred to *Trichocline* Cassini, as *T. hieracioides* (Kunth) Ferreyra.

Gerbera jamesonii Bolus is cultivated in China.

1a. Outer female florets without obvious limbs, tubular ..... 1. *G. maxima*
1b. Outer female florets with obvious limbs.
2a. Capitula nodding; scapes ebracteate or 1- or 2-bracteate; achenes glabrous.
3a. Outer phyllaries ca. 1 mm wide, innermost ca. 3 mm wide, apices acuminate; outer lips of female florets narrow, 3–4 mm wide; staminode apices erect ..... 2. *G. nivea*
3b. Outer phyllaries ca. 2.5 mm wide, innermost 6–7 mm wide, apices mucronate; outer lips of female florets wide, 6–8 mm wide; staminode apices hamate ..... 3. *G. latiligulata*
2b. Capitula erect; scapes multibracteate; achenes pilose.
4a. Phyllary apices acute, acuminate, or mucronate.
5a. Leaf blade and petiole glabrous ..... 4. *G. raphanifolia*
5b. Leaf blade abaxial surface densely lanuginous, petiole arachnoid lanate ..... 5. *G. delavayi*
4b. Phyllary apices rounded or obtuse.
6a. Leaf blade ovate-oblong to oblong, 17–29 cm, 7–14 cm wide; involucre 4.5–5 cm in diam., phyllaries obviously unequal, apices green, mucronate or subobtuse, innermost oblong ..... 6. *G. rupicola*
6b. Leaf blade broadly ovate or suborbicular, equally wide and long, 5–10 cm; involucre ca. 2.5 cm in diam., phyllaries subequal, apices rufous, rounded ..... 7. *G. tanantii*

1. Gerbera maxima (D. Don) Beauverd, Bull. Soc. Bot. Genève 2: 44. 1910.

箭叶火石花 jian ye huo shi hua

Chaptalia maxima D. Don, Prodr. Fl. Nepal. 166. 1825; *Berniera nepalensis* Candolle, nom. illeg. superfl.; *Gerbera macrophylla* Wallich ex C. B. Clarke, nom. illeg. superfl.; *G. nepalensis* Schultz Bipontinus, nom. illeg. superfl.

Herbs, perennial; rhizome lanuginous. Leaves in basal rosette; petiole 19–30 cm, lanuginous; leaf blade ovate-lanceolate, 11–20 × 5–9 cm, sometimes with few small lobes at base, papery, abaxially densely white lanuginous, adaxially glabrous, base cordate-sagittate, margin irregularly denticulate, apex acuminate. Scapes 1 or 2, ca. 43 cm or longer, ebracteate, lanuginous. Capitula solitary, terminal, radiate, 2.5–3 cm in diam.; involucre broadly campanulate; phyllaries ca. 4-seriate, outer phyllaries linear-subulate, ca. 1 cm, inner phyllaries linear, ca. 2 cm. Marginal female florets bilabiate, tubular, corolla ca. 8 mm, inner lips oblong, ca. 4 mm; central bisexual florets many, bilabiate, tubular, corolla ca. 8 mm. Achenes (immature) ca. 8 mm, subglabrous, ribbed; pappus whitish tawny, ca. 1 cm. Fl. Aug–Sep.

Forest margins; ca. 2300 m. Xizang [Bhutan, India, Nepal, Pakistan, Thailand].

2. Gerbera nivea (Candolle) Schultz Bipontinus, Flora 27: 780. 1844.

白背火石花 bai bei huo shi hua

Oreoseris nivea Candolle, Prodr. 7: 18. 1838.

Herbs, perennial; rhizome glabrous. Leaves in basal rosette; petiole 1–4 cm, lanuginous; leaf blade obovate-spatulate, 3.5–9 × 1–2.7 cm, papery, abaxially gray lanuginous, adaxially glabrous, base attenuate, margin pinnatilobate to pinnatisect, apex obtuse to acuminate. Scapes 15–25 cm, arachnoid lanate; bracts absent or 1 or 2, subulate, ca. 1 cm. Capitula solitary, nodding, terminal, radiate, 2.5–3 cm in diam.; involucre campanulate; phyllaries 4-seriate, outer phyllaries subulate, ca. 1 cm × 1 mm, base lanuginous, innermost phyllaries oblong-lanceolate, ca. 2 cm × 3 mm. Marginal female florets bilabiate, outer lips light red, long elliptic, 14–15 × 3–4 mm, inner lips ca. 8 mm, coiled, staminode apices erect; central bisexual florets many, bilabiate, corolla ca. 1.1 cm. Achenes terete, ca. 3 mm, glabrous, multiribbed; pappus 8–10 mm. Fl. Aug–Sep.

Alpine meadows, forest margins; 3300–4100 m. W Sichuan, S Xizang, NW Yunnan [Bhutan, India, Nepal].

3. Gerbera latiligulata Y. C. Tseng, Acta Bot. Austro Sin. 3: 11. 1986.

阔舌火石花 kuo she huo shi hua

Herbs, perennial; rhizome glabrous. Leaves in basal rosette; petiole 3–7 cm, subglabrous; leaf blade obovate-lanceolate or obovate-oblong, 5–9 × 1.5–2 cm, papery, abaxially gray lanuginous, adaxially glabrous, base attenuate, margin pinnatilobate, apex obtuse to acuminate. Scapes 10–25 cm, arachnoid lanate; bracts 1 or 2, linear, ca. 1 cm. Capitula solitary, nodding, terminal, radiate, ca. 4 cm in diam.; involucre broadly campanulate; phyllaries 4-seriate, arachnoid lanate at least at apices, outer phyllaries lanceolate, 0.8–1 cm × ca. 2.5 mm, innermost phyllaries oblong-lanceolate, 2–2.5 cm × 6–7 mm. Marginal female florets bilabiate, outer lips light yellow, elliptic, 18–20 × 6–8 mm, inner lips ca. 1.2 cm, coiled, staminode apices hamate; central bisexual florets many, bilabiate, corolla ca. 1.3 cm. Achenes fusiform, ca. 5 mm, glabrous, multiribbed; pappus yellow-white, 8–10 mm. Fl. Sep.

• Rock fissures. Yunnan (Qiaojia).

4. Gerbera raphanifolia Franchet, J. Bot. (Morot) 2: 67. 1888.

光叶火石花 guang ye huo shi hua

Herbs, perennial; rhizome fulvous lanuginous. Leaves in basal rosette; petiole 10–15 cm, glabrous; leaf blade oblong or oblong-lanceolate, 15–27 × 6–11 cm, papery, both surfaces glabrous, base attenuate, margin runcinate, apex mucronate. Scapes 30–62 cm, arachnoid lanate; bracts many, subulate, 1–1.5 cm. Capitula solitary, erect, terminal, radiate, 2.5–4 cm in diam.; involucre campanulate; phyllaries 4- or 5-seriate, outer phyllaries linear, ca. 8 mm, sparsely tomentose, inner phyllaries oblong, 1.6–1.9 cm, glabrous. Marginal female florets bilabiate, outer lips light red, strap-shaped, ca. 13 × 2.5 mm, inner lips 6–8 mm; central bisexual florets many, white, bilabiate. Achenes terete, ca. 5 mm, pilose; pappus brownish, ca. 1.2 cm. Fl. Oct–Nov.

• Forests; ca. 2700 m. NW Yunnan.

5. Gerbera delavayi Franchet, J. Bot. (Morot) 2: 68. 1888.

火石花 huo shi hua

Herbs, perennial; rhizome white lanuginous. Leaves in basal rosette; petiole 1.5–7 cm, arachnoid lanate; leaf blade lanceolate, oblong-lanceolate, or ovate-oblong to ovate, 6–16 × 3–10 cm, leathery, abaxially white lanuginous, adaxially glabrescent, base truncate or subcordate, margin repand, apex obtuse or mucronate. Scapes many, sometimes solitary, 10–45 cm, arachnoid lanate; bracts many, linear-subulate or subulate, 0.5–1.5 cm. Capitula solitary, erect, terminal, radiate, 2–3.5 cm in diam.; involucre turbinate-campanulate; phyllaries 4- or 5-seriate, outer phyllaries subulate, 6–15 mm, inner phyllaries lanceolate, 1.5–4.5 cm. Marginal female florets bilabiate, outer lips light red, oblong to narrowly elliptic, 13–15 × 3–3.5 mm, inner lips 8–9 mm; central bisexual florets many, bilabiate, corolla 1–1.5 cm. Achenes terete, 3–3.5 mm, pilose, ribbed; pappus yellow-white, 1–1.3 cm. Fl. Oct–Apr.

Open places, mountain slopes, forest margins, forests; 1800–3200 m. Guizhou, Sichuan, Yunnan [N Vietnam].

1a. Leaf blade lanceolate or oblong-lanceolate ..... 5a. var. *delavayi*

1b. Leaf blade ovate to ovate-oblong ..... 5b. var. *henryi*

5a. Gerbera delavayi var. **delavayi**

火石花(原变种) huo shi hua (yuan bian zhong)

Gerbera uncinata Beauverd.

Leaf blade lanceolate or oblong-lanceolate. Fl. Nov–Feb.

Open places, mountain slopes, forest margins; 1800–3200 m. Sichuan, Yunnan [N Vietnam].

5b. Gerbera delavayi var. **henryi** (Dunn) C. Y. Wu & H. Peng, Acta Bot. Yunnan. 24: 143. 2002.

蒙自火石花 meng zi huo shi hua

Gerbera henryi Dunn, J. Linn. Soc., Bot. 35: 511. 1903.

Leaf blade ovate to ovate-oblong.

• Mountain slopes, forest margins, forests; 1800–3200 m. Guizhou, Yunnan.

6. Gerbera rupicola T. G. Gao & D. J. N. Hind, **nom. nov.**

巨头火石花 ju tou huo shi hua

Replaced synonym: *Gerbera macrocephala* Y. C. Tseng, Acta Bot. Austro Sin. 3: 12. 1986, not *Gerbera macrocephala* Lessing, Linnaea 5: 295. 1830.

Herbs, perennial. Leaves in basal rosette; petiole 5–10 cm, white lanuginous; leaf blade ovate-oblong or oblong, 17–29 × 7–14 cm, papery, abaxially densely lanuginous, adaxially lanuginous, base cordate, margin repand, apex mucronate. Scapes solitary, 17–40 cm, densely white lanuginous; bracts many, subulate, ca. 1.3 cm, abaxially lanuginous. Capitula solitary, erect, terminal, radiate, 5.5–7 cm in diam.; involucre broadly campanulate, 4.5–5 cm in diam.; phyllaries 4- or 5-

seriate, densely white lanuginous, apices green, mucronate or subobtuse, outer phyllaries lanceolate, 4–6 mm, inner phyllaries oblong, 1.5–2 cm. Marginal female florets bilabiate, white, outer lips rounded to narrowly elliptic, 22–24 × 5–6 mm, inner lips 13–15 mm; central bisexual florets many, bilabiate, corolla ca. 2.1 cm. Achenes (immature) terete, ca. 6 mm, densely villous; pappus light yellow, ca. 1.6 cm. Fl. Mar–Apr.

• Steep cliffs in gorges. NW Yunnan (Lijiang, Zhongdian).

7. Gerbera tanantii Franchet, J. Bot. (Morot) 7: 155. 1893.

钝苞火石花 dun bao huo shi hua

Herbs, perennial. Leaves in basal rosette; petiole longer than blade; leaf blade suborbicular, 5–10 × 5–10 cm, thickly papery, abaxially densely lanuginous, base broadly cordate, margin sinuate, apex obtuse or mucronate. Scapes 30–40 cm; bracts lanceolate. Capitula solitary, terminal, radiate; involucre ca. 2.5 cm in diam.; phyllaries 4-seriate, subequal, abaxially lanuginous, apices rounded and rufous. Marginal female florets bilabiate, corolla ca. 3 cm; central bisexual florets bilabiate. Achenes (immature) hairy; pappus white. Fl. unknown.

• Yunnan.

6. PILOSELLOIDES (Lessing) C. Jeffrey ex Cufodontis, Bull. Jard. Bot. Natl. Belg. 37(3, Suppl.): 1180. 1967.

兔耳一枝箭属 tu er yi zhi jian shu

Gao Tiangang (高天刚); D. J. Nicholas Hind

Gerbera sect. *Piloselloides* Lessing, Linnaea 5: 296. 1830.

Herbs, perennial. Leaves rosulate; leaf blade obovate to oblong, entire. Synflorescence scapose, 1 to many per plant, ebracteate, expanded below capitula. Capitula terminal, radiate, heterogamous, chasmogamous; phyllaries 2-seriate; receptacles flat, alveolate, glabrous, epaleate. Florets all fertile, marginal 2-seriate, female, bilabiate, outer series with obvious limb, outer lip 3-denticulate at apex, inner shallowly 2-lobed, lobes filiform, coiled, inner female florets tubular, without obvious limb, outer lip 3-toothed at apex, inner deeply 2-lobed; central florets numerous, bisexual, bilabiate (tubular), outer lips 3-toothed at apex, inner deeply 2-lobed; anther bases long tailed, apex appendages truncate; styles shallowly divided at apex, style branches short, papillose. Achenes fusiform, long beaked, ribbed, finely bristly; pappus of fine bristles.

Two species: Africa, Asia, Australia; one species in China.

1. Piloselloides hirsuta (Forsskål) C. Jeffrey ex Cufodontis, Bull. Jard. Bot. Natl. Belg. 37(3, Suppl.): 1180. 1967.

兔耳一枝箭 tu er yi zhi jian

Arnica hirsuta Forsskål, Fl. Aegypt.-Arab. 151. 1775; *A. piloselloides* Linnaeus; *Gerbera amabilis* Hance; *G. hirsuta* (Forsskål) Lessing; *G. ovalifolia* Candolle; *G. piloselloides* (Linnaeus) Cassini.

Herbs, perennial; rhizome covered by marcescent petiole. Leaves in basal rosette; petiole 1–7.5 cm, lanuginous; leaf blade obovate, obovate-oblong, or oblong, rarely ovate, 6–16 × 2.5–5.5 cm, papery, abaxially densely white arachnoid lanuginous, adaxially glabrate, base attenuate or obtuse, margin entire, ciliate, apex rounded. Scapes solitary or tufted, 15–30(–45) cm, densely tomentose, ebracteate. Capitula solitary, terminal, radiate, 2.5–4 cm in diam.; involucre disciform; phyllaries 2-seriate, linear or linear-lanceolate, outer phyllaries 8–11 mm, inner phyllaries 1.4–4.8 cm. Marginal florets 2-seriate, female, bilabiate, outer female florets with obvious limbs, corolla 1.6–1.8 cm, outer lip oblanceolate or spatulate-oblong, 3-denticulate at apex, inner shallowly 2-lobed, lobes filiform, coiled, inner female florets tubular, without obvious limbs, corolla 1–1.2 cm; central florets many, bisexual, bilabiate (tubular), corolla ca. 1.2 cm. Achenes fusiform, 4.5–6.5 mm, finely bristly, ribbed, long beaked, beak 7–8 mm, glabrous; pappus mandarin-red or brownish, ca. 1.1 cm. Fl. Feb–May and Aug–Dec.

Grassy open areas, forest margins, disturbed sites; 900–2400 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Xizang, Yunnan, Zhejiang [India, Indonesia, Japan, Laos, Myanmar, Nepal, Thailand, Vietnam; Africa, Australia].

7. AINSLIAEA Candolle, Prodr. 7: 13. 1838.

兔儿风属 tu er feng shu

Gao Tiangang (高天刚); Susana Edith Freire, D. J. Nicholas Hind

Diaspananthus Miquel.

Herbs, perennial, rarely subshrubs. Leaves alternate, often in basal rosettes or densely aggregated near median part of stems; blade linear, ovate, elliptic, or orbicular, margin entire, crenate, denticulate, dentate, or lobed. Capitula many in spikes, racemes, or panicles, sometimes nodding, radiate or discoid, homogamous; involucres cylindric; phyllaries often multiseriate, imbricate; receptacle small, glabrous, epaleate. Florets few, (1–)3(–5), bisexual, all fertile, chasmogamous or cleistogamous; chasmogamous corollas open, deeply irregularly 5-lobed, one of slits much longer than others, lobes linear, reflexed and usually coiled; cleistogamous corolla (if present) closed, tubular, shorter than pappus; anther bases long tailed, apex appendages truncate to rounded, sometimes apiculate; styles shallowly divided at apex, style branches short, abaxially with papillae, apices obtuse to acute, rounded, or truncate. Achenes

terete or fusiform, ribbed, glabrous or pilose; pappus of plumose bristles or sometimes absent in chasmogamous florets, usually uniseriate, more rarely biseriate. $2n = 24, 26$.

About 50 species: Afghanistan, Bangladesh, Bhutan, China, India, Indonesia, Japan, Korea, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam; 40 species (28 endemic) in China; one additional species is incompletely known.

See the revision of *Ainsliaea* by Freire (Ann. Missouri Bot. Gard. 94: 79–191. 2007).

1a. Subshrubs; stems much branched ..... 1. *A. pertyoides*
1b. Perennial herbs; stems not branched.
2a. Leaves aggregated near or toward median part of stem or above basal part of stem.
3a. Capitula 1-flowered ..... 2. *A. lancangensis*
3b. Capitula 2–4-flowered.
4a. Leaves lobed.
5a. Leaf blade shallowly pinnately lobed ..... 3. *A. grossedentata*
5b. Leaf blade palmately lobed.
6a. Leaf blade 5–14 × 5.5–18 cm, shallowly 5–7-lobed ..... 4. *A. acerifolia*
6b. Leaf blade (1–)2.5–3.5 × (1–)2–3 cm, deeply lobed with apical lobe elongated ..... 5. *A. apiculata*
4b. Leaves not lobed.
7a. Leaf blade linear to elliptic or lanceolate (0.3–1.3 cm wide).
8a. Leaf blade linear to elliptic, 3–7 mm wide, apex acute, 1-veined ..... 6. *A. walkeri*
8b. Leaf blade lanceolate, 5–13 mm wide, apex acuminate, 3-veined ..... 7. *A. trinervis*
7b. Leaf blade lanceolate or ovate (1–12 cm wide).
9a. Petiole winged ..... 8. *A. foliosa*
9b. Petiole wingless.
10a. Leaf blade lanceolate, attenuate at base ..... 7. *A. trinervis*
10b. Leaf blade ovate, rounded or cordate at base.
11a. Petiole densely strigose or villous.
12a. Capitula usually in spikes; florets 3 ..... 9. *A. fragrans*
12b. Capitula in panicles; florets 3 or 4 ..... 10. *A. asaroides*
11b. Petiole glabrous.
13a. Leaf blade 2–3.5(–7) cm, usually caerulescent, caerulescent-purple, or purplish green abaxially ..... 11. *A. gracilis*
13b. Leaf blade usually more than 4 cm, green abaxially.
14a. Achenes glabrous or pilose above; leaf margin entire to shallowly denticulate ..... 12. *A. kawakamii*
14b. Achenes pilose; leaf margin usually dentate.
15a. Leaves aggregated near median part of stem ..... 13. *A. macroclinidioides*
15b. Leaves above basal part of stem.
16a. Petiole broadly winged, leaf blade margin obscurely denticulate ..... 14. *A. smithii*
16b. Petiole wingless, leaf blade margin dentate ..... 15. *A. aptera*
2b. Leaves in basal rosette (rarely specimens with leaves above stem base in *A. apteroides*).
17a. Leaf blade uniformly narrowed at base ..... 16. *A. mairei*
17b. Leaf blade abruptly narrowed into petiole.
18a. Leaves shortly petiolate (petioles 4–10 mm).
19a. Leaf blade lanceolate; achenes glabrous ..... 17. *A. caesia*
19b. Leaf blade obovate to pandurate; achenes pilose ..... 18. *A. spicata*
18b. Leaves long petiolate (petioles more than 10 mm).
20a. Petiole wholly winged (more than 1.5 mm wide at upper point) or winged in upper half.
21a. Leaf base cordate ..... 19. *A. bonatii*
21b. Leaf base rounded or attenuate.
22a. Involucre 12–18 mm.
23a. Anther appendages truncate; phyllaries and leaves pilose ..... 20. *A. macrocephala*
23b. Anther appendages apiculate; phyllaries and leaves glabrous ..... 21. *A. qianiana*
22b. Involucre less than 10 mm (occasionally equal to 10 mm).
24a. Leaf margin straight, leaf base rounded, petiole wholly winged ..... 22. *A. latifolia*
24b. Leaf margin wavy, leaf base cuneate and commonly decurrent into petiole, petiole winged in upper half.
25a. Achenes glabrous or apically pilose ..... 23. *A. henryi*
25b. Achenes pilose ..... 24. *A. reflexa*

20b. Petiole wingless (leaf blade cuneate in *A. glabra*, *A. nervosa*, and *A. yunnanensis*).
26a. Leaf margin dentate, blade obtuse to rounded at apex, discolorous, adaxial surface lanuginous and abaxial surface white tomentose ..... 25. *A. crassifolia*
26b. Leaf margin entire to denticulate.
27a. Leaf base cordate.
28a. Capitula 2-flowered ..... 26. *A. elegans*
28b. Capitula 3(or 4)-flowered.
29a. Petiole lanuginous or glabrous.
30a. Leaf blade 50–80 mm, apex acute to acuminate ..... 27. *A. apteroides*
30b. Leaf blade less than 20 mm, apex acute or obtuse.
31a. Leaf blade ovate, 7–16 × 5–10 mm; achenes glabrous ..... 28. *A. nana*
31b. Leaf blade deltate, 10–15 × 10–15 mm; achenes pilose ..... 29. *A. paucicapitata*
29b. Petiole densely strigose.
32a. Anther appendages emarginate; achenes pilose above ..... 9. *A. fragrans*
32b. Anther appendages apiculate; achenes pilose.
33a. Phyllaries apically pilose ..... 30. *A. cavaleriei*
33b. Phyllaries glabrous.
34a. Leaf blade ± concolorous ..... 31. *A. ramosa*
34b. Leaf blade abaxially whitish green, veins red ..... 32. *A. rubrinervis*
27b. Leaf base rounded or cuneate.
35a. Petiole densely strigose.
36a. Leaf blade elliptic ..... 33. *A. angustata*
36b. Leaf blade oblong to elliptic.
37a. Leaf blade 8–12 cm ..... 34. *A. pingbianensis*
37b. Leaf blade 3–7.5 cm ..... 35. *A. fulvipes*
35b. Petiole lanuginous or glabrous.
38a. Leaf blade elliptic, slightly fleshy, glabrous to subglabrous.
39a. Leaf blade broadly elliptic, (2–)3.5–10 mm wide, apex acute-acuminate ..... 36. *A. glabra*
39b. Leaf blade linear-elliptic, 1–2.5 mm wide, apex acute ..... 37. *A. nervosa*
38b. Leaf blade ovate.
40a. Achenes apically pilose ..... 38. *A. parvifolia*
40b. Achenes pilose.
41a. Leaf surface hairs T-shaped ..... 39. *A. yunnanensis*
41b. Leaf surface hairs straight ..... 40. *A. chapaensis*

1. Ainsliaea pertyoides Franchet, J. Bot. (Morot) 2: 70. 1888.

腋花兔儿风 ye hua tu er feng

Subshrubs, 0.5–1.2 m tall, much branched. Leaves alternate; petiole 2–5 mm, wingless, strigose; leaf blade ovate or ovate-lanceolate, cauline leaf blade 2.5–5.5 × 1–3 cm, subleathery, palmate-pinnate veined, abaxially villous or tomentose, adaxially glabrous, base cordate, margin entire to callose-denticulate, ciliate, apex acuminate. Capitula subsessile or shortly pedunculate, arranged in leafy panicles, 3-flowered; involucre cylindric, ca. 3 mm in diam.; phyllaries ca. 6-seriate, subleathery, abaxially glabrous or apically pubescent, outer phyllaries ovate, 2–3 mm, inner narrowly oblong to oblong, ca. 1.2 cm. Florets bisexual, chasmogamous, corollas white, tubular, ca. 1.6 cm, deeply 5-lobed, lobes unequal, anther appendages rounded. Achenes subfusiform, ca. 6 mm, ribbed, densely sericeous; pappus white, ca. 8 mm. Fl. Nov–Jan, Feb–Jun, Sep–Oct.

• Stream banks, rock fissures, moist areas in forests; 1500–2500 m. Guizhou, Sichuan, Yunnan.

1a. Leaf blade densely villous abaxially ..... 1a. var. *pertyoides*
1b. Leaf blade densely white tomentose abaxially ..... 1b. var. *albotomentosa*

1a. Ainsliaea pertyoides var. **pertyoides**

腋花兔儿风(原变种) ye hua tu er feng (yuan bian zhong)

Ainsliaea pertyoides f. *sparsiflora* (Vaniot) Beauverd; *A. pertyoides* var. *sparsiflora* (Vaniot) H. Léveillé; *A. sparsiflora* Vaniot.

Leaf blade densely villous abaxially. Fl. Feb–Jun, Sep–Oct.

• Stream banks or moist areas in forests; 1500–2500 m. Guizhou, Sichuan, Yunnan.

1b. Ainsliaea pertyoides var. **albotomentosa** Beauverd, Bull. Soc. Bot. Genève 1: 384. 1909 [*"albo-tomentosa"*].

白背兔儿风 bai bei tu er feng

Ainsliaea ovalifolia Vaniot; *A. pertyoides* var. *intermedia* Beauverd; *A. pertyoides* f. *ovalifolia* (Vaniot) Beauverd; *A. pteropoda* Candolle f. *ovalifolia* (Vaniot) H. Léveillé.

Leaf blade densely white tomentose abaxially. Fl. Nov–Jan, Mar–Jun.

• Stream banks, rock fissures, moist areas in dense forests; 1700–2500 m. Guizhou, Sichuan, Yunnan.

2. Ainsliaea lancangensis Y. Y. Qian, J. Trop. Subtrop. Bot. 8(2): 161. 2000.

澜沧兔儿风 lan cang tu er feng

Herbs, perennial, 40–70 cm tall. Leaves aggregated near median part of stem; petiole (1.5–)4–9 cm, wingless; leaf blade subrounded, palmatifid, (2–)4–11 × (1.5–)5–12 cm, papery, palmately veined, both surfaces green, subglabrous or abaxially very sparsely villous, base cordate, margin lobed, apex acute. Capitula subsessile, arranged in panicles, 1-flowered; involucre cylindric, ca. 2 mm in diam.; phyllaries 8- or 9-seriate, papery, abaxially apically puberulent, outer phyllaries ovate, 1–1.3 mm, inner oblong, 1–1.3 cm. Florets bisexual, chasmogamous, corolla tubular, 1.3–1.7 cm, deeply 5-lobed, lobes oblong, unequal, anther appendages apiculate. Achenes subfusiform, 6–7 mm, densely pilose; pappus brownish, 6.5–8.5 mm. Fl. Nov–Jan.

• Forests; ca. 2000 m. Yunnan.

3. Ainsliaea grossedentata Franchet, J. Bot. (Morot) 8: 297. 1894.

粗齿兔儿风 cu chi tu er feng

Ainsliaea gracilis Franchet var. *robusta* Diels.

Herbs, perennial, 25–60 cm tall. Leaves aggregated near median part of stem; petiole 3–7 cm, wingless; leaf blade broadly ovate, ovate, or ovate-lanceolate, 3–4.5(–7) × 2–5 cm, papery, palmate-pinnate veined, abaxially sparsely villous, adaxially sparsely strigose, base truncate, obtuse, or shortly attenuate, margin large dentate or sinuate, apex acute, rarely acuminate. Capitula shortly pedunculate, arranged in racemes, 3-flowered; involucre cylindric, ca. 3 mm in diam.; phyllaries ca. 6-seriate, papery, abaxially sparsely pubescent or glabrate, outer phyllaries broadly ovate, 1.5–2.5 mm, inner narrowly elliptic, ca. 1 cm. Florets bisexual, chasmogamous, corollas white, tubular, 1.6–1.7 cm, deeply 5-lobed, lobes linear-oblong, unequal, anther appendages truncate. Achenes subfusiform, ca. 4 mm, glabrous; pappus light brownish, ca. 7 mm. Fl. Sep–Oct.

• Forests; 1200–2100 m. Chongqing, N Guangxi, Guizhou, Hubei, W Hunan, W Jiangxi, Sichuan.

Ainsliaea gracilis var. *robusta* is treated here as a synonym of *A. grossedentata* on account of its leaf margins being shallowly pinnately lobed to dentate (vs. obscurely denticulate in *A. gracilis*).

4. Ainsliaea acerifolia Schultz Bipontinus var. **subapoda** Nakai, Bot. Mag. (Tokyo) 30: 290. 1916.

槭叶兔儿风 qi ye tu er feng

Ainsliaea acerifolia var. *affinis* (Miquel) Kitamura; *A. affinis* Miquel.

Herbs, perennial, 40–80 cm tall. Leaves aggregated near median part of stem; petiole 4–12 cm, wingless; leaf blade subrounded, palmatifid, 5–14 × 5.5–18 cm, papery, palmately veined, both surfaces green, abaxially sparsely villous, especially on midvein, adaxially subglabrous, base cordate, margin cleft or lobed, apex acute. Capitula subsessile, arranged in spikes, 3-flowered; involucre cylindric, ca. 1 cm in diam.; phyllaries 8-seriate, subleathery, abaxially glabrous or apically pubescent, outer phyllaries broadly ovate or ovate, 1.5–3 mm, inner narrowly elliptic to narrowly oblong, 1.3–1.4 cm. Florets bisexual, chasmogamous, corollas tubular, ca. 1.6 cm, deeply 5-lobed, lobes oblong, unequal, anther appendages apiculate. Achenes terete, ca. 8 mm, glabrous; pappus red-brownish, ca. 10 mm. Fl. Jul–Oct.

Forests; 300–500 m. Jilin, Liaoning [Japan, Korea].

This variety is quite different from *Ainsliaea acerifolia* var. *acerifolia*, found in Japan, in its leaf blades shallowly 5–7-lobed (vs. leaf blades deeply 7–9(–11)-lobed).

5. Ainsliaea apiculata Schultz Bipontinus var. **acerifolia** Masamune, Mem. Fac. Sci. Taihoku Imp. Univ. 11: 455. 1934.

五裂兔儿风 wu lie tu er feng

Ainsliaea liukiuensis Beauverd; *A. macroclinidioides* Hayata var. *secundiflora* (Hayata) Kitamura; *A. secundiflora* Hayata.

Plants perennial, 8–30 cm tall. Leaves basally clustered; petiole 1.5–6 cm, wingless, strigose; leaf blade deeply palmately lobed, with apical lobe elongate (1–)2.5–3.5 × (1–)2–3 cm, papery, blackish green, pale opaque abaxially, slightly glossy adaxially, sparsely strigose on both surfaces; cauline leaves few, much reduced, alternate, shortly petiolate to sessile, ovate to ovate-lanceolate. Capitula subsessile, arranged in spikes, 3-flowered; involucre narrowly obdeltate, ca. 3 mm in diam.; phyllaries 5- or 6-seriate, papery, glabrous, outer phyllaries ovate, ca. 2 mm, inner linear, ca. 10 mm. Florets bisexual, cleistogamous, corolla closed, tubular, minutely 5-lobed, 5–6 mm, hidden in pappus. Achenes narrowly oblong, ca. 5 mm, shortly pilose. Pappus ca. 9 mm. Fl. Feb–Mar, Aug–Oct.

Low hills, mountain slopes. Taiwan [Japan].

This variety is quite different from *Ainsliaea apiculata* var. *apiculata* and *A. apiculata* var. *ovatifolia* Masamune, both found in Japan, in its leaf blades deeply lobed with elongated apical lobe (vs. leaf blades 5-angled or shallowly 5-lobed in *A. apiculata* var. *apiculata* and ovate in *A. apiculata* var. *ovatifolia*).

Ainsliaea secundiflora was treated under *A. macroclinidioides* in FRPS (79: 60. 1996, as *A. macroclinidioides* var. *secundiflora*). However, analysis of the type specimen of *A. secundiflora* (*Nakahara 922*) confirms that it possesses leaves similar to those of *A. apiculata*, i.e., leaf blades palmately lobed (vs. not lobed in *A. macroclinidioides*).

6. Ainsliaea walkeri J. D. Hooker, Bot. Mag. 102: t. 6225. 1876.

华南兔儿风 hua nan tu er feng

Herbs, perennial, 20–40 cm tall. Leaves loosely aggregated near median part of stem; petiole 0.5–1.3 cm, narrowly winged; leaf blade oblong or linear, 3–7 × 0.3–0.7 cm, papery, apparently 1-veined, both surfaces glabrous, base long attenuate, margin sparsely denticulate, apex acuminate and mucronate. Capitula shortly pedunculate, arranged in panicles, (2 or)3-flowered; involucre cylindric, 2.5–3 mm in diam.; phyllaries ca. 5-seriate, papery, abaxially glabrous, outer phyllaries ovate, 1–2 mm, inner lanceolate, ca. 1 cm. Florets bisexual, chasmogamous, corollas white, tubular, 4–7.5 mm, deeply 5-lobed, lobes linear, unequal, anther appendages rounded to trun-

cate. Achenes terete, ca. 3 mm, densely pilose; pappus dark white, ca. 6 mm. Fl. Oct–Dec.

• Stream banks, moist areas in dense forests; below 700 m. SW Fujian, S Guangdong, S Guangxi.

7. Ainsliaea trinervis Y. C. Tseng, Acta Phytotax. Sin. 31: 367. 1993.

三脉兔儿风 san mai tu er feng

Ainsliaea macroclinidioides Hayata var. *oblonga* (Koidzumi) Hatusima; *A. oblonga* Koidzumi.

Herbs, perennial, 30–60 cm tall. Leaves loosely aggregated near median part of stem; petiole 1–1.5 cm, wingless; leaf blade narrowly elliptic, narrowly lanceolate, or lanceolate, 5–9.5 × 0.5–2.5 cm, papery, apparently 3-veined, both surfaces glabrous, base attenuate, slightly decurrent, margin denticulate or obscurely denticulate, apex long acuminate. Capitula shortly pedunculate, arranged in panicles, 3-flowered; involucre cylindric, 2–3 mm in diam.; phyllaries ca. 7-seriate, papery, abaxially glabrous, outer phyllaries ovate, 1–2 mm, inner narrowly elliptic, 1–1.2 cm. Florets bisexual, chasmogamous, corollas pink to white, tubular, ca. 9 mm, deeply 5-lobed, lobes oblong, unequal, anther appendages rounded to truncate. Achenes terete, ca. 3 mm, densely pilose; pappus dark yellow or light yellow, ca. 8 mm. Fl. Jul–Sep.

Stream banks, moist areas in dense forests; 600–900 m. N Fujian, Guangdong, Guangxi, SW Guizhou, S Jiangxi [Japan].

According to Freire (Ann. Missouri Bot. Gard. 94: 179. 2007), *Ainsliaea oblonga* is very close to *A. trinervis* but differs in having leaf blades lanceolate, 1–2.5 cm wide, with margin obscurely denticulate (vs. narrowly lanceolate, 0.5–1.3 cm wide, with margin denticulate in *A. trinervis*). Further studies will be necessary to determinate whether or not they are conspecific.

8. Ainsliaea foliosa Handel-Mazzetti, Acta Horti Gothob. 12: 348. 1938.

异叶兔儿风 yi ye tu er feng

Herbs, perennial, 60–80 cm tall. Leaves loosely aggregated near median part of stem, sometimes alternate in median part of stem; petiole 2.5–5 cm, broadly winged; leaf blade ovate, ovate-lanceolate, or elliptic, 5–10 × 2–5 cm, papery, palmate-pinnate veined, both surfaces sparsely villous, base broadly cuneate or abruptly constricted into winged petiole, margin callose-denticulate, rarely repand, apex acute. Capitula subsessile or shortly pedunculate, arranged in racemes or spikes, 4- or 5-flowered; involucre cylindric, 6–7 mm in diam.; phyllaries 4-seriate, subleathery, abaxially sparsely pubescent, sometimes glabrate when old, outer phyllaries broadly ovate, 2.5–3 mm, inner narrowly elliptic, 0.8–1.1 cm. Florets bisexual, chasmogamous and cleistogamous (at different seasons). Chasmogamous florets pink, corollas deeply 5-lobed, lobes unequal, anther appendages obtuse. Achenes ca. 2 mm, densely pilose; pappus absent. Cleistogamous florets purplish above, corolla closed, tubular, minutely 5-lobed, ca. 5 mm, anthers much reduced, ca. 0.5 mm. Achenes fusiform, 4–5 mm; pappus brownish, 5–6 mm. Fl. Jul–Sep.

• *Abies* forests, scrub, stream banks; 2700–4300 m. W Sichuan, NE Yunnan.

9. Ainsliaea fragrans Champion ex Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 236. 1852.

杏香兔儿风 xing xiang tu er feng

Ainsliaea asarifolia Hayata; *A. cordifolia* Franchet & Savatier var. *integrifolia* Maximowicz; *A. fragrans* var. *integrifolia* (Maximowicz) Kitamura; *A. integrifolia* (Maximowicz) Makino; *A. ningpoensis* Matsuda; *A. rubrifolia* Franchet.

Herbs, perennial, 25–60 cm tall. Leaves in basal rosette or above stem base; petiole 1.5–10(–14) cm, wingless, strigose; leaf blade ovate to ovate-lanceolate, 2–11 × 1.5–5 cm, subleathery, palmate-pinnate veined, abaxially commonly purple, red villous, especially along veins, adaxially glabrous or sparsely pilose, base cordate, margin entire or sparsely callose-denticulate, ciliate, apex obtuse or mucronate extended from midvein. Capitula subsessile or shortly pedunculate, arranged in spikes (rarely panicles), 3-flowered; involucre cylindric, 3–3.5 mm in diam.; phyllaries ca. 5-seriate, papery, abaxially glabrous, outer phyllaries ovate, 1.8–2 mm, inner narrowly elliptic, ca. 1.1 cm. Florets bisexual, chasmogamous and cleistogamous in same plant (or at different seasons). Chasmogamous florets white, corollas tubular, ca. 1 cm, deeply 5-lobed, lobes linear, unequal, anther appendages obtuse. Achenes terete or subfusiform, ca. 4 mm, ribbed, densely villous throughout or on upper part; pappus light brownish, ca. 7 mm. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 8 mm, hidden in pappus. Achenes ca. 5 mm; pappus ca. 12 mm. Fl. Sep–Dec.

Scrub, roadsides, grassy areas by stream banks; near sea level to 1300 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan].

Ainsliaea asarifolia, *A. integrifolia*, *A. ningpoensis*, and *A. rubrifolia* are treated here as synonyms of *A. fragrans* because there is no diagnostic character to separate them as distinct taxa. All of these have petiolate leaves that are ovate to oblong, cordate at the base, with margins remotely callose-denticulate and lanuginous abaxially, especially on the veins. In addition, the differential character mentioned in the protologue of *A. rubrifolia*, i.e., leaves reddish green on the abaxial surface, is a variable feature throughout the range of *A. fragrans*.

10. Ainsliaea asaroides Y. S. Ye, J. Wang & H. G. Ye, Nordic J. Bot. 28: 196. 2010.

细辛叶兔儿风 xi xin ye tu er feng

Herbs, perennial, 20–80 cm tall. Leaves above stem base; petiole 2–13 cm, wingless, villous; leaf blade ovate to narrowly ovate, 3–11 × 2–7 cm, subleathery, palmate-pinnate veined, abaxially pale, villous along veins, adaxially glabrous, base cordate to subcordate, margin callose-denticulate, ciliate, apex acute to obtuse or mucronate extended from midvein. Capitula subsessile or shortly pedunculate, arranged in panicles, 3- or 4-flowered; involucre cylindric, ca. 2 mm in diam.; phyllaries ca. 6- or 7-seriate, papery, abaxially glabrous, outer phyllaries ovate, 1–2.5 mm, inner narrowly elliptic, 7–10 mm. Florets bisexual, chasmogamous, white, corollas tubular, ca. 6 mm, deeply 5-lobed, lobes linear, unequal, anther appendages obtuse. Achenes terete or subfusiform, ca. 4 mm, ribbed, villous; pappus brownish, ca. 5 mm. Fl. Jul–Oct, fr. Sep–Nov. $2n = 26$*.

• Riversides in forests; 600–700 m. Guangdong (Yangchun).

Ainsliaea asaroides is very close if not identical to *A. fragrans*. It may no longer be possible to maintain them as separate species when additional gatherings become available.

11. Ainsliaea gracilis Franchet, J. Bot. (Morot) 8: 297. 1894.

纤枝兔儿风 xian zhi tu er feng

Herbs, perennial, 20–60(–100) cm tall. Leaves aggregated near median part of stem; petiole 1.5–6 cm, wingless; leaf blade ovate or ovate-lanceolate, 2–6 × 1.2–3.4 cm, papery, palmate-pinnate veined, abaxially commonly purplish red, sparsely villous, especially on veins, adaxially green, glabrous, base cordate or subcordate, slightly decurrent, margin callose-denticulate, apex acute to acuminate. Capitula shortly pedunculate, arranged in racemes, 3-flowered; involucre cylindric, ca. 3 mm in diam.; phyllaries ca. 7-seriate, papery, abaxially glabrous, outer phyllaries ovate, 1–2.5 mm, inner linear-oblanceolate, 1–1.2 cm. Florets bisexual, chasmogamous and cleistogamous in same plant. Chasmogamous floret corollas white, tubular, 1–1.3 cm, deeply 5-lobed, lobes linear-lanceolate, unequal, anther appendages rounded. Achenes subfusiform, ca. 5 mm, glabrous or apically pilose; pappus light red, 6–10 mm. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 5 mm, hidden in pappus. Achenes ca. 5 mm; pappus ca. 8 mm. Fl. Sep–Oct.

• Forests; 400–1600 m. Chongqing, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan.

12. Ainsliaea kawakamii Hayata, Icon. Pl. Formosan. 8: 72. 1919.

灯台兔儿风 deng tai tu er feng

Ainsliaea hui Diels ex Mattfeld.

Herbs, perennial, 20–70 cm tall. Leaves clustered, above stem base or crowded near midpoint of stem; petiole (2.5–)3.5–8.5 cm, wingless; leaf blade ovate, 5–7(–9.5) × 3–6 cm, papery, palmate-pinnate veined, abaxially paler than adaxial surface, adaxially subglabrous, base rounded or slightly cordate to truncate, margin entire to denticulate, apex obtuse. Capitula shortly pedunculate, arranged in spikes, 3-flowered; involucre campanulate-cylindric, ca. 3 mm in diam.; phyllaries 6- or 7-seriate, subleathery, glabrous, sparsely pilose above, outer phyllaries ovate, ca. 2.5 mm, inner linear, ca. 7.5 mm. Florets bisexual, usually chasmogamous (occasionally cleistogamous in same plant). Chasmogamous floret corollas white, tubular, ca. 13 mm, deeply 5-lobed, lobes linear-lanceolate, unequal, anther appendages truncate. Achenes oblong, ca. 2.5 mm, glabrous or pilose above; pappus ca. 8 mm. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 4.5 mm, hidden in pappus. Achenes ca. 6 mm; pappus ca. 9 mm. Fl. Sep–Nov.

• Forests; 600–1600 m. Anhui, Fujian, Guangdong, Hunan, Taiwan, Zhejiang.

This species and *Ainsliaea macroclinidioides* are closely related; leaf blade margin slightly entire (vs. dentate) is the only difference between them. Further studies are needed to clarify the relationships and specific limits between these species.

13. Ainsliaea macroclinidioides Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 141. 1908.

阿里山兔儿风 a li shan tu er feng

Ainsliaea dentata Koidzumi; *A. macroclinidioides* var. *okinawensis* (Hayata) Kitamura; *A. okinawensis* Hayata; *A. ovata* Koidzumi; *A. yadsimae* Koidzumi.

Herbs, perennial, 25–80 cm tall. Leaves aggregated near median part of stem; petiole 3–11 cm, wingless; leaf blade broadly ovate to deltate or ovate-lanceolate, 4.5–13 × 3–11 cm, papery, palmate-pinnate veined, abaxially sparsely villous, especially on veins, adaxially glabrous or sparsely pilose when young, base shallowly to deeply cordate or rounded, margin dentate to obscurely dentate, apex acute or acuminate to long acuminate. Capitula sessile or shortly pedunculate, arranged in spikes or racemes, 3-flowered; involucre cylindric, 3–4 mm in diam.; phyllaries ca. 6-seriate, papery, abaxially glabrous or apically pubescent, outer phyllaries ovate, 2.5–3 mm, inner narrowly oblong, ca. 1 cm. Florets bisexual, chasmogamous, corollas tubular, 0.9–1.3 cm, deeply 5-lobed, lobes linear, unequal, anther appendages rounded. Achenes terete, ca. 8 mm, pilose; pappus red-brownish, ca. 10 mm. Fl. Mar, Jul–Oct.

Forests along stream banks; 500–2000 m. Taiwan [Japan].

Ainsliaea macroclinidioides is a polymorphic species, with leaf blades varying from ovate-lanceolate with base rounded, apex long acuminate, and margin dentate (in the type specimen from Taiwan) to leaf blades ovate to deltate with base rounded to deeply cordate, apex acuminate, and margin dentate to obscurely dentate (in specimens from the Ryukyu Islands, Japan). Specimens from SE China with entire leaf margins that have been determined as *A. macroclinidioides* are referred in the present treatment to *A. kawakamii*.

14. Ainsliaea smithii Mattfeld, Acta Horti Gothob. 8: 79. 1933.

紫枝兔儿风 zi zhi tu er feng

Herbs, perennial, 0.8–1.2 m tall. Leaves alternate above basal part of stem, deciduous in flowering seasons; petiole 5.5–11 cm, broadly winged; leaf blade ovate or broadly ovate, 7–12 × 5–9.5 cm, papery, palmate-pinnate veined, both surfaces sparsely pilose, sometimes glabrate when old, base shallowly cordate, margin obscurely denticulate, apex acute to shortly acuminate. Capitula shortly pedunculate, arranged in spikes, 3-flowered; involucre cylindric, 4–5 mm in diam.; phyllaries ca. 5-seriate, papery, abaxially glabrous, outer phyllaries ovate, 3–4 mm, inner narrowly lanceolate, ca. 1.5 cm. Florets bisexual, cleistogamous, corollas closed, tubular, minutely 5-lobed, ca. 7 mm, hidden in pappus, anther appendages rounded. Achenes subterete, ca. 5 mm, densely pilose; pappus dark white, ca. 9 mm. Fl. Sep–Oct.

• Forests, stream banks; 3000–3400 m. Sichuan, Yunnan.

15. Ainsliaea aptera Candolle, Prodr. 7: 14. 1838.

无翅兔儿风 wu chi tu er feng

Ainsliaea aptera f. *paniculata* Kuntze.

Herbs, perennial, 30–70 cm tall. Leaves approximate above basal part of stem, basal ones deciduous in flowering seasons; petiole 7–13(–20) cm, wingless; leaf blade ovate, broadly ovate, or subrounded, 5–15 × 3.5–12 cm, papery, palmate-pinnate veined, both surfaces sparsely pilose, sometimes glabrate when old, base shallowly (rarely deeply) cordate, margin dentate,

apex acute to acuminate. Capitula sessile or shortly pedunculate, arranged in narrow panicles, 3-flowered; involucre cylindric, ca. 4 mm in diam.; phyllaries ca. 7-seriate, papery, abaxially glabrous or sparsely pubescent, outer phyllaries ovate, 1.5–2 mm, inner linear-oblong, 1.1–1.4 cm. Florets bisexual, chasmogamous and cleistogamous (at different seasons). Chasmogamous floret corollas tubular, 1.1–1.3 cm, deeply 5-lobed, anther appendages rounded. Achenes oblong, (2–)3–5 mm, densely pilose; pappus 5–8 mm. Cleistogamous floret corollas closed, tubular, minutely 4- or 5-lobed, 5–6 mm, hidden in pappus. Achenes 6–9 mm; pappus 1–1.2 cm. Fl. Apr–Sep.

Forests, scrub or grassy areas of mountain slopes; 1200–3600 m. S Xizang [Afghanistan, Bhutan, India, Nepal, Pakistan].

16. Ainsliaea mairei H. Léveillé, Monde Pl. 18: 31. 1916.

药山兔儿风 yao shan tu er feng

Herbs, perennial, 30–75 cm tall. Leaves in basal rosette, sessile; leaf blade lanceolate or narrowly elliptic, 9–18 × 1–3.5 cm, subleathery, palmate-pinnate veined, both surfaces densely gray-white villous, base attenuate, margin ciliate, very sparsely callose-denticulate, apex acute. Capitula sessile, 5–9 clustered, arranged in spikes, 2- or 3-flowered; involucre cylindric, ca. 3 mm in diam.; phyllaries ca. 5-seriate, subleathery, outer phyllaries ovate, 3–4 mm, abaxially densely villous, inner narrowly elliptic, 1.4–1.5 cm, glabrous. Florets bisexual, chasmogamous, corollas purplish red, tubular, ca. 1.2 cm, deeply 5-lobed, lobes linear, unequal, anther appendages rounded. Achenes obconical, ca. 4.2 mm, densely white villous; pappus dark yellow or yellow-white, 6–9 mm. Fl. Aug–Nov.

• Forest margins, scrub or grassy areas of mountain slopes; 2000–3500 m. Guizhou, Sichuan, Yunnan.

17. Ainsliaea caesia Handel-Mazzetti, Beih. Bot. Centralbl., Abt. 2, 56: 469. 1937.

蓝兔儿风 lan tu er feng

Herbs, perennial, 30–75 cm tall. Leaves in basal rosette; petiole 1–6 cm, wingless; leaf blade lanceolate, 4.5–7 × 1.4–3 cm, papery, palmate-pinnate veined, abaxially caerulescent or caerulescent-purple, sparsely villous, especially on veins, adaxially green, glabrate when old, base cuneate or slightly acuminate, margin callose-denticulate, apex acute. Capitula subsessile, arranged in spikes, 3-flowered; involucre obconical, 4–5 mm in diam.; phyllaries 5- or 6-seriate, papery, abaxially glabrous, outer phyllaries ovate, ca. 0.5 mm, median ovate-oblong, 1.5–3 mm, inner linear-lanceolate, 1–1.3 cm. Florets bisexual, cleistogamous, corollas closed, tubular, minutely 5-lobed, 0.4–1 cm, anther appendages truncate. Achenes fusiform, ca. 5 mm, glabrous; pappus dark yellow, ca. 8 mm. Fl. Oct–Nov.

• Forests, stream banks; 900–1200 m. N Guangdong, Jiangxi.

18. Ainsliaea spicata Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 117. 1903.

细穗兔儿风 xi sui tu er feng

Ainsliaea latifolia (D. Don) Schultz Bipontinus var. *obovata* (Franchet) Grierson & Lauener; *A. pteropoda* Candolle var. *obovata* Franchet.

Herbs, perennial, 20–60 cm tall. Leaves in basal rosette; petiole short, nearly absent or 3–8 mm, wingless; leaf blade obovate or obovate-rounded, 3–10 × 2–6 cm, papery, palmate-pinnate veined, both surfaces sparsely villous, base rounded, abruptly constricted into petiole, margin callose-denticulate, apex obtuse or rounded. Capitula subsessile or shortly pedunculate, commonly 2 or 3 clustered, arranged in spikes; involucre cylindric, 2–3 mm in diam.; phyllaries ca. 6-seriate, papery, abaxially glabrous or very sparsely pilose, outer phyllaries ovate, 1.5–3 mm, inner narrowly elliptic, ca. 1 cm. Florets bisexual, chasmogamous and cleistogamous (at different seasons or in same plant). Chasmogamous floret corollas tubular, ca. 1.3 cm, deeply 5-lobed, lobes linear, unequal, anther appendages truncate. Achenes oblong, ca. 4 mm, ribbed, densely white pilose; pappus brownish, ca. 8 mm, sometimes absent. Fl. Nov–Jun and Sep–Oct. Cleistogamous floret corollas closed, tubular, minutely 4-lobed, ca. 4 mm, hidden in pappus. Achenes oblong, 4–5 mm, ribbed, densely pilose; pappus brownish, ca. 7 mm. Fl. Jan–Mar, May, Aug–Nov.

Open forests, forest margins, scrub or grassy areas of mountain slopes; 1100–2000 m. Chongqing, Guangdong, Guangxi, Guizhou, Hubei, Sichuan, Yunnan [Bangladesh, Bhutan, India, Thailand].

19. Ainsliaea bonatii Beauverd, Bull. Soc. Bot. Genève 1: 377. 1909.

心叶兔儿风 xin ye tu er feng

Herbs, perennial, 35–85 cm tall. Leaves in basal rosette; petiole broadly winged; leaf blade ovate or broadly ovate to orbicular, papery, palmate-pinnate veined, both surfaces gray-white lanuginous, sometimes glabrate, base cordate, margin callose-denticulate, apex rounded, obtuse, or acute. Capitula subsessile, 4–6 clustered, arranged in spikes, 3(or 4)-flowered; involucre cylindric, ca. 3 mm in diam.; phyllaries 5- or 6-seriate, scarious, abaxially apically strigose, outer phyllaries ovate, 2–2.5 mm, inner linear, ca. 1.2 cm. Florets bisexual, chasmogamous and cleistogamous (at different seasons or in same plant). Chasmogamous floret corollas tubular, 1.1–1.7 cm, deeply 5-lobed, lobes unequal, anther appendages truncate. Achenes subterete, ca. 5 mm, ribbed, densely pilose; pappus brownish, 6.5–8 mm. Fl. Oct–Nov. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, 3.5–5 mm, hidden in pappus. Achenes subfusiform, ca. 6 mm, ribbed, densely pilose; pappus dark yellow or dark brownish, 6–7 mm. Fl. Aug–Oct.

• Dense forests, stream banks; 900–3500 m. Chongqing, Guizhou, Sichuan, Yunnan.

1a. Leaf blade broadly ovate to orbicular ..... 19a. var. *bonatii*
1b. Leaf blade narrowly ovate ..... 19b. var. *multibracteata*

19a. Ainsliaea bonatii var. **bonatii**

心叶兔儿风(原变种) xin ye tu er feng (yuan bian zhong)

Ainsliaea bonatii var. *arachnoidea* Beauverd; *A. bonatii* var. *glabra* Beauverd; *A. pteropoda* Candolle var. *platyphylla* Franchet.

Petiole 5–19 cm × 4–18 mm (at upper point); leaf blade broadly ovate to orbicular, 6–11.5 × 5–11.5 cm, apex acute to

subobtuse. Florets usually chasmogamous, occasionally florets cleistogamous at apex of stem.

• Dense forests, stream banks; 900–3000 m. Chongqing, Guizhou, Sichuan, Yunnan.

The lectotype of *Ainsliaea pteropoda* var. *platyphylla* (Yunnan, *J. M. Delavay 607*, P!) shows no diagnostic character that differentiates it from *A. bonatii* var. *bonatii*; the former name is therefore placed into synonymy of the latter.

19b. Ainsliaea bonatii var. **multibracteata** (Mattfeld) S. E. Freire, Ann. Missouri Bot. Gard. 94: 108. 2007.

薄叶兔儿风 bao ye tu er feng

Ainsliaea multibracteata Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 106. 1931; *A. mattfeldiana* Handel-Mazzetti.

Petiole 5–13 cm × 6–8 mm (at upper point); leaf blade narrowly ovate, 8.5–11 × 5–6 cm, apex acute; cauline leaves alternate, petiolate to sessile, ovate to ovate-lanceolate. Florets usually cleistogamous.

• Dense forests, stream banks; 3000–3500 m. Sichuan.

20. Ainsliaea macrocephala (Mattfeld) Y. C. Tseng, Acta Phytotax. Sin. 31: 364. 1993.

大头兔儿风 da tou tu er feng

Ainsliaea pteropoda Candolle var. *macrocephala* Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 107. 1931.

Herbs, perennial, 30–60 cm tall. Leaves in basal rosette; petiole 4–9 cm, winged, sparsely pilose; leaf blade ovate or ovate-lanceolate, 3.5–9 × 2.5–4.5 cm, subleathery, palmate-pinnate veined, abaxially densely pilose, adaxially sparsely pilose, base constricted and decurrent into broadly winged petiole, margin callose-denticulate, apex acute to obtuse, rarely mucronate. Capitula sessile, (2 or)3–5(or 6) clustered, arranged in spikes, 3-flowered; involucre cylindric, 4–5 mm in diam.; phyllaries ca. 5-seriate, papery, abaxially white villous, outer phyllaries ovate, 3.5–5 mm, inner oblong, ca. 1.5 cm. Florets bisexual, chasmogamous, corollas purplish red, tubular, ca. 1.3 cm, deeply 5-lobed, lobes linear, unequal, anther appendages obtuse. Achenes terete, 4–5 mm, densely villous; pappus brownish or dark brownish, 8–9 mm. Fl. Aug–Sep.

• Forests, forest margins, scrub or grassy areas of mountain slopes; 2300–3600 m. Sichuan, Yunnan.

21. Ainsliaea qianiana S. E. Freire, Novon 12: 453. 2002.

钱氏兔儿风 qian shi tu er feng

Herbs, perennial, 50–60 cm tall. Leaves in basal rosette; petiole 10–11 cm, winged; leaf blade elliptic or elliptic to ovate, 7.5–8.5 × 3.5–3.8 cm, subcarnose, palmate-pinnate veined, both surfaces glabrous, base abruptly rounded and decurrent into petiole, margin callose-denticulate, apex acute to subobtuse. Capitula sessile, commonly 3–5 clustered, arranged in spikes, 3-flowered; involucre cylindric, 3–4 mm in diam.; phyllaries 5–7-seriate, papery, abaxially glabrous, outer phyllaries linear to ovate, 2.8–3 mm, inner linear to ovate or linear to elliptic, 1.1–1.3 cm. Florets bisexual, chasmogamous, corollas pink, tubular, ca. 8 mm, deeply 5-lobed, anther appendages apiculate. Achenes oblong, 3–4 mm, densely pilose; pappus light brownish, 6–7 mm. Fl. Oct.

• 3000–3600 m. Sichuan, Yunnan.

22. Ainsliaea latifolia (D. Don) Schultz Bipontinus, Jahresber. Pollichia 18–19: 190. 1861.

宽叶兔儿风 kuan ye tu er feng

Liatris latifolia D. Don, Prodr. Fl. Nepal. 169. 1825; *Ainsliaea heterantha* Handel-Mazzetti; *A. hypoleuca* Diels; *A. latifolia* var. *ramifera* H. Chuang; *A. petelotii* Merrill; *A. pteropoda* Candolle; *A. pteropoda* var. *silhetensis* Candolle; *A. silhetensis* (Candolle) C. B. Clarke.

Herbs, perennial, 30–90(–130) cm tall. Leaves in basal rosette; petiole broadly winged, (2–)4–9(–11) × 4–30 mm (at upper point); leaf blade ovate or narrowly ovate, (2–)5–10 × (1.5–)3–8 cm, papery, palmate-pinnate veined, concolorous, strigose on both surfaces with long straight trichomes, or more commonly slightly discolorous with abaxial surface strigose-lanate and adaxial surface sparsely strigose, base constricted and decurrent into petiole, margin callose-denticulate and straight, apex obtuse or acute. Capitula subsessile or shortly pedunculate, (1 or)2–4 clustered, arranged in spikes or panicles, 3-flowered; involucre cylindric, ca. 3 mm in diam.; phyllaries ca. 5-seriate, papery, abaxially ± sparsely pilose, outer phyllaries ovate, ca. 1.5 mm, inner elliptic, ca. 8 mm. Florets bisexual, usually chasmogamous (sometimes without pappus), more rarely cleistogamous (at different seasons or in same plant). Chasmogamous floret corollas tubular, 0.8–1.1 cm, deeply 5-lobed, lobes oblong, unequal, anther appendages rounded. Achenes subfusiform, ca. 5.5 mm, ribbed, densely pilose; pappus absent or present, brownish, 8–10 mm. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 4 mm, hidden in pappus. Achenes subfusiform, ca. 6 mm, ribbed, densely pilose; pappus brownish, 8–10 mm. Fl. year-round.

Valleys with evergreen forests, mossy sites in evergreen forests by streams, open forests, roadsides, very dry open places in full sunlight or some shade; 800–3600 m. Guangdong, Guangxi, Guizhou, Hainan, Hubei, Sichuan, Xizang, Yunnan [Bangladesh, Bhutan, India, Indonesia, Kashmir, Myanmar, Nepal, Thailand, Vietnam].

Ainsliaea latifolia most resembles *A. bonatii*, *A. macrocephala*, *A. qianiana*, and *A. spicata*, those species with winged petioles. However, they may be differentiated by their leaf blades, e.g., ovate, concolorous, strigose, and rounded at the base in *A. latifolia* var. *latifolia*. *Ainsliaea bonatii* has cordate leaf blades, whereas *A. spicata* has obovate or obovate to pandurate blades. *Ainsliaea qianiana* is distinguished by its glabrous and somewhat fleshy leaves. *Ainsliaea macrocephala* may be distinguished by its larger involucre, 13–15 mm, as well as by its foliar trichomes T-shaped.

Ainsliaea hypoleuca (*A. petelotii*) was treated as a separate species by Freire (Ann. Missouri Bot. Gard. 94: 131. 2007) on account of its strongly discolorous leaves, which are densely white tomentose below and deep green and glabrous above.

"Perdicium triflorum" (D. Don, Prodr. Fl. Nepal. 169. 1825) belongs here but was not validly published because it was merely cited as a synonym of *Liatris latifolia* (*Vienna Code*, Art. 34.1(c)). Conse-

quently, the intended new combination *"Ainsliaea triflora"* (Druce, Rep. Bot. Exch. Cl. Brit. Isles 1916: 603. 1917) was not validly published either.

"Ainsliaea latifolia var. *taiwanensis"* (S. E. Freire, Ann. Missouri Bot. Gard. 94: 136. 2007), described from China (Taiwan), Indonesia, and Thailand, was not validly published because no Latin description or diagnosis, or reference to such, was provided (*Vienna Code*, Art. 36.1). It is therefore excluded from the present treatment.

23. Ainsliaea henryi Diels, Bot. Jahrb. Syst. 29: 628. 1901.

长穗兔儿风 chang sui tu er feng

Herbs, perennial, 10–80 cm tall. Leaves in basal rosette; petiole 2–5 cm, winged in upper half or wingless; leaf blade obovate to oblong or ovate, 2.5–8.5 × 1.5–3 cm, thinly papery, palmate-pinnate veined, abaxially sparsely villous, adaxially subglabrous, base attenuate, rounded, or cuneate, margin slightly repand, callose-denticulate, apex acute to subobtuse. Capitula subsessile or shortly pedunculate, commonly 2 or 3 clustered, arranged in spikes, (1–)3-flowered; involucre cylindric, ca. 2 mm in diam.; phyllaries ca. 5-seriate, papery, abaxially apically pilose, outer phyllaries ovate, 1.5–2 mm, inner linear, 0.7–1.6 cm. Florets bisexual, chasmogamous and cleistogamous (at different seasons). Chasmogamous floret corollas tubular, ca. 7.5 mm, deeply 5-lobed, lobes oblong, anther appendages rounded. Achenes subfusiform, ca. 1.5 mm, ribbed, glabrous, sometimes apically pilose; pappus absent. Fl. Dec–Apr. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 3.2 mm, hidden in pappus. Achenes terete, ca. 6 mm, ribbed, glabrous; pappus dark white to dark yellow, ca. 8 mm. Fl. Jun–Mar.

• Open forests, stream banks; 700–3900 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Sichuan, Taiwan, Yunnan.

The variation patterns of such characters as leaf morphology and achene pubescence within *Ainsliaea henryi* and *A. reflexa* are not clear enough. Extensive field investigation at the population level is needed to clarify this.

1a. Leaves obovate, attenuate into petiole, petiole winged in upper half ..... 23a. var. *henryi*
1b. Leaves ovate, rounded or cuneate at base, petiole wingless ..... 23b. var. *subalpina*

23a. Ainsliaea henryi var. **henryi**

长穗兔儿风(原变种) chang sui tu er feng (yuan bian zhong)

Ainsliaea henryi var. *daguanensis* H. Chuang; *A. latifolia* (D. Don) Schultz Bipontinus subsp. *henryi* (Diels) H. Koyama; *A. undulata* Diels.

Petiole winged in upper half; leaf blade obovate to oblong, 4.5–8.5 × 1.8–3 cm, base attenuate, apex subobtuse. Fl. Jul–Oct, Dec–Mar.

• Open forests, stream banks; 700–2000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Sichuan, Taiwan, Yunnan.

23b. Ainsliaea henryi var. **subalpina** (Handel-Mazzetti) S. E. Freire, Ann. Missouri Bot. Gard. 94: 129. 2007.

亚高山长穗兔儿风 ya gao shan chang sui tu er feng

Ainsliaea reflexa Merrill var. *subalpina* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 12. 1926; *A. henryi* var. *ovatifolia* C. C. Chang; *A. latifolia* var. *nimborum* (Handel-Mazzetti) Kitamura; *A. morrisonicola* Hayata; *A. reflexa* f. *morrisonicola* (Hayata) Suzuki; *A. reflexa* var. *morrisonicola* (Hayata)Yamamoto; *A. reflexa* var. *nimborum* Handel-Mazzetti.

Petiole long, 3.5–5.5 cm, slender, wingless; leaf blade ovate, 2.5–3.8 × 1.5–2.4 cm, base rounded or cuneate. Fl. Jun–Nov.

• Open forests; 2000–3900 m. Taiwan, Yunnan.

24. Ainsliaea reflexa Merrill, Philipp. J. Sci. 1(Suppl. 3): 242. 1906.

长柄兔儿风 chang bing tu er feng

Ainsliaea angustifolia J. D. Hooker & Thomson ex C. B. Clarke var. *luchunensis* H. Chuang; *A. longipetiolata* Merrill; *A. reflexa* var. *lobbiana* Beauverd; ?*A. tonkinensis* Merrill.

Herbs, perennial, 10–60 cm tall. Leaves in basal rosette; petiole 3–9 cm, distal part winged, proximal part wingless, rarely nearly wingless; leaf blade ovate or ovate-lanceolate, 2–7 × 2–5 cm, papery, palmate-pinnate veined, both surfaces sparsely villous, base attenuate, margin slightly repand, callose-denticulate, apex acute or obtuse. Capitula subsessile or shortly pedunculate, commonly 2 or 3 clustered, arranged in spikes, (1–)3-flowered; involucre cylindric, 2–3 mm in diam.; phyllaries ca. 5-seriate, papery, abaxially glabrous or apically pilose, outer phyllaries ovate, 1.5–2.5 mm, inner lanceolate, ca. 1.2 cm. Florets bisexual, chasmogamous and cleistogamous (in same plant or at different seasons). Chasmogamous floret corollas tubular, 5.5–9 mm, deeply 5-lobed, anther appendages rounded. Achenes terete, ca. 3 mm, ribbed, densely pilose; pappus absent. Fl. Dec–Apr. Cleistogamous floret corollas closed, tubular, minutely 4-lobed, ca. 4 mm, hidden in pappus. Achenes terete, 3–5 mm, ribbed, densely pilose; pappus brownish, ca. 7 mm. Fl. Dec–Jul.

Open forests, forest margins, scrub; 500–3500 m. Guangdong, Hainan, Taiwan, Xizang, Yunnan [Indonesia, Philippines, Vietnam].

Ainsliaea tonkinensis, a rheophyte distributed in Vietnam, is sometimes treated as a synonym of *A. reflexa* (see Freire, Ann. Missouri Bot. Gard. 94: 149. 2007). Further studies are necessary to confirm whether or not they are conspecific.

25. Ainsliaea crassifolia C. C. Chang, Sinensia 6: 549. 1935.

厚叶兔儿风 hou ye tu er feng

Herbs, perennial, 40–80 cm tall. Leaves in basal rosette; petiole 4–11 cm, wingless, densely white lanuginous; leaf blade ovate, 9–13 × 6–12 cm, papery, palmate-pinnate veined, abaxially white, densely white lanuginous, adaxially green, sparsely white lanuginous, base cordate, margin obviously dentate, apex obtuse or rounded. Capitula sessile, solitary or 2 or 3 arranged in spikes, 3-flowered; involucre cylindric, 6–7 mm in diam.; phyllaries ca. 5-seriate, papery, abaxially subglabrous, outer phyllaries ovate, 2–3 mm, inner lanceolate, ca. 11 mm. Florets bisexual, chasmogamous, corollas white or pink, tubular, ca. 1.5 cm, deeply 5-lobed, lobes linear, unequal, anther appendages

rounded. Immature achenes awl-shaped, ca. 2.5 mm, sparsely villous; pappus dark white, 11–12 mm. Fl. Jul–Jan.

• Forests, forest margins, grassy areas of mountain slopes; 2800–3000 m. Sichuan, Yunnan.

26. Ainsliaea elegans Hemsley, Hooker's Icon. Pl. 28: t. 2747. 1902.

秀丽兔儿风 xiu li tu er feng

Herbs, perennial, 0.3–1.2 m tall. Leaves in basal rosette; petiole 10–30 cm, wingless, villous; leaf blade cordate or ovate-cordate, 8–22 × 4.5–14 cm, subleathery, palmate-pinnate veined, base deeply cordate, margin sparsely callose-denticulate, ciliate, apex obtuse. Capitula subsessile or shortly pedunculate, arranged in panicles, 2(or 3)-flowered; involucre cylindric, ca. 3.5 mm; phyllaries ca. 5-seriate, subleathery, abaxially apically pilose, outer phyllaries ovate, 3–3.5 mm, inner oblong, 1–1.2 cm. Florets bisexual, chasmogamous, corollas white, tubular, ca. 1.6 cm, deeply 5-lobed, lobes linear, unequal, anther appendages truncate or slightly emarginate. Achenes terete, ca. 5.5 mm, densely white pilose; pappus yellow-white, 8–9 mm. Fl. Nov–Mar.

Limestone forests; 1000–2500 m. Guizhou, Yunnan [Vietnam].

1a. Leaf blade abaxially densely white lanuginous ..... 26a. var. *elegans*
1b. Leaf blade abaxially densely strigose ..... 26b. var. *strigosa*

26a. Ainsliaea elegans var. **elegans**

秀丽兔儿风(原变种) xiu li tu er feng (yuan bian zhong)

Ainsliaea elegans var. *tomentosa* Mattfeld; *Pertya esquirolii* H. Léveillé.

Leaf blade abaxially densely white lanuginous, adaxially strigose when young and glabrate when old. Fl. Nov–Mar.

• Limestone forests; 1000–1900 m. Guizhou, Yunnan.

26b. Ainsliaea elegans var. **strigosa** Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 107. 1931.

红毛兔儿风 hong mao tu er feng

Leaf blade strigose on both surfaces. Fl. Jan–Mar.

Limestone forests; 1800–2500 m. Yunnan [Vietnam].

27. Ainsliaea apteroides (C. C. Chang) Y. C. Tseng, Acta Phytotax. Sin. 31: 363. 1993.

狭翅兔儿风 xia chi tu er feng

Ainsliaea pteropoda Candolle var. *apteroides* C. C. Chang, Sinensia 4: 227. 1934.

Herbs, perennial, 20–50 cm tall. Leaves commonly in basal rosette, sometimes tightly alternate near base of stem; petiole 4–11 cm, wingless; leaf blade ovate, 5–10 × 3.5–6 cm, papery, palmate-pinnate veined, abaxially white tomentose, adaxially pubescent, base cordate, margin denticulate, apex acute to acuminate, rarely obtuse. Capitula sessile, arranged in spikes, 3-flowered; involucre cylindric, 3–4 mm in diam.; phyllaries ca. 7-seriate, papery, abaxially glabrous, outer phyllaries ovate or broadly ovate, 0.8–1.2 mm, inner narrowly elliptic, ca. 1.3 cm. Florets bisexual, chasmogamous and cleistogamous (at different seasons). Chasmogamous floret corollas purplish red, tubular, 1.2–1.4 cm, deeply 5-lobed, anther appendages truncate. Achenes fusiform, ca. 6 mm, densely white villous; pappus light red, ca. 7 mm. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 4 mm, hidden in pappus. Achenes 5–6 mm; pappus ca. 7 mm. Fl. Oct–Feb.

Limestone forests; 1200–1800 m. Sichuan, SE Yunnan [Bhutan, India].

28. Ainsliaea nana Y. C. Tseng, Acta Phytotax. Sin. 31: 365. 1993.

小兔儿风 xiao tu er feng

Herbs, perennial, 11–18 cm tall. Leaves in basal rosette; petiole 1–2.3 cm, wingless; leaf blade ovate, 0.7–1.6 × 0.5–1 cm, papery, palmate-pinnate veined, abaxially red, sparsely villous, adaxially sparsely strigose, base shallowly cordate, margin sparsely callose-denticulate, apex mucronate. Capitula shortly pedunculate, arranged in panicles, 3-flowered; involucre cylindric, ca. 3 mm in diam.; phyllaries ca. 5-seriate, abaxially glabrous, outer phyllaries ovate, 1–3.5 mm, inner oblong, ca. 7 mm. Florets bisexual, chasmogamous and cleistogamous. Chasmogamous floret corollas tubular, ca. 9 mm, deeply 5-lobed, lobes oblong, unequal, anther appendages rounded. Achenes fusiform, ca. 5 mm, ribbed, glabrous; pappus dark yellow, 6–8 mm. Cleistogamous floret corollas closed, tubular, ca. 1.5 mm, hidden in pappus. Fl. Aug–Oct.

• Forests; 1200–2400 m. Sichuan.

29. Ainsliaea paucicapitata Hayata, Icon. Pl. Formosan. 8: 71. 1919.

花莲兔儿风 hua lian tu er feng

Herbs, perennial, ca. 20 cm tall. Leaves basally clustered; petiole 1–1.5 cm, wingless; leaf blade deltate, 1–1.5 × 1–1.5 cm, palmate-pinnate veined, base cordate, margin obscurely denticulate, apex acute. Capitula sessile, arranged in spikes, 3-flowered; involucre campanulate; outer phyllaries ovate, inner linear to lanceolate. Florets bisexual, chasmogamous, corollas tubular, ca. 10 mm, 5-lobed. Achenes oblong to elliptic, densely pilose; pappus unknown. Fl. Jan.

• About 3000 m. Taiwan.

This species is very similar to *Ainsliaea apiculata* var. *apiculata* in its leaves long petiolate, leaf blades deltate, and capitula arranged in spikes. The only difference is that *A. paucicapitata* has leaf blades shallowly 5-lobed (vs. 5-angled) and leaves basally rosulate (vs. leaves clustered above stem base). No material of this species was available, so the description is based on the original diagnosis and a photograph of the type distributed by TI.

30. Ainsliaea cavaleriei H. Léveillé, Fl. Kouy-Tchéou, 82. 1914–1915.

卡氏兔儿风 ka shi tu er feng

Ainsliaea cleistogama C. C. Chang.

Herbs, perennial, 25–80 cm tall. Leaves basally clustered;

petiole (1.5–)3–10 cm, wingless, conspicuously strigose; leaf blade ovate to oblong, 4–13 × (0.5–)3–7 cm, papery, palmate-pinnate veined, abaxially reddish strigose, especially on veins, adaxially sparsely strigose, base deeply cordate, margin obscurely denticulate, apex acute to subobtuse; cauline leaves (when present) similar to radical, 17–30 × 9–16 mm, shortly petiolate and cuneate at base. Capitula sessile or shortly pedunculate, arranged in panicles, 3-flowered; involucre cylindric, 3–5 mm in diam.; phyllaries 5- or 6-seriate, purple, papery, strigose apically, outer phyllaries ovate, 2–2.5 mm, inner linear to elliptic, 6–10 mm. Florets bisexual, cleistogamous, corollas white, closed, tubular, minutely 5-lobed, 3–3.5 mm, anther appendages shortly apiculate. Achenes oblong-elliptic, 3–4 mm, densely pilose; pappus bristles ca. 6 mm. Fl. May–Jul, Oct–Dec.

• Moist slopes; 300–1100 m. Guangdong, Guangxi, Jiangxi.

This species is very similar to *Ainsliaea fragrans*, *A. ramosa*, and *A. rubrinervis* in its leaf blade ovate to oblong, leaf base deeply cordate, and petioles villous, but it differs by its phyllaries strigose apically.

31. Ainsliaea ramosa Hemsley, J. Linn. Soc., Bot. 23: 471. 1888.

莲沱兔儿风 lian tuo tu er feng

Herbs, perennial, 25–70 cm tall. Leaves in basal rosette; petiole 4–8 cm, wingless, strigose; leaf blade ovate, ovate-oblong, or ovate-lanceolate, 5–14 × 3–9 cm, subleathery, palmate-pinnate veined, abaxially densely red strigose, adaxially strigose, base deeply cordate, margin sparsely callose-denticulate, ciliate, apex acute or obtuse. Capitula shortly pedunculate, arranged in panicles, 3-flowered; involucre cylindric, 3–4 mm in diam.; phyllaries ca. 5-seriate, papery, glabrous, outer phyllaries ovate, 2–2.5 mm, inner oblong, ca. 9 mm. Florets bisexual, chasmogamous and cleistogamous (at different seasons). Chasmogamous floret corollas tubular, 7–9 mm, deeply 5-lobed, lobes oblong, unequal, anther appendages apiculate. Achenes fusiform, ca. 2 mm, ribbed, densely pilose; pappus dark yellow, 6–8 mm. Fl. Apr–Jun. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 5 mm, hidden in pappus. Achenes ca. 2.5 mm; pappus ca. 6 mm. Fl. Oct–Dec.

• Stream banks, dense forests; 100–800 m. Chongqing, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan.

This species is very similar to *Ainsliaea cavaleriei*, *A. fragrans*, and *A. rubrinervis* in its leaf blade ovate to oblong, leaf base deeply cordate, and petioles villous, but it differs by its phyllaries glabrous and leaf blade ± concolorous.

32. Ainsliaea rubrinervis C. C. Chang, Sinensia 4: 226. 1934.

红脉兔儿风 hong mai tu er feng

Herbs, perennial, 15–60 cm tall. Leaves in basal rosette; petiole 1.5–11 cm, wingless, strigose; leaf blade ovate or ovate-lanceolate, 2.5–11 × 1.4–4 cm, subleathery, palmate-pinnate veined, abaxially whitish green, veins red, strigose, adaxially green, sparsely strigose, base cordate, margin entire or obscurely callose-denticulate, ciliate, apex shortly acuminate. Capitula subsessile or shortly pedunculate, solitary or 2 or 3, arranged in spikes, 3-flowered; involucre cylindric, 3–4 mm in diam.; phyllaries ca. 6-seriate, papery, abaxially glabrous, outer phyllaries ovate, 2–3 mm, inner narrowly oblong, 9–11 mm. Florets bisexual, chasmogamous, corollas white, tubular, ca. 1 cm, deeply 5-lobed, lobes linear, unequal, anther appendages apiculate. Achenes fusiform, ca. 4.5 mm, ribbed, densely pilose; pappus dark white, ca. 7 mm. Fl. Jun–Jul.

• Forests; 800–1000 m. Sichuan.

This species is very similar to *Ainsliaea cavaleriei*, *A. fragrans*, and *A. ramosa* in its leaf blade ovate to oblong, leaf base deeply cordate, and petioles villous, but it differs by its phyllaries glabrous and leaf blade abaxially whitish green with veins red.

33. Ainsliaea angustata C. C. Chang, Sinensia 5: 158. 1934.

马边兔儿风 ma bian tu er feng

Herbs, perennial, 20–50 cm tall. Leaves in basal rosette; petiole 2–9 cm, wingless; leaf blade narrowly elliptic to lanceolate, 5–9 × 1–2.5 cm, subleathery, palmate-pinnate veined, abaxially strigose, adaxially sparsely strigose, base attenuate, slightly decurrent, margin entire or sparsely callose-denticulate, apex mucronate. Capitula shortly pedunculate, arranged in panicles, 3-flowered; involucre cylindric, ca. 4 mm in diam.; phyllaries 4- or 5-seriate, abaxially glabrous, outer phyllaries ovate, 2–3 mm, inner oblong-lanceolate, 7.5–9 mm. Florets bisexual, chasmogamous, corollas tubular, 0.9–1.2 cm, deeply 5-lobed, lobes oblong, unequal, anther appendages acuminate. Achenes subfusiform, ca. 4 mm, densely white pilose; pappus brownish or slightly red, ca. 6.5 mm. Fl. Mar–May, Oct.

• Stream banks, grassy areas; 600–1300 m. Chongqing, S Gansu, S Shaanxi, Sichuan.

34. Ainsliaea pingbianensis Y. C. Tseng, Acta Phytotax. Sin. 31: 365. 1993.

屏边兔儿风 ping bian tu er feng

Ainsliaea gongshanensis H. Chuang; *A. pingbianensis* var. *malipoensis* H. Chuang.

Herbs, perennial, 30–50 cm tall. Leaves in basal rosette; petiole 4–11 cm, wingless, densely fulvous strigose; leaf blade narrowly oblong or oblong-lanceolate, (7–)8–12 × 3–6 cm, papery, palmate-pinnate veined, both surfaces villous, base rounded, margin callose-denticulate, ciliate, apex obtuse to acute. Capitula shortly pedunculate, arranged in panicles, 3(–5)-flowered; involucre cylindric, 3–4 mm in diam.; phyllaries ca. 5-seriate, abaxially pilose when young and glabrate when old, outer phyllaries ovate, 1–2.5 mm, inner narrowly elliptic, 7–10 mm. Florets bisexual, chasmogamous and cleistogamous (at different seasons). Chasmogamous floret corollas tubular, ca. 9 mm, deeply 5-lobed, lobes oblong, unequal, anther appendages slightly rounded. Immature achenes terete, ca. 3.5 mm, densely dark yellow pilose; pappus dark white, ca. 7 mm. Fl. May. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 5 mm, hidden in pappus. Achenes ca. 4 mm; pappus ca. 7 mm. Fl. Aug–Dec.

• Stream banks, moist areas in forests; 1300–1900 m. Guangdong, Sichuan, Yunnan.

35. Ainsliaea fulvipes Jeffrey & W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 175. 1914.

黄毛兔儿风 huang mao tu er feng

Ainsliaea fulvioides H. Chuang; *A. fulvioides* var. *glabriachenia* H. Chuang; *A. lijiangensis* H. Chuang.

Herbs, perennial, 15–45 cm tall. Leaves in basal rosette; petiole 2–7 cm, wingless; leaf blade elliptic or subovate, 3–7.5 × 1.5–4 cm, subleathery, palmate-pinnate veined, both surfaces strigose, base rounded, margin callose-denticulate, apex rounded or obtuse. Synflorescence axis solitary, obscurely bracteate; paraclades in spike. Capitula subsessile or shortly pedunculate, (1 or)2 or 3, arranged in spikes; involucre cylindric, ca. 3 mm in diam.; phyllaries ca. 5-seriate, subleathery, abaxially apically sparsely pilose, outer phyllaries ovate, 2–3 mm, inner oblong or lanceolate, 5–10 mm. Florets bisexual, chasmogamous and cleistogamous. Chasmogamous floret corollas tubular, ca. 9 mm, deeply 5-lobed, anther appendages rounded. Immature achenes oblong, ca. 1.8 mm; pappus brownish, ca. 6 mm. Fl. Sep–Oct. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 3.5 mm, hidden in pappus. Achenes oblong, 3–3.5 mm, commonly densely pilose; pappus ca. 5 mm. Fl. May, Jul–Nov.

• Open forests, forest margins, grassy areas of mountain slopes; 1300–2700 m. Guangdong, Sichuan, Yunnan.

The variation patterns of the differential characters mentioned in the protologues of *Ainsliaea fulvipes*, *A. fulvioides*, *A. fulvioides* var. *glabriachenia*, and *A. lijiangensis*, e.g., achene pubescence and floret type (i.e., both chasmogamous and cleistogamous florets in the same plant or only cleistogamous florets) seem very complex. The present taxonomy is a temporary treatment based on limited specimens, and extensive field investigations at the population levels are needed to clarify their identities.

36. Ainsliaea glabra Hemsley, J. Linn. Soc., Bot. 23: 471. 1888.

光叶兔儿风 guang ye tu er feng

Herbs, perennial, 15–80(–150) cm tall. Leaves of variable position, alternate between base and median part of stem, basally clustered, or alternate above base of stem, especially in tiny individuals; petiole 4–18 cm, wingless; leaf blade ovate-lanceolate, lanceolate, oblong-lanceolate, or elliptic, 6–20 × 2–10 cm, subleathery, palmate-pinnate veined, commonly both surfaces glabrous, sometimes adaxially sparsely strigose, base attenuate or cuneate, margin callose-denticulate, apex acuminate. Capitula shortly pedunculate, arranged in panicles, 3-flowered; involucre cylindric, 2–4 mm in diam.; phyllaries (5 or)6-seriate, papery, abaxially glabrous, rarely apically sparsely pilose, outer phyllaries ovate, 1–2 mm, inner linear, 7–8.5 mm. Florets bisexual, chasmogamous and cleistogamous (at different seasons). Chasmogamous floret corollas tubular, 8–10 mm, deeply 5-lobed, lobes oblong, unequal, anther appendages rounded. Achenes fusiform, ca. 5 mm; pappus white, dark white, or light red, 5–7 mm. Fl. Apr–Oct. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, 2.8–7 mm, hidden in pappus. Achenes fusiform, ca. 4 mm; pappus yellow-white, 5–7.5 mm. Fl. Apr–Oct.

• Stream banks or moist grassy areas in forests, forest margins; 600–2400 m. Chongqing, Fujian, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan.

1a. Achenes glabrous or apically pilose ..... 36a. var. *glabra*
1b. Achenes densely pilose ..... 36b. var. *sutchuenensis*

36a. Ainsliaea glabra var. **glabra**

光叶兔儿风(原变种) guang ye tu er feng (yuan bian zhong)

Ainsliaea lancifolia Franchet.

Achenes glabrous or apically pilose. Fl. Apr–Oct.

• Moist grassy areas in forests, forest margins; 800–2400 m. Guizhou, Sichuan, Yunnan.

36b. Ainsliaea glabra var. **sutchuenensis** (Franchet) S. E. Freire, Ann. Missouri Bot. Gard. 94: 125. 2007.

四川兔儿风 si chuan tu er feng

Ainsliaea sutchuenensis Franchet, J. Bot. (Morot) 8: 296. 1894; *A. glabra* var. *tenuicaulis* (Mattfeld) C. C. Chang; *A. plantaginifolia* Mattfeld; *A. tenuicaulis* Mattfeld.

Achenes densely pilose. Fl. Apr–Jul.

• Stream banks or moist grassy areas in forests; 600–2000 m. Chongqing, Fujian, Guizhou, Hubei, Hunan, Jiangxi, Sichuan.

37. Ainsliaea nervosa Franchet, Bull. Mus. Hist. Nat. (Paris) 1: 64. 1895.

直脉兔儿风 zhi mai tu er feng

Herbs, perennial, 20–50 cm tall. Leaves mostly in basal rosette; petiole 3–10 cm, wingless; leaf blade ovate or oblong-lanceolate, 5–13 × 1–2.5 cm, leathery, palmate-pinnate veined, both surfaces glabrous or abaxially sparsely strigose, base long attenuate, margin callose-denticulate, not ciliate, apex acute; cauline leaves few, smaller. Capitula shortly pedunculate, arranged in panicles, 2- or 3-flowered; involucre cylindric, 4–5 mm in diam.; phyllaries 4- or 5-seriate, papery, outer phyllaries ovate, 1–2 mm, abaxially glabrous, inner lanceolate, 8–10 mm, abaxially with long glandular trichomes. Florets bisexual, chasmogamous and cleistogamous (at different or same seasons). Chasmogamous floret corollas tubular, 8–8.5 mm, deeply 5-lobed, lobes oblong, anther appendages rounded. Achenes fusiform or obconical-fusiform, ca. 5 mm, ribbed, densely white pilose; pappus dark white, ca. 6 mm. Cleistogamous floret corollas closed, tubular, minutely 5-lobed, ca. 4.2 mm, hidden in pappus. Achenes fusiform, ca. 2.5 mm; pappus ca. 6 mm. Fl. Apr–Jun.

• Stream banks, moist places or moist grassy areas in forests; 1000–1800 m. Guizhou, Sichuan, NE Yunnan.

38. Ainsliaea parvifolia Merrill, Philipp. J. Sci., C, 12: 110. 1917.

小叶兔儿风 xiao ye tu er feng

Herbs, perennial, 11–25 cm tall. Leaves basally clustered; petiole 2–5 cm, wingless, strigose; leaf blade ovate to oblong, 2–3.5 × 1.5–2 cm, subleathery, palmate-pinnate veined, abaxially moderately strigose, adaxially subglabrous, base abruptly

rounded, then cuneately narrowed into petiole, margin denticulate, apex acute-mucronate. Capitula shortly pedunculate, arranged in spikes, 3-flowered; involucre 5- or 6-seriate, narrowly campanulate, ca. 4 mm in diam.; phyllaries dull purple, subleathery, glabrous, outer phyllaries ovate, 1–2 mm, inner linear to elliptic, ca. 10 mm. Florets bisexual, chasmogamous, corollas white, tubular, 8.5–11 mm, anther appendages truncate. Achenes oblong to obovoid, ca. 2 mm, apically pilose; pappus 6.5–8 mm. Fl. Oct.

• Open grassy slopes; 500–1000 m. Guangdong.

This species is similar to *Ainsliaea yunnanensis* in its leaves long petiolate, leaf blades ovate with cuneate base, and capitula sessile but is quite different in its foliar trichomes straight (vs. T-shaped), involucre 8–10 mm (vs. 13–15 mm), and achenes apically pilose (vs. pilose).

39. Ainsliaea yunnanensis Franchet, J. Bot. (Morot) 2: 70. 1888.

云南兔儿风 yun nan tu er feng

Ainsliaea latifolia (D. Don) Schultz Bipontinus f. *yunnanensis* (Franchet) Kitamura; *A. pteropoda* Candolle var. *leiophylla* Franchet; *A. scabrida* Dunn.

Herbs, perennial, 20–70 cm tall. Leaves in basal rosette; petiole 2–7.5 cm, wingless; leaf blade ovate or ovate-lanceolate, 2–6 × 1–4 cm, subleathery, palmate-pinnate veined, both surfaces strigose, with long T-shaped hairs and few glandular hairs, base rounded and cuneately narrowed into petiole, margin callose-denticulate, apex acute. Capitula subsessile or shortly pedunculate, commonly 3–6 clustered, arranged in spikes; involucre cylindric, ca. 6 mm in diam.; phyllaries 5- or 6-seriate, subleathery, abaxially glabrous or very sparsely pilose, outer phyllaries ovate, 2.5–3.5 mm, inner lanceolate, ca. 1.4 cm. Florets bisexual, chasmogamous, corollas pink to purplish red, tubular, 1.6–1.8 cm, deeply 5-lobed, lobes oblong, unequal, apices revolute, anther appendages rounded. Achenes subfusiform, ca. 5 mm, densely white villous; pappus yellow-white, ca. 9 mm. Fl. Sep–Jan, Mar, May.

• Open forests, forest margins, grassy areas of mountain slopes; 1700–3700 m. Guizhou, Sichuan, Yunnan.

40. Ainsliaea chapaensis Merrill, J. Arnold Arbor. 21: 387. 1940.

边地兔儿风 bian di tu er feng

Herbs, perennial, 25–60 cm tall. Leaves in basal rosette; petiole 2–6(–10) cm, wingless, villous or glabrate; leaf blade ovate, 3–6 × 2–4 cm, papery, palmate-pinnate veined, abaxially at least villous on veins, adaxially glabrous or villous on midvein, base rounded, margin callose-denticulate, apex obtuse or mucronate. Synflorescence axis solitary, obviously bracteate; paraclades in spike. Capitula 1 or 2 in 1 reduced paraclade, subsessile, 3- or 4-flowered; involucre cylindric, ca. 3 mm in diam.; phyllaries ca. 5- or 6-seriate, papery, abaxially glabrous or sparsely pilose, outer phyllaries ovate, 2–3 mm, inner oblong, 9–11 mm. Florets bisexual, chasmogamous and cleistogamous. Chasmogamous floret corollas tubular, ca. 1 cm, deeply 5-lobed, lobes oblong, unequal, anther appendages obtuse. Immature achenes terete, ca. 4 mm, ribbed, densely villous; pappus light brownish, ca. 7 mm. Cleistogamous floret corollas closed, cylindric, ca. 4.2 mm, hidden in pappus. Fl. Dec–Apr.

Open forests, sandy places near seashores; below 800 m. Guangxi, Hainan [Vietnam].

Incompletely known species

Ainsliaea mollis Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 514. 1922.

Ainsliaea mollis was treated by Y. C. Tseng (FRPS 79: 34. 1996) as an accepted species, occurring in Sichuan and Yunnan. It resembles *A. fragrans* in external morphology. No material of this species was available to the present authors. Its identity is dubious.

8. PERTYA Schultz Bipontinus, Bonplandia 10: 109. 1862, nom. cons.

帚菊属 zhou ju shu

Gao Tiangang (高天刚); D. J. Nicholas Hind

Macroclinidium Maximowicz.

Shrubs, subshrubs, or perennial herbs, rarely scandent shrubs. Leaves alternate, or tufted on brachyblasts; leaf blade linear, subulate, lanceolate, oblong, or ovate, entire, dentate, or denticulate. Capitula subsessile or pedunculate, in glomerulate, corymbose, or paniculate synflorescences, or solitary, discoid, homogamous; involucre campanulate or cylindric; phyllaries many, 3-seriate to multiseriate, imbricate, unequal, herbaceous or leathery; receptacle flat, alveolate or not, glabrous or villous around, epaleate. Florets few, bisexual, rarely unisexual, tubular, corollas deeply 5-lobed, regularly or slightly irregularly, rarely obviously irregularly, lobed, lobes linear, revolute; anther bases long tailed, apex appendaged; styles shallowly divided at apex, style branches very short, abaxially with short hairs or papillae, apices obtuse. Achenes terete, obovoid, or obconic, 10-ribbed; pappus setae barbellate, numerous. $2n = 24, 26, 28$.

About 25 species: Afghanistan, China, Japan, Thailand; 17 species (16 endemic) in China.

1a. Leaf blade ovate to broadly ovate, rarely subelliptic on brachyblasts, (2.5–)3–7.5 mm wide, margin serrate, veins 3.
2a. Leaves alternate or tufted; capitulum solitary.
3a. Brachyblast leaves on branchlets elliptic; capitula terminal on branchlets ..... 1. *P. scandens*

3b. Brachyblast leaves on branchlets ovate; capitula terminal on long shoots ..... 2. *P. simozawae*
2b. Leaves alternate; capitula many, rarely few, in glomerulate or corymbose synflorescences.
4a. Capitulum 1-flowered; involucres cylindric, ca. 3 mm in diam. ..... 3. *P. desmocephala*
4b. Capitulum 4–12-flowered; involucres campanulate, 5–12 mm in diam.
5a. Phyllary apices mucronate to acuminate, pungent ..... 4. *P. pungens*
5b. Phyllary apices rounded to obtuse, never pungent.
6a. Capitula solitary, paired, or in corymbose synflorescences; leaf blade base broadly cuneate, obtuse, or truncate.
7a. Florets all bisexual; involucres narrowly campanulate, 5–6 mm in diam.; achenes glabrous or apices sparsely pubescent, pappus dark white ..... 5. *P. henanensis*
7b. Marginal florets female, central florets bisexual; involucres broadly campanulate, ca. 12 mm in diam.; achenes densely hairy, pappus brownish ..... 6. *P. corymbosa*
6b. Capitula 3–8 in glomerulate synflorescences; leaf blade base cordate, rarely truncate.
8a. Leaf blade apex mucronate or obtuse; florets 9–12 per capitulum ..... 7. *P. pubescens*
8b. Leaf blade apex acuminate to caudate; florets 4 or 5 per capitulum ..... 8. *P. cordifolia*
1b. Leaf blade linear, oblong, linear-lanceolate, or ovate-lanceolate, rarely subelliptic, 1–6(–15) mm wide, margin entire, vein 1, never 3, rarely with weak lateral veins.
9a. Phyllaries multiseriate, at least 6- or 7-seriate; leaf margin strongly revolute.
10a. Capitula many and small, 10–15 × 7–10 mm, solitary and terminal on branchlets or subtended by tufted leaves; florets 4–6 per capitulum.
11a. Leaves on branchlets homogeneous, leaf margin strongly revolute, terete, apex mucronate ..... 9. *P. phylicoides*
11b. Leaves on branchlets heterogeneous, leaf margin strongly or slightly revolute, dimorphic, one form terete, other form oblong or spatulate-oblong, apex obtuse or rounded ..... 10. *P. berberidoides*
10b. Capitula few and large, 2.5–3 × 1.5–2.5 cm, solitary and terminal on branches; florets 7–11 per capitulum.
12a. Capitula terminal, long pedunculate; phyllaries ca. 6-seriate; leaves subterete ..... 11. *P. monocephala*
12b. Capitula terminal or axillary, sessile; phyllaries 16–18-seriate; leaves on branchlets oblong ..... 12. *P. tsoongiana*
9b. Phyllaries 3- or 4-seriate, rarely 5-seriate, few; leaf blade flat.
13a. Capitula 1-flowered.
14a. Leaf blade oblong to linear, 11–40 × 2–5 mm; capitula solitary, terminal on branchlets; phyllaries 3-seriate ..... 13. *P. uniflora*
14b. Leaf blade elliptic or obovate, 2–12 × 1–6 mm; capitula many, in leafy panicles, axillary or terminal; phyllaries 5–7-seriate ..... 14. *P. bodinieri*
13b. Capitula multiflowered or with only 2 florets in female plants.
15a. Involucres narrow, 2–3 mm in diam. ..... 15. *P. discolor*
15b. Involucres wide, 5–8 mm in diam.
16a. Leaves without lateral veins and reticulate veins ..... 16. *P. angustifolia*
16b. Leaves with obvious lateral veins and reticulate veins ..... 17. *P. sinensis*

1. Pertya scandens (Thunberg) Schultz Bipontinus, Bonplandia 10: 109. 1862.

长花帚菊 chang hua zhou ju

Erigeron scandens Thunberg in Murray, Syst. Veg., ed. 14, 754. 1784; *Leucomeris scandens* (Thunberg) Schultz Bipontinus; *Pertya scandens* f. *schultziana* Franchet; *P. scandens* var. *viridis* Nakai.

Shrubs, 1–1.5 m tall. Leaves on long shoots alternate, petiole short, leaf blade ovate, 2.5–3.5 × 1.5–2.5 cm, papery, 3-veined, both surfaces glabrous, base rounded, margin serrate, apex acute or obtuse; leaves on branchlets tufted, 3 or 4, petiole 2–4 mm, 3-veined, leaf blade elliptic or narrowly elliptic, 4–6.5 × 1.5–2.5 cm or 1.5–3 × 0.7–1 cm, abaxially glabrous, adaxially sparsely hispidulous along midvein, base cuneate, margin serrulate, apex acuminate. Capitula solitary, terminal on branchlets, sessile, ca. 3 cm, many flowered; involucre cylindric, ca. 1.5 × 0.8 cm; phyllaries ca. 7-seriate, margin and apices sparsely pilose, outer phyllaries ovate, 1–1.2 mm, inner narrowly oblong, ca. 1.2 cm. Florets bisexual, corollas tubular, 1.6–1.9 cm, deeply 5-lobed, lobes linear-oblong, unequal. Achenes obconic, ca. 7 mm, densely white hairy, ribbed; pappus white, 0.8–1.1 cm. Fl. Jul–Aug.

Forest margins, open forests. Fujian, Jiangxi [Japan].

2. Pertya simozawae Masamune, Trans. Nat. Hist. Soc. Formosa 30: 37. 1940 [*"Simozawai"*].

台湾帚菊 tai wan zhou ju

Pertya scandens (Thunberg) Schultz Bipontinus var. *simozawae* (Masamune) Kitamura.

Shrubs. Leaves on long shoots alternate, petiole 1–3 mm, leaf blade ovate, 2–5 × 1.5–4.5 cm, papery, 3-veined, both surfaces sparsely villous, base rounded, margin mucronulate-dentate, apex acute or obtuse; leaves on branchlets tufted, 3 or 4, leaf blade ovate, deciduous, both surfaces sparsely villous, apex acute. Capitula solitary, terminal on long shoots, ca. 13-flowered; involucre campanulate, 1.4–1.7 cm; phyllaries ca. 7-seri-

ate, outer phyllaries ovate, inner narrowly oblong, ca. 1.2 cm. Florets bisexual, corolla tubular, ca. 1.3 cm, deeply 5-lobed, lobes linear, revolute. Achenes obconic, ca. 5.5 mm, densely white villous, ribbed; pappus 1.1–1.2 cm. Fl. Nov.

• Open forests; 300–1400 m. Taiwan.

3. Pertya desmocephala Diels, Notizbl. Bot. Gart. Berlin-Dahlem 9: 1032. 1926.

聚头帚菊 ju tou zhou ju

Herbs, perennial, 0.5–1 m tall. Leaves alternate; petiole 3–7 mm; leaf blade broadly ovate, 4–7.5 × 2–6.5 cm, papery, 3-veined, both surfaces sparsely villous, glabrate when old, base shallowly cordate or auriculate, margin undulate-serrate, apex acuminate. Capitula 2–5 in glomerulate synflorescences, axillary on upper parts of branches, 1-flowered; peduncle 2–5 mm; involucre cylindric, 1.1–1.3 cm × ca. 3 mm; phyllaries ca. 7-seriate, abaxially apically pubescent, apices obtuse to slightly acuminate, outer phyllaries ovate, 1.8–2.5 mm, inner linear, 1.1–1.3 cm. Florets bisexual, corolla tubular, 1.3–1.5 cm, deeply 5-lobed, lobes linear, unequal. Achenes fusiform, ca. 9 mm, villous, ribbed; pappus dark white to light brownish, ca. 1.3 cm. Fl. Aug–Nov.

• Forest margins, meadows, roadsides; 500–1200 m. Fujian, Guangdong, Jiangxi, Zhejiang.

4. Pertya pungens Y. C. Tseng, Guihaia 5: 334. 1985.

尖苞帚菊 jian bao zhou ju

Subshrubs, ca. 1 m tall. Leaves alternate; petiole 3–5 mm; leaf blade ovate, 3–5.5 × 2–4 cm, papery, 3-veined, both surfaces villous, base truncate or subtruncate, margin sparsely callose-denticulate, apex acuminate. Capitula 2–4-clustered on branch terminals, 7-flowered; involucre narrowly campanulate, 1.6–1.9 × ca. 0.6 cm; phyllaries ca. 7-seriate, abaxially glabrous or only outer phyllaries abaxially pubescent, apices acute to acuminate, pungent, outer phyllaries ovate, 1.8–4 mm, inner linear, 1.2–1.3 cm. Florets bisexual, corollas tubular, ca. 1.3 cm, deeply 5-lobed, lobes linear, 3–6.5 mm, unequal. Achenes fusiform, 6–7 mm, white villous, ribbed; pappus brownish, 1–1.2 cm. Fl. Oct–Nov.

• Stream banks. Guangdong (Hong Kong, Yangchun), Guangxi.

5. Pertya henanensis Y. C. Tseng, Guihaia 5: 330. 1985.

瓜叶帚菊 gua ye zhou ju

Herbs, perennial, ca. 1 m tall. Leaves alternate; petiole 5–8 mm; leaf blade ovate to broadly ovate, 5.5–10 × 3–7.5 cm, papery, 3-veined, abaxially villous, adaxially sparsely villous along midvein, base broadly cuneate or sometimes truncate, never cordate, margin hornlike dentate, ciliate, apex acuminate. Capitula solitary or double, axillary on upper part of branches, ca. 2 × 1 cm, 7–9-flowered; peduncle 4–15 mm; involucre cylindric, ca. 1.5 × 0.5–0.6 cm; phyllaries 6- or 7-seriate, abaxially villous, margin ciliate, outer phyllaries ovate, ca. 2 mm, inner linear, ca. 1.1 cm. Florets bisexual, corolla tubular, 1–1.1 cm, deeply 5-lobed, lobes linear, revolute. Immature achenes terete, ca. 5 mm, glabrous or apically sparsely pubescent, ribbed; pappus dark white, ca. 0.8 cm. Fl. Sep.

• Forests; 900–1100 m. Henan, Sichuan.

6. Pertya corymbosa Y. C. Tseng, Guihaia 5: 332. 1985.

疏花帚菊 shu hua zhou ju

Subshrubs, 1–3 m tall. Leaves alternate; petiole 3–4 mm; leaf blade ovate or broadly ovate, 6–8 × 4–6 cm, subleathery, 3-veined, both surfaces sparsely villous along veins, adaxially sparsely villous along midvein, base broadly cuneate or obtuse, margin sparsely denticulate on middle and upper part, apex acute to acuminate. Capitula many in corymb, terminal on branches, 10- or 11-flowered; peduncle 1–4 cm; involucre broadly campanulate, 1.2–1.5 × ca. 1.2 cm; phyllaries 8-seriate, abaxially densely pubescent, apices rounded or obtuse, outer phyllaries ovate, 2–3 mm, inner narrowly oblong, ca. 10 mm. Florets bisexual, corollas tubular, 1.2–1.4 cm, deeply 5-lobed, lobes linear. Achenes fusiform, ca. 8 mm, hispid, ribbed; pappus brownish, 1–1.2 cm. Fl. Jul–Oct.

• Dense forests. Guangxi, Hunan.

7. Pertya pubescens Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 32. 1949.

腺叶帚菊 xian ye zhou ju

Pertya cordifolia Mattfeld var. *pubescens* Y. Ling, Contr. Bot. Surv. N.W. China 1(2): 41. 1939.

Subshrubs, 1–2 m tall. Leaves alternate; petiole 3–5(–10) mm; leaf blade broadly ovate or ovate, 5–8 × 4–7 cm, papery, 3-veined, both surfaces densely pubescent, base broadly cordate, subauriculate, sometimes truncate, margin sparsely denticulate, apex acute or obtuse. Capitula solitary or 2 or 3 in glomerulate synflorescences, axillary, 9–12-flowered; peduncle 4–11 mm; involucre narrowly campanulate, 1.1–1.3 cm × 6–8 mm; phyllaries 7- or 8-seriate, abaxially densely sericeous, apices obtuse or acute (inner phyllaries), outer phyllaries broadly ovate, 1–3 mm, inner linear-oblong, 9–10 mm. Florets bisexual, corollas tubular, ca. 1.8 cm, deeply 5-lobed, lobes linear, unequal. Achenes subfusiform, 5–6 mm, sericeous, ribbed; pappus light brownish, 1.1–1.4 cm. Fl. Jul–Oct.

• Open forests, grassy areas of stream banks, roadsides; 600–1000 m. Fujian, Guangdong, Jiangxi, Zhejiang.

8. Pertya cordifolia Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 103. 1931.

心叶帚菊 xin ye zhou ju

Subshrubs, 1–1.8 m tall. Leaves alternate; petiole 2–4 mm; leaf blade broadly ovate, 5–7 × 3.5–6 cm, papery, 3-veined, both surfaces sparsely hispidulous when young, glabrate when old, base cordate or shallowly cordate, sometimes subtruncate, margin undulate or sparsely denticulate, apex acuminate. Capitula 3–8 in glomerulate synflorescences, axillary, 4- or 5-flowered; peduncle 1–2 cm; involucre narrowly campanulate, ca. 1.2 cm × 5–6 mm; phyllaries ca. 8-seriate, abaxially pubescent, apices obtuse, outer phyllaries ovate, 1.8–4 mm, inner linear-oblong, 8–9 mm. Florets bisexual, corollas tubular, 1.5–1.6 cm, deeply 5-lobed, lobes linear, unequal. Achenes subfusiform, ca. 6 mm, densely hispidulous, ribbed; pappus light brownish, 1–1.2 cm. Fl. Sep–Oct.

• Margins of forests or scrub; 800–1500 m. Anhui, Hunan, Jiangxi.

9. Pertya phylicoides Jeffrey, Notes Roy. Bot. Gard. Edinburgh 5: 200. 1912.

针叶帚菊 zhen ye zhou ju

Shrubs, ca. 1 m tall. Leaves on long shoots alternate, deciduous in flowering seasons, petiole very short, marcescent, leaf blade flat, linear-lanceolate to ovate-oblong, 4–8 × 1–4 mm; leaves on branchlets tufted, 4–6, sessile, leaf blade linear-lanceolate, 3–7 × 1–1.2 mm, abaxially glabrous, adaxially white sericeous, base attenuate, margin entire, strongly revolute, apex mucronate. Capitula solitary, terminal on branches, sessile, ca. 1.5 cm, 4–6-flowered; involucre cylindric, ca. 1 cm × 5 mm; phyllaries 6- or 7-seriate, abaxially sparsely pubescent, margin villous, outer phyllaries ovate, 2–2.5 mm, inner oblong-lanceolate, ca. 1 cm. Florets bisexual, corolla tubular, ca. 1 cm, deeply 5-lobed, lobes oblong-lanceolate, unequal. Achenes terete, 5–6 mm, densely white villous; pappus dark white, ca. 1 cm. Fl. Jun–Sep.

• Dry valleys; 2400–3100 m. Xizang, Yunnan.

10. Pertya berberidoides (Handel-Mazzetti) Y. C. Tseng, Guihaia 5: 328. 1985.

异叶帚菊 yi ye zhou ju

Pertya bodinieri Vaniot var. *berberidoides* Handel-Mazzetti, Symb. Sin. 7: 1174. 1936.

Shrubs, 0.5–1.5 m tall. Leaves on long shoots alternate, petiole base expanded, very short, leaf blade flat, ovate or ovate-lanceolate, 5–8 × 2–5 mm, both surfaces subglabrous, base rounded, margin entire or 2-dentate near middle part, apex attenuate; leaves on branchlets tufted, 4–6, sessile, dimorphic, one form flat, oblong to spatulate-oblong, 4–9 × 1–1.7 mm, abaxially glabrous, adaxially white stellate hairy, base attenuate, margin entire, slightly revolute, apex obtuse or rounded, other form strongly revolute, terete or awl-shaped, 2–5 × 0.7–1.2 mm, abaxially glabrous, adaxially densely sericeous, base attenuate, margin entire, strongly revolute, apex obtuse or mucronate. Capitula solitary, terminal on branches, sessile, 7–10 mm in diam., 5- or 6-flowered; involucre cylindric, ca. 6 mm in diam.; phyllaries 6- or 7-seriate, margin ciliate, outer phyllaries ovate, 1.5–2 mm, inner 9–12 mm. Florets bisexual, corollas tubular, 1–1.3 cm, deeply 5-lobed, lobes oblong-lanceolate. Achenes terete, ca. 6 mm, densely white villous; pappus dark white, ca. 1.1 cm. Fl. Jun–Sep.

• Mountain slopes, dry valleys; 2400–3200 m. Sichuan, Xizang, Yunnan.

11. Pertya monocephala W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 212. 1914.

单头帚菊 dan tou zhou ju

Shrubs, 30–80 cm tall. Leaves on long shoots alternate, deciduous in flowering seasons, petiole very short, marcescent, leaf blade not seen; leaves on branchlets tufted, 4–6, rarely 9, sessile, leaf blade linear-lanceolate, 5–6 × 1–2 mm, abaxially sparsely arachnoid lanate or subglabrous, adaxially white sericeous, base obtuse, margin entire, strongly revolute, apex mucronate. Capitula few, solitary, terminal on branches, ca. 2.5 cm, 7–11-flowered; peduncle 0.5–2.5 cm; involucre subcampanulate, ca. 2 × 1.5 cm; phyllaries ca. 6-seriate, outer phyllaries ovate, 3–5 mm, inner lanceolate or oblong-lanceolate, ca. 2 cm. Florets bisexual, corollas tubular, ca. 2 cm, deeply 5-lobed, lobes linear. Achenes terete, ca. 8 mm, densely white villous; pappus snow white, 1.3–1.5 cm. Fl. Jan–Feb.

• Dry valleys; 1900–3000 m. Xizang, Yunnan.

12. Pertya tsoongiana Y. Ling, Contr. Bot. Surv. N.W. China 1(2): 40. 1939.

巫山帚菊 wu shan zhou ju

Shrubs, 1–1.5 m tall. Leaves on long shoots alternate, deciduous in flowering seasons, petiole very short, marcescent, leaf blade not seen; leaves on branchlets tufted, 2–5, subsessile, leaf blade oblong, rarely narrowly elliptic, 6–12 × 2–5 mm, abaxially glabrous, adaxially glabrous or sparsely pubescent along midvein, base rounded, margin entire, slightly revolute, apex obtuse or rounded. Capitula very few, solitary, terminal on branchlets or very rarely axillary on long shoots, sessile, 2.5–3 cm, 8–10-flowered; involucre turbinate-campanulate, 2–2.5 × 1.5–1.8 cm; phyllaries 16–18-seriate, abaxially sparsely villous, margin scarious, lacerate, outer phyllaries ovate, ca. 0.5 mm, inner oblong-lanceolate, ca. 1.5 cm. Florets bisexual, corollas tubular, ca. 1.9 cm, deeply 5-lobed, lobes linear, 8–9 mm. Achenes fusiform-terete, 8–9 mm, densely white villous, ribbed; pappus white, ca. 1.2 cm. Fl. Apr–May.

• Mountain slopes; 300–700 m. Chongqing (Wushan).

13. Pertya uniflora (Maximowicz) Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 11: 105. 1931.

单花帚菊 dan hua zhou ju

Myripnois uniflora Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 495. 1882.

Shrubs, ca. 1 m tall. Leaves on long shoots alternate, petiole ca. 1 mm, leaf blade oblong or linear-oblong, 11–25 × 2–4 mm, papery, abaxially densely sericeous, adaxially sparsely villous, base attenuate, margin entire, apex mucronate or obtuse; leaves on branchlets tufted, 3–5, leaf blade narrowly oblong to linear-lanceolate, 18–40 × 2–5 mm. Capitula solitary, terminal on branchlets, ca. 1.3 cm, 1-flowered; peduncle 2–4 mm; involucre narrowly cylindric, 9–10 × 2–3 mm; phyllaries ca. 3-seriate, abaxially densely white lanuginous, outer phyllaries ovate, ca. 3.5 mm, inner narrowly linear, 8–10 mm. Florets bisexual, corolla purplish red, tubular, ca. 10 mm, deeply 5-lobed, lobes linear, revolute. Achenes obovoid, ca. 5 mm, white villous, ribbed; pappus white, ca. 8 mm. Fl. Jun–Aug.

• Scrub on mountain slopes; 1900–2100 m. Gansu.

14. Pertya bodinieri Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 116. 1903.

昆明帚菊 kun ming zhou ju

Subshrubs, 0.6–1.5 m tall. Leaves on long shoots alternate, petiole 1–3 mm, leaf blade oblong, 5–15 × 3–7 mm, papery,

both surfaces sparsely hispidulous, base attenuate, margin entire, ciliate, apex rounded or mucronate; leaves on branchlets tufted, 3–5, leaf blade subelliptic, 2–4 × 1–3 mm. Capitula many in large leafy panicles, 1-flowered; peduncle (0–)2–5 mm; involucre cylindric, 1.3–1.5 cm × 4–5 mm; phyllaries 5-seriate, abaxially pubescent, outer phyllaries ovate, 2–3 mm, inner narrowly oblong, 1.2–1.4 cm. Florets bisexual, corolla tubular, 1.7–1.9 cm, deeply 5-lobed, lobes linear, revolute. Achenes obovoid, ca. 6 mm, densely white villous, ribbed; pappus white or white-yellow, 1.2–1.5 cm. Fl. Jan–Mar.

• Stream banks; ca. 1900 m. Yunnan.

15. Pertya discolor Rehder, J. Arnold Arbor. 10: 135. 1929.

两色帚菊 liang se zhou ju

Shrubs, 0.8–2 m tall. Leaves on long shoots alternate, petiole ca. 1 mm, leaf blade linear-lanceolate, 7–30 × 2–4 mm, papery, abaxially densely sericeous, adaxially glabrous or sparsely villous when young, base attenuate, margin entire, apex mucronate; leaves on branchlets tufted, 3 or 4, leaf blade lanceolate or oblanceolate, 10–35 × 2–6 mm. Capitula solitary, terminal on branchlets; peduncle 2–5 mm; female capitula 1–1.1 cm, 2-flowered, male capitula 7–8 mm, 3–5-flowered; involucre cylindric, 2–3 mm in diam.; phyllaries 3-seriate, abaxially densely white lanuginous, outer phyllaries ovate, 2–3 mm, inner narrowly elliptic, ca. 6 mm. Florets unisexual, corollas purplish red, tubular, ca. 7 mm, deeply 5-lobed. Achenes obovoid-oblong or subterete, ca. 5 mm, villous; pappus white, ca. 8 mm. Fl. Jun–Aug.

• Scrub on mountain summits or slopes, coniferous forests; 1900–3200 m. Gansu, Ningxia, Qinghai, Shanxi, Sichuan.

1a. Leaf blade adaxially glabrous or sparsely villous when young, abaxially densely sericeous ..... 15a. var. *discolor*

1b. Leaf blade glabrous on both surfaces or sparsely villous abaxially when young ..... 15b. var. *calvescens*

15a. Pertya discolor var. **discolor**

两色帚菊(原变种) liang se zhou ju (yuan bian zhong)

Leaf blade abaxially densely sericeous, adaxially glabrous or sparsely villous when young. Fl. Jun–Aug.

• Scrub on mountain summits, coniferous forests; 1900–3100 m. Gansu, Ningxia, Qinghai, Shanxi, Sichuan.

15b. Pertya discolor var. **calvescens** Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 28. 1949.

同色帚菊 tong se zhou ju

Leaf blade glabrous on both surfaces or sparsely villous abaxially when young. Fl. Jul.

• Scrub on mountain slopes; ca. 3200 m. Gansu.

16. Pertya angustifolia Y. C. Tseng, Guihaia 5: 328. 1985.

狭叶帚菊 xia ye zhou ju

Shrubs. Leaves on long shoots alternate, subsessile, leaf blade lanceolate or narrowly lanceolate, 2–3.5 × 0.3–0.6 cm, papery, abaxially subglabrous, adaxially sparsely pubescent, base attenuate, margin entire, ciliate, apex acuminate; leaves on branchlets tufted, 3 or 4, subsessile, leaf blade oblong or obovate-oblong. Capitula solitary, terminal on branchlets; peduncle ca. 2 cm × 7–8 mm; involucre broadly campanulate, 5–6 × ca. 5 mm; phyllaries ca. 3-seriate, margin ± arachnoid lanate, outer phyllaries ovate, ca. 3 mm, median obovate-oblong or subelliptic, 6–7 mm, inner oblanceolate, 4.5–6 mm. Florets bisexual, corollas tubular, 7–8.5 mm, deeply 5-lobed, lobes slightly unequal, oblong. Immature achenes obconic, ca. 1 mm, densely hairy; pappus snow white, ca. 6 mm. Fl. Apr.

• Meadows, scrub; ca. 3600 m. Sichuan (Dawu).

17. Pertya sinensis Oliver, Hooker's Icon. Pl. 23: t. 2214. 1892.

华帚菊 hua zhou ju

Myripnois maximowiczii C. Winkler.

Shrubs, deciduous, 1–2 m tall. Leaves on long shoots alternate, petiole 2–4 mm, leaf blade oblong-lanceolate to lanceolate, 3–5 × 1.2–1.5 cm, papery, both surfaces sparsely pilose or glabrescent, base attenuate or obtuse, margin entire, apex acuminate or mucronate; leaves on branchlets 4–6, tufted, leaf blade oblong-lanceolate to narrowly elliptic, 4–6 × 1.2–1.5 cm or smaller. Capitula solitary, terminal on branchlets, dioecious; peduncle 2–3 cm; female capitula ca. 10 mm, with 4 or 5 florets, male 6–7 mm, with 9–12 florets; involucre narrowly campanulate or subcylindric, 5–8 mm in diam.; phyllaries 4- or 5-seriate, abaxially glabrous or margin sparsely pubescent, outer phyllaries broadly ovate, ca. 2 mm, median obovate, ca. 5 mm, inner oblanceolate, 8–9 mm. Female floret corollas tubular, ca. 9 mm, deeply 5-lobed, lobes unequal; male floret corollas deeply 5-lobed, limbs expanded. Achenes fusiform, ca. 7 mm, 10-ribbed, densely hairy; pappus yellow-white, 7–10 mm. Fl. Jun–Aug.

• Scrub, coniferous forests; 2100–2500 m. Gansu, Henan, Hubei, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

9. MYRIPNOIS Bunge, Enum. Pl. China Bor. 38. 1833.

蚂蚱腿子属 ma zha tui zi shu

Gao Tiangang (高天刚); D. J. Nicholas Hind

Shrubs, deciduous. Leaves on long shoots alternate, leaf blade elliptic or suboblong, papery; leaves on branchlets tufted, subsessile, leaf blade broadly lanceolate or ovate-lanceolate. Capitula solitary, terminal on branchlets, subsessile or with short peduncle, dioecious, hysteranthous; involucre campanulate or subcylindric; phyllaries few, 2- or 3-seriate, imbricate, subequal, herbaceous; receptacle small, glabrous, epaleate. Florets few, female florets tubular, corollas purple, irregularly deeply 5-lobed, often with one slit

deepest; male florets white, tubular, corolla irregularly deeply 5-lobed; anther bases of male florets tailed, apex appendaged, anthers of male florets reduced; styles of female florets shallowly divided at apex, style branches very short, abaxially with short hairs, apices obtuse; styles of male florets nearly undivided, abaxially papillate. Achenes fusiform, densely long setuliferous; pappus setae of female florets numerous, barbellate to subplumose; carpopodium annular; pappus setae of male florets of very few scabrid bristles.

• One species: China.

1. Myripnois dioica Bunge, Enum. Pl. China Bor. 38. 1833.

蚂蚱腿子 ma zha tui zi

Shrubs, deciduous, 0.6–1.6 m tall. Leaves on long shoots alternate, petiole 3–5 mm, leaf blade elliptic or suboblong, 2–6 × 1–2 cm, papery, both surfaces villous when young and glabrescent when old, base rounded or cuneate, margin entire, apex mucronate to acuminate; leaves on branchlets tufted, subsessile, leaf blade broadly lanceolate or ovate-lanceolate. Capitula solitary, terminal on branchlets, subsessile or with peduncle ca. 8 mm, dioecious, hysteranthous, 7–10 mm in diam.; involucre campanulate or subcylindric, 6–8 mm in diam.; phyllaries 2- or 3-seriate, few, subequal, oblong or suboblong, 8–10 mm, abaxially densely sericeous. Female floret corollas purple, ca. 13 mm, irregularly deeply 5-lobed, often with one slit deepest; male floret corollas white, ca. 13 mm, irregularly deeply 5-lobed. Achenes fusiform, ca. 7 mm, densely hairy; pappus setae of female florets numerous, light white, ca. 10 mm; pappus setae of male florets very few, snow white, 7–8 mm. Fl. Apr–May.

• Open places on mountain slopes; 100–600 m. Hebei, Henan, Hubei, Liaoning, Nei Mongol, Shaanxi, Shanxi.

2. Tribe **ECHINOPEAE**

蓝刺头族 lan ci tou zu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial or rarely annual. Leaves alternate. Synflorescence a compact globose pseudocephalium. Capitula with 1 floret, surrounded by crowded bristles at base. Phyllaries imbricate. Floret bisexual. Corolla actinomorphic. Stamen filaments glabrous; anther sagittate, with short basal appendages; connective with a sterile apical appendage. Style branches divergent, linear. Achene cylindric, angled, densely hairy, lacking an apical rim surrounding pappus insertion. Pappus of scales, inserted directly on upper edge of achene.

One genus and ca. 120 species: Africa, Asia, Europe; 17 species (five endemic) in China.

10. **ECHINOPS** Linnaeus, Sp. Pl. 2: 814. 1753.

蓝刺头属 lan ci tou shu

Acantholepis Lessing.

Herbs, perennial or rarely annual. Stems erect, usually apically branched, mostly cobwebby to lanate or glandular hairy or both. Leaves spiny. Pseudocephalia usually solitary, terminal to stem and branches, rarely clustered, bracteate at base. Capitula deciduous, inserted on a globose secondary receptacle. Basal phyllaries grading into bristles; middle phyllaries keeled and distally with a ciliate margin, apex usually spiny; inner phyllaries often shorter, unarmed, distinct to completely connate. Corolla white, blue, or purple. Anthers bluish gray. Achene covered with long straight appressed hairs. Pappus scales distinct to connate, inserted directly on apical plate.

About 120 species: Africa, Asia, Europe; 17 species (five endemic) in China.

Echinops albicaulis Kamelin & Kirilov and *E. chantaviscus* Trautvetter have been reported from Xinjiang (G. M. Shen, Fl. Xinjiang. 5: 238, 241. 1999), but they are not included in the following treatment and key because no material from China has been seen by the present authors.

1a. Annuals; middle phyllaries abaxially cobwebby.
2a. Stems and branches yellowish, glabrous or with glandular hairs; leaves green, sparsely cobwebby and glandular hairy ..... 16. *E. gmelinii*
2b. Stems and branches whitish to canescent, densely cobwebby to lanate; leaves grayish white, densely cobwebby to lanate ..... 17. *E. nanus*
1b. Perennials; middle phyllaries glabrous or strigose but not abaxially cobwebby.
3a. Margin of pappus scales not strigose.
4a. Leaves linear to linear-lanceolate, undivided and with an entire margin, discolorous, abaxially grayish white, adaxially green and glabrous ..... 14. *E. integrifolius*
4b. Leaves elliptic to oblanceolate, margin dentate to bipinnatifid, concolorous, cobwebby to lanate ..... 15. *E. humilis*
3b. Margin of pappus scales strigose.
5a. Leaves leathery.
6a. Outermost phyllaries 1/3–1/2 as long as involucre.
7a. Lower leaves lanceolate, undivided but toothed, adaxially glabrous and shiny ..... 1. *E. coriophyllus*
7b. Leaves elliptic, elliptic-lanceolate, or oblanceolate, pinnatipartite to bipinnatipartite, adaxially sparsely cobwebby ..... 2. *E. przewalskyi*
6b. Outermost phyllaries 1/5–1/4 as long as involucre.
8a. Plants to 1.5 m tall; stems sparsely cobwebby, strigose, and with glandular hairs ..... 4. *E. talassicus*
8b. Plants 0.2–0.6 m tall; stems cobwebby to lanate and strigose but lacking glandular hairs.
9a. Corolla lobes outside glabrous ..... 3. *E. ritro*
9b. Corolla lobes outside with a few hairs ..... 5. *E. tjanschanicus*
5b. Leaves ± thickly papery.
10a. Phyllaries abaxially strigose.
11a. Leaves adaxially glabrous or sparsely cobwebby ..... 12. *E. tricholepis*
11b. Leaves adaxially densely strigose ..... 13. *E. sphaerocephalus*
10b. Phyllaries abaxially glabrous.
12a. Stems glabrous to densely cobwebby in lower half but lacking bristles.
13a. Lobes of lower and middle cauline leaves densely spinulose ciliate ..... 6. *E. grijsii*
13b. Lobes of lower and middle cauline leaves entire or with irregular spiny teeth ..... 7. *E. davuricus*
12b. Stems cobwebby and beset with bristles in lower half.
14a. Leaves rough, adaxially sparsely strigose ..... 11. *E. setifer*

14b. Leaves smooth, glabrous or adaxially sparsely cobwebby.
15a. Outermost phyllaries ca. 1/4 as long as involucre; plants 1.5–2 m tall ..... 10. *E. sylvicola*
15b. Outermost phyllaries 1/3–1/2 as long as involucre; plants 0.3–1 m tall.
16a. Leaves pinnatipartite; phyllaries 18–22 ..... 8. *E. pseudosetifer*
16b. Leaves bipinnatisect; phyllaries 16–19 ..... 9. *E. dissectus*

1. Echinops coriophyllus C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 63. 1979.

截叶蓝刺头 jie ye lan ci tou

Herbs to 45 cm tall, perennial. Stem solitary, branched below middle, sparsely cobwebby. Leaves leathery, abaxially gray to grayish green and thinly cobwebby, adaxially green, glabrous, and shiny. Lower cauline leaves sessile, lanceolate, ca. 10.5 × 5.5 cm, base truncate, margin with spine-tipped teeth. Middle cauline leaves similar but gradually smaller upward. Uppermost cauline leaves lanceolate to elliptic. Pseudocephalia ca. 4 cm in diam. Capitula ca. 1.3 cm. Phyllaries 20 or 21, abaxially glabrous; outermost phyllaries oblanceolate, ca. 5 mm, unequal in length, 1/3–1/2 as long as involucre, claw margin sparsely long ciliate, distal portion broadly elliptic, cartilaginous, margin ciliate, and apex acuminate; middle and inner phyllaries oblanceolate to narrowly elliptic, 0.8–1.3 cm, distal half of margin sparsely shortly appressed ciliate. Florets ca. 1.3 cm. Corolla blue, glabrous, tube ca. 5 mm. Achene ca. 6 mm, hairs yellowish. Pappus scales linear, to 2 mm, unequal in length, connate for up to proximal half. Fl. and fr. Jul.

• Mountain slopes. Jiangsu (Tongshan).

2. Echinops przewalskyi Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 4: 108. 1923.

火烙草 huo lao cao

Herbs 15–40 cm tall, perennial. Stems solitary or tufted, unbranched or 1–3-branched, cobwebby to lanate. Leaves leathery, abaxially whitish to grayish white and densely cobwebby to thickly lanate, adaxially green to yellowish green and sparsely cobwebby, margin and apex spiny. Basal and lower cauline leaves shortly petiolate; leaf blade elliptic, elliptic-lanceolate, or oblanceolate, 10–20 × 2–8 cm, bipinnatipartite or subbipinnatisect, with 5–8 pairs of segments and a triangular ultimate lobe. Middle and upper cauline leaves sessile, gradually smaller upward, pinnatipartite, semiamplexicaul. Pseudocephalia 1 to few, ± corymbose, 5–5.5 cm in diam. Capitula ca. 1.8 cm. Phyllaries 16–20, abaxially glabrous; outermost phyllaries oblanceolate, to 8 mm, unequal in length, at least 1/2 as long as involucre, claw margin sparsely long ciliate, distal portion broadly elliptic, cartilaginous, margin sparsely shortly ciliate, and apex acuminate; middle phyllaries oblanceolate, ca. 1.5 cm, margin long appressed ciliate, apex narrowed into an awn; inner phyllaries similar but longer. Corolla white or bluish, outside gland-dotted, tube ca. 5 mm. Achene ca. 6 mm, hairs yellowish. Pappus scales linear, mostly ca. 1 mm, connate almost entirely. Fl. and fr. Jun–Aug.

• Sandy mountainous regions, desert steppes; 500–2200 m. C Gansu, Nei Mongol, Ningxia, SE Shandong, Shanxi, N Xinjiang.

Although C. Shih and Y. Ling (FRPS 78(1): 6. 1987) indicated that *Echinops przewalskyi* occurs in Mongolia, the species was not included among the *Echinops* in Mongolia by V. I. Grubov (Key Vascular Pl. Mongolia 2: 665–666. 2001).

3. Echinops ritro Linnaeus, Sp. Pl. 2: 815. 1753.

硬叶蓝刺头 ying ye lan ci tou

Echinops ritro var. *tenuifolius* (Fischer ex Schkuhr) Candolle; *E. tenuifolius* Fischer ex Schkuhr.

Herbs 20–60 cm tall, perennial. Stems solitary or tufted, whitish to grayish white, unbranched or apically branched, densely cobwebby to lanate. Leaves leathery, abaxially whitish to grayish white and densely cobwebby to thickly lanate, adaxially green and glabrous or sparsely cobwebby. Basal and lower cauline leaves petiolate; leaf blade elliptic, oblanceolate, or linear-elliptic, 8–20 × 2–8 cm, pinnatipartite or subpinnatisect; proximal segments transformed into spines; distal segments elliptic to lanceolate, 5–8 pairs, with triangular, spiny, and spine-tipped teeth. Middle and upper cauline leaves similar but sessile, sometimes bipinnatisect. Pseudocephalia corymbose, rarely solitary, 3.5–4.5 cm in diam. Capitula 1.2–1.7 cm. Phyllaries 20 or 21, abaxially glabrous; outermost phyllaries oblanceolate, 3–4 mm, 1/5–1/4 as long as involucre, distal portion broadly elliptic, cartilaginous, margin shortly ciliate, and apex acuminate; middle phyllaries elliptic to oblanceolate, 1.3–1.5 cm, margin long patent ciliate in distal half, apex spinulose acuminate; inner phyllaries shorter. Corolla blue, tube gland-dotted outside. Achene ca. 5.5 mm, hairs brown. Pappus scales linear, ca. 1.2 mm, connate in proximal half. Fl. and fr. Jun–Aug. $2n$ = 30, 32.

Gravelly places on mountain slopes; 400–2400 m. N Xinjiang [Kazakhstan, Mongolia, Russia, Turkmenistan; SW Asia, Europe].

Several subspecies were described from the European part of the species range. The Chinese plants possibly belong to *Echinops ritro* subsp. *ruthenicus* (M. Bieberstein) Nyman (*E. ruthenicus* M. Bieberstein).

4. Echinops talassicus Goloskokov, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Kazakhsk. S.S.R. 3: 52. 1965.

大蓝刺头 da lan ci tou

Herbs to 1.5 m tall, perennial. Stem solitary, grayish white, unbranched or branched up to twice, sparsely cobwebby to lanate and strigose, densely so under synflorescences. Leaves leathery, abaxially grayish white and densely cobwebby to thickly lanate, adaxially green and densely gland-dotted. Lower and middle cauline leaves shortly petiolate; leaf blade oblanceolate, 15–20 × 2–8 cm, pinnatipartite or pinnatifid; segments elliptic, with triangular, spiny, and spine-tipped teeth. Upper cauline leaves similar but sessile, gradually decreasing in size upward, semiamplexicaul. Pseudocephalia 1 to few, 4–5 cm in diam. Capitula 2–2.5 cm. Phyllaries few; outermost phyllaries narrowly oblanceolate, 5–6 mm, unequal, ca. 1/4 as long as involucre, distal portion broadly elliptic and margin long ciliate;

middle phyllaries oblanceolate to narrowly elliptic, 0.8–2.5 cm, distal portion of margin shortly ciliate, apex spinulose acuminate; inner phyllaries narrowly elliptic, ca. 1.2 cm, apex cleft and awned. Corolla blue, tube outside gland-dotted. Achene ca. 5 mm. Pappus scales ca. 1 mm, connate almost entirely. Fl. and fr. Jul–Sep.

Mountain slopes. Xinjiang (Tian Shan) [Kazakhstan].

5. Echinops tjanschanicus Bobrov, Fl. URSS 27: 714. 1962.

天山蓝刺头 tian shan lan ci tou

Herbs 20–25 cm tall, perennial. Stems branched from base, sparsely to densely cobwebby to lanate. Leaves leathery, abaxially grayish white or white and densely cobwebby to thickly lanate, adaxially green, glabrous, and gland-dotted. Basal and lower cauline leaves shortly petiolate; leaf blade elliptic, 10–20 × 2–3 cm, pinnatipartite or subpinnatisect; proximal segments transformed into spines; distal segments triangular-lanceolate to lanceolate, spiny. Middle and upper cauline leaves similar but sessile and gradually smaller upward, semiamplexicaul. Uppermost leaves narrowly elliptic to lanceolate, spiny toothed. Pseudocephalia solitary or paired, 3–4 cm in diam. Capitula 1.4–1.5 cm. Phyllaries 20–28; outermost phyllaries oblanceolate, 3–4 mm, unequal, 1/5–1/4 as long as involucre, distal portion brownish, broadly elliptic, cartilaginous, margin long ciliate, and apex shortly acuminate; middle phyllaries narrowly elliptic to lanceolate, 0.9–1.2 cm, distal half of margin long ciliate, abruptly constricted from middle into a spiny tip; inner phyllaries narrowly elliptic, ca. 1.3 cm, apex dentate. Corolla blue, tube outside gland-dotted, lobes abaxially with a few long hairs. Achene ca. 6.5 mm, hairs yellowish. Pappus scales linear, ca. 1 mm, unequal, connate at base. Fl. and fr. Jul–Sep.

Mountain slopes; ca. 2200 m. Xinjiang (Tian Shan) [Kazakhstan].

6. Echinops grijsii Hance, Ann. Sci. Nat., Bot., sér. 5, 5: 221. 1866.

华东蓝刺头 hua dong lan ci tou

Echinops cathayanus Kitagawa.

Herbs 30–80 cm tall, perennial. Stem solitary, apically usually branched, densely and thickly cobwebby, with fibrous petiole remains at base. Leaves papery, abaxially whitish to grayish white and densely cobwebby to thickly lanate, adaxially green, glabrous, and not glandular. Basal and lower cauline leaves long petiolate; leaf blade ± narrowly elliptic, ovate, or ovate-lanceolate, 10–15 × 4–7 cm, pinnatipartite; segments 4 or 5(–7) pairs, ovate-triangular to linear-elliptic, margin finely and densely spinulose. Middle cauline leaves similar but shortly petiolate or sessile. Pseudocephalia 1 to several, ca. 4 cm in diam. Capitula 1.5–2 cm. Phyllaries 24–28, glabrous, abaxially not gland-dotted; outermost phyllaries numerous, oblanceolate, 7–8 mm, unequal, ca. 1/2 as long as involucre, claw margin long ciliate in proximal half, distal portion brown, broadly elliptic, and margin shortly ciliate; middle phyllaries narrowly elliptic, ca. 1.3 cm, distal portion gradually constricted from middle into a spiny tip and margin shortly ciliate; inner phyllaries narrowly elliptic, ca. 1.5 cm, apex dentate. Florets ca. 1 cm. Corolla white, tube outside gland-dotted. Achene ca. 1 cm, hairs brownish yellow. Pappus scales linear, ca. 3 mm, connate almost entirely. Fl. and fr. Jul–Oct. $2n = 32+2B$*.

• Grasslands; 100–800 m. Anhui, Fujian, Guangxi, Henan, Hubei, Jiangsu, Jiangxi, S Liaoning, Shandong, Taiwan, Zhejiang.

7. Echinops davuricus Fischer ex Hornemann, Suppl. Hort. Bot. Hafn. 105. 1819.

驴欺口 lü qi kou

Echinops davuricus var. *angustilobus* Candolle; *E. davuricus* var. *latilobus* Candolle; *E. latifolius* Tausch; *E. latifolius* var. *manshuricus* (Kitagawa) C. Y. Li; *E. manshuricus* Kitagawa.

Herbs 30–60 cm tall, perennial. Stems grayish white, unbranched or with 1 or 2 short branches, with fibrous petiole remains at base, sparsely cobwebby to lanate or glabrous in lower part, densely cobwebby to thickly lanate below synflorescences. Leaves papery, abaxially grayish white and densely cobwebby to thickly lanate, adaxially green and glabrous or sparsely cobwebby. Basal and cauline leaves long petiolate; leaf blade ± narrowly elliptic to lanceolate-elliptic, 15–35 × 8–18 cm, bipinnatipartite, semiamplexicaul; segments 4–8 pairs; lobes entire or with few triangular spiny teeth, apex long acuminate. Uppermost cauline leaves sessile, pinnately lobed or pinnatifid, semiamplexicaul. Pseudocephalia 1–3, 3–5.5 cm in diam. Capitula ca. 1.9 cm. Phyllaries 14–17, abaxially glabrous; outermost phyllaries scalelike, oblanceolate, ca. 7 mm, ca. 2/5 as long as involucre, distal portion broadly rhombic to elliptic, margin long ciliate, and apex shortly acuminate; middle phyllaries oblanceolate, 1–1.3 cm, margin sparsely shortly ciliate, abruptly constricted from maximum width into a long spiny tip; inner phyllaries narrowly elliptic, ca. 1.5 cm, distal portion of margin shortly ciliate, apex spinulose acuminate. Corolla blue, tube outside gland-dotted. Achene ca. 7 mm. Pappus scales linear, ca. 1.2 mm, proximal half connate. Fl. and fr. Jun–Sep.

Grasslands, open forests; 100–2200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Mongolia, Russia].

Fischer's *"Echinops dauricus"* of 1812, a nomen nudum, was published twice independently in the same year, by Hornemann with the spelling *"davuricus"* and by Treviranus (Ind. Sem. Hort. Bot. Wratislav., App. 1: 2. 1819) as *"dahuricus."* We treat these two names as published simultaneously and give precedence to the former.

8. Echinops pseudosetifer Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 2: 120. 1935.

羽裂蓝刺头 yu lie lan ci tou

Herbs 50–100 cm tall, perennial. Stems grayish white, unbranched or apically with short branches, with fibrous petiole remains at base, lower half bristly and cobwebby to lanate, below synflorescences densely and thickly cobwebby to lanate. Leaves papery, abaxially whitish to grayish white and thickly cobwebby to densely lanate, adaxially green and usually glabrous. Basal and lower cauline leaves long petiolate; leaf blade elliptic, 25–30 × 8–13 cm, pinnatipartite, base enlarged and semiamplexicaul; segments 5–8 pairs, elliptic to narrowly lan-

ceolate, on one side with 1 or more triangular spiny teeth. Middle and upper cauline leaves similar but sessile, pinnately lobed or pinnatifid, semiamplexicaul. Pseudocephalia 1–7, ca. 6 cm in diam. Capitula 1.9–2.1 cm. Phyllaries 18–22, abaxially glabrous; outermost phyllaries oblanceolate, 7–8 mm, 1/3–2/5 as long as involucre, claw margin shortly ciliate, distal portion brown, rhombic to broadly elliptic, and margin shortly ciliate; middle phyllaries oblanceolate to narrowly oblanceolate-elliptic, 1.3–1.8 cm, margin shortly ciliate, abruptly constricted from maximum width into a spiny tip; inner phyllaries linear, ca. 1.5 cm. Corolla blue, outside apically gland-dotted. Achene ca. 6.5 mm, hairs yellowish. Pappus scales linear, ca. 2 mm, connate at base. Fl. and fr. Aug–Sep.

• Mountain slopes; 400–700 m. Hebei, Shanxi.

9. Echinops dissectus Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 2: 118. 1935.

东北蓝刺头 dong bei lan ci tou

Herbs 1.5–2 m tall, perennial. Stem solitary, whitish to grayish white, unbranched or apically sparingly branched, sparsely cobwebby and densely strigose in lower half, densely cobwebby to thickly lanate below synflorescences. Leaves ± thinly papery, abaxially grayish white and densely cobwebby to thickly lanate, adaxially green and glabrous. Middle and upper cauline leaves long petiolate; leaf blade oblanceolate, 16–18 × 4–6 cm, pinnatipartite or pinnatifid; proximal segments transformed into spines; distal segments 3 or 4 pairs, triangular to lanceolate, margin spiny ciliate or with triangular spiny teeth. Uppermost cauline leaves similar but smaller. Pseudocephalia 1–3, 5–6 cm in diam. Capitula 2–2.4 cm. Phyllaries ca. 23, abaxially glabrous; outermost phyllaries oblanceolate, 5–6 mm, unequal, ca. 1/4 as long as involucre, claw margin long ciliate, distal portion brownish, rhombic, margin ciliate, and apex shortly acuminate; middle phyllaries oblanceolate, 1.4–1.6 cm, margin shortly ciliate, constricted from maximum width into a spiny awn; inner phyllaries narrowly elliptic, apex dentate. Corolla blue, tube outside gland-dotted in distal half. Achene ca. 6 mm, hairs yellowish. Pappus scales linear, ca. 1.4 mm, connate at base. Fl. and fr. Jul–Aug.

Forest margins, moist grasslands, stony sunny slopes, river margins; 1300–1800 m. N Hebei, SW Heilongjiang, W Jilin, Liaoning, Nei Mongol, Shandong, Shanxi [Korea, Russia].

10. Echinops sylvicola C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 68. 1979.

林生蓝刺头 lin sheng lan ci tou

Herbs 1.5–2 m tall, perennial. Stem solitary, whitish to grayish white, unbranched or apically sparingly branched, sparsely cobwebby and densely strigose in lower half, densely cobwebby to thickly lanate below synflorescences. Leaves ± thinly papery, abaxially grayish white and densely cobwebby to thickly lanate, adaxially green and glabrous. Middle and upper cauline leaves long petiolate; leaf blade oblanceolate, 16–18 × 4–6 cm, pinnatipartite or pinnatifid; proximal segments transformed into spines; distal segments 3 or 4 pairs, triangular to lanceolate, margin spiny ciliate or with triangular spiny teeth. Uppermost cauline leaves similar but smaller. Pseudocephalia 1–3, 5–6 cm in diam. Capitula 2–2.4 cm. Phyllaries ca. 23, abaxially glabrous; outermost phyllaries oblanceolate, 5–6 mm, unequal, ca. 1/4 as long as involucre, claw margin long ciliate, distal portion brownish, rhombic, margin ciliate, and apex shortly acuminate; middle phyllaries oblanceolate, 1.4–1.6 cm, margin shortly ciliate, constricted from maximum width into a spiny awn; inner phyllaries narrowly elliptic, apex dentate. Corolla blue, tube outside gland-dotted in distal half. Achene ca. 6 mm, hairs yellowish. Pappus scales linear, ca. 1.4 mm, connate at base. Fl. and fr. Jul–Aug.

• Forests on mountain slopes; 1300–1500 m. Xinjiang (W Tian Shan).

11. Echinops setifer Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 4: 108. 1923.

糙毛蓝刺头 cao mao lan ci tou

Herbs 1–2 m tall, perennial. Stem solitary, whitish to grayish white, unbranched or apically shortly branched, base with dense long multicellular hairs and sparsely cobwebby, below synflorescences densely and thickly cobwebby to lanate. Leaves papery, abaxially whitish to grayish white, adaxially green and sparsely strigose but along veins densely cobwebby to thickly lanate and with dense long brown multicellular hairs. Basal and lower cauline leaves shortly petiolate; leaf blade elliptic to oblanceolate-elliptic in outline, 15–25 × 7–14 cm, bipinnatisect; segments 5–7 pairs; lobes narrowly elliptic to oblanceolate-triangular, with spiny and spine-tipped teeth. Middle and upper cauline leaves pinnatipartite. Uppermost cauline leaves narrowly elliptic. Pseudocephalia 1–3, 4–5 cm in diam. Capitula ca. 2 cm. Phyllaries 17–22, abaxially glabrous; outermost phyllaries oblanceolate, 8–9 mm, unequal, ca. 1/2 as long as involucre, claw margin long ciliate above middle, distal portion brown, broadly elliptic, margin sparsely ciliate, and apex spinulose acuminate; middle phyllaries oblanceolate, margin ciliate, abruptly constricted from maximum width into a 1.4–1.6 cm spiny tip; inner phyllaries elliptic, ca. 1.5 cm, apex dentate. Corolla blue, ca. 1.3 cm, tube outside sparsely gland-dotted. Achene ca. 7 mm, hairs yellowish. Pappus scales linear, ca. 2 mm, proximal half connate. Fl. and fr. Aug–Sep.

Mountain slopes. Henan, Shandong [Japan, Korea].

12. Echinops tricholepis Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 47. 1841.

薄叶蓝刺头 bao ye lan ci tou

Herbs 1–1.5 m tall, perennial. Stem solitary, grayish white, unbranched or apically branched, sparsely cobwebby and strigose, densely cobwebby to lanate below synflorescences. Leaves papery, green to grayish green, concolorous, both surfaces glabrous or sparsely cobwebby. Middle and upper cauline leaves sessile, elliptic, lanceolate, or ovate, 7–16 × 4–9 cm, pinnatipartite; segments elliptic-lanceolate to triangular-lanceolate, with spiny teeth. Uppermost cauline leaves similar but smaller. Pseudocephalia 1 or 2, 3.5–7 cm in diam. Capitula 2–2.3 cm. Phyllaries 15–18; outermost phyllaries oblanceolate to long spatulate, ca. 1 cm, ca. 1/2 as long as involucre, claw margin long ciliate, distal portion elliptic, abaxially sparsely strigose and gland-dotted, margin ciliate, and apex spinulose acu-

minate; middle phyllaries oblanceolate to oblanceolate-elliptic, 1.5–2 cm, abaxially strigose, apex aristate dentate. Corolla blue, tube apically gland-dotted. Achene ca. 7 mm, hairs yellow. Pappus scales linear, connate almost entirely. Fl. and fr. Aug.

Mountain slopes; 900–1300 m. NW Xinjiang [Kazakhstan].

13. Echinops sphaerocephalus Linnaeus, Sp. Pl. 2: 814. 1753.

蓝刺头 lan ci tou

Echinops cirsiifolius (K. Koch) Grossheim; *E. maximus* Sievers ex Pallas; *E. rochelianus* Grisebach var. *cirsiifolius* K. Koch.

Herbs 0.5–1.5 m tall, perennial. Stem solitary, branched, with dense long multicellular hairs and sparsely cobwebby. Leaves papery, abaxially grayish white, sparsely cobwebby to lanate, and with long multicellular hairs, adaxially green and densely strigose. Basal and lower cauline leaves petiolate; leaf blade broadly lanceolate, 15–24 × 5–10 cm, pinnatifid; segments 3–5 pairs, triangular to lanceolate, with spiny teeth and acuminate spiny apex. Upper cauline leaves sessile, gradually smaller upward. Pseudocephalia 1–3, 4–4.5 cm in diam. Phyllaries 14–18; outermost phyllaries narrowly oblanceolate, ca. 1 cm, ca. 1/2 as long as involucre, claw margin long ciliate, distal portion brown, broadly elliptic, abaxially densely strigose and gland-dotted, margin long ciliate, and apex spinulose acuminate; middle phyllaries oblanceolate to narrowly elliptic, ca. 1.2 cm, abaxially densely strigose, margin long ciliate; inner phyllaries lanceolate, abaxially densely strigose, apex dentate. Corolla blue to white, tube outside not gland-dotted or sparsely gland-dotted. Achene ca. 7 mm, hairs yellowish. Pappus scales ca. 1.2 mm, connate almost entirely. Fl. and fr. Aug–Sep. $2n$ = 30, 32.

Forest margins, next to water, fields; ca. 2000 m. Xinjiang (Altay Shan, Tian Shan) [Kazakhstan, Russia; SW Asia, Europe].

14. Echinops integrifolius Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 446. 1841.

全缘叶蓝刺头 quan yuan ye lan ci tou

Herbs 20–90 cm tall, perennial. Stem solitary, pale gray to grayish white, unbranched, leafy, with dense leaf remains at base, densely gland-dotted in lower and middle part, densely cobwebby to thickly lanate below synflorescences. Leaves sessile, linear to linear-lanceolate, 2–8 × 0.6–0.8 cm, undivided, abaxially whitish to grayish white and densely cobwebby to thickly lanate, adaxially green and densely gland-dotted, margin entire and revolute. Pseudocephalium solitary, 2–4 cm in diam. Capitula ca. 1.6 cm. Phyllaries 16–18; outermost phyllaries oblanceolate to linear, ca. 7 mm, ca. 1/2 as long as involucre, abaxially strigose, claw margin long ciliate, distal portion strigose and apex spinulose acuminate; middle phyllaries oblanceolate, ca. 1.1 cm, abaxially strigose, distal half of margin long ciliate; inner phyllaries narrowly elliptic, abaxially gland-dotted, margin long ciliate. Corolla white, tube outside not gland-dotted. Achene ca. 5 mm, hairs yellowish. Pappus scales subulate, ca. 1.5 mm, connate almost entirely. Fl. and fr. Jul–Sep.

Dry rocky slopes, sandy slopes, open areas in forests, fields; 400–2400 m. Xinjiang (Fuyun) [Kazakhstan, Mongolia, Russia].

15. Echinops humilis M. Bieberstein, Fl. Taur.-Caucas. 3: 598. 1819.

矮蓝刺头 ai lan ci tou

Herbs 7–16 cm tall, perennial. Stems solitary to few, grayish white, usually unbranched, leafy, densely to thickly cobwebby to lanate. Leaves papery, grayish white, concolorous, both surfaces densely cobwebby to thickly lanate. Basal leaves rosulate, shortly petiolate; leaf blade elliptic to oblanceolate, 2–7 × ca. 1 cm, pinnately lobed, lyrately pinnately lobed, or pinnatifid; segments 3–6 pairs, obliquely ovate to obliquely triangular, apex obtuse. Cauline leaves sessile, semiamplexicaul. Pseudocephalium usually solitary, ca. 3 cm in diam. Capitula ca. 1 cm. Outermost phyllaries oblanceolate, ca. 1 cm, ± equaling involucre, proximal half of margin long ciliate; middle phyllaries lanceolate, ca. 1 cm, margin shortly ciliate around middle, apex spinulose acuminate; inner phyllaries linear-lanceolate, margin shortly ciliate, apex long acuminate. Achene ca. 6 mm, hairs yellow. Pappus scales linear, ca. 1.2 mm, connate at base. Fl. and fr. Aug.

Mountain slopes; ca. 3000 m. SW Xinjiang (Taxkorgan) [Kazakhstan, Mongolia, Russia].

16. Echinops gmelinii Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 195. 1832.

砂蓝刺头 sha lan ci tou

Echinops turczaninowii Trautvetter.

Herbs 10–90 cm tall, annual. Stem solitary, yellowish, with patent branches in lower half, rarely unbranched, sparsely glandular hairy to glabrous. Leaves papery, green, concolorous, both surfaces sparsely cobwebby and glandular hairy. Lower cauline leaves sessile, linear to linear-lanceolate, 3–9 × ca. 0.5 cm, semiamplexicaul, margin with spiny teeth and spinulose. Middle and upper cauline leaves similar but gradually smaller upward. Pseudocephalia 1 to several, 2–3 cm in diam. Capitula 1.2–1.4 cm. Phyllaries 16–20; outermost phyllaries oblanceolate, to 1 cm, less than 1/2 as long as involucre, claw abaxially cobwebby at base, margin ciliate with cilia longest around middle, distal portion brown, broadly elliptic, abaxially densely strigose, and apex spinulose acuminate; middle phyllaries oblanceolate, ca. 1.3 cm, abaxially strigose and cobwebby at base, distal half of margin shortly ciliate, constricted from maximum width into a spiny tip; inner phyllaries narrowly elliptic, apex dentate. Corolla blue or white, tube not gland-dotted. Achene ca. 5 mm, hairs dark yellow. Pappus scales linear, ca. 1.2 mm, connate at base. Fl. and fr. Jun–Sep.

Gravelly places on mountain slopes, desert steppes, loess hills, flooded places; 500–3200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Mongolia, Russia (Tyva)].

17. Echinops nanus Bunge, Bull. Acad. Imp. Sci. Saint-Pétersbourg 6: 411. 1863.

丝毛蓝刺头 si mao lan ci tou

Herbs 12–16 cm tall, annual. Stem solitary, whitish to grayish white, with ascending robust branches, densely cob-

webby to thickly lanate. Leaves thickly papery, subconcolorous, both surfaces densely cobwebby to thickly lanate. Lower cauline leaves shortly petiolate; leaf blade oblanceolate to linear-oblanceolate, 4–8 × 1–1.2 cm, pinnately lobed to pinnatifid; segments 2–4(or 5) pairs, narrowly ovate, triangular-lanceolate, or triangular, with sparse spiny teeth. Upper cauline leaves similar but gradually smaller upward. Pseudocephalia several, 2.5–3 cm in diam. Capitula ca. 1.3 cm. Phyllaries 12–14; outermost phyllaries linear, slightly shorter than involucre, abaxially strigose, claw margin long ciliate, distal portion slightly expanded, margin shortly ciliate, and apex spinulose acuminate; middle phyllaries narrowly elliptic, ca. 1 cm, abaxially cobwebby on proximal portion, margin shortly ciliate, apex densely strigose and spinulose acuminate; inner phyllaries narrowly elliptic, abaxially cobwebby, apex bidentate. Corolla blue, tube outside sparsely glandular hairy and gland-dotted. Achene ca. 5 mm. Pappus scales linear, ca. 1.3 mm, proximal half connate. Fl. and fr. Jun–Jul.

Deserts; 1300–1500 m. Xinjiang (Pamir, Tian Shan) [Kazakhstan, Mongolia, Russia, Uzbekistan].

3. Tribe CARLINEAE

刺苞菊族 ci bao ju zu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Leaves alternate, rarely all basal. Capitula homogamous, bisexual, rarely unisexual in dioecious plants, persistent, solitary or several at end of stem and branches. Involucre surrounded by spiny ± divided bracts dissimilar from phyllaries. Phyllaries imbricate, undivided. Receptacle with scales and sometimes bristles, rarely naked. Florets numerous. Corolla actinomorphic, 5-lobed. Stamen filaments glabrous; anther sagittate, base caudate; connective with a sterile apical appendage. Style branches coherent, short, ± truncate. Achene covered with dense long straight appressed hairs, lacking apical rim surrounding pappus insertion. Pappus elements of one or two types of plumose or scabrid bristles, inserted directly on upper edge of achene, not surrounded by a rim.

Five genera and ca. 70 species: N Africa, Asia, Europe; three genera and six species (two endemic) in China.

1a. Inner phyllaries longer than florets, with a scarious and colored distal portion spreading when dry ..... 11. *Carlina*
1b. Inner phyllaries shorter than florets, erect and lacking a colored distal portion.
2a. Most leaves cauline; florets bisexual; receptacle covered with scales ..... 12. *Atractylodes*
2b. All leaves in a basal tuft; florets unisexual, plants dioecious; receptacle naked ..... 13. *Tugarinovia*

11. CARLINA Linnaeus, Sp. Pl. 2: 828. 1753.

刺苞菊属 ci bao ju shu

Herbs, biennial [or annual to perennial], with a taproot. Leaves undivided [to bipinnatisect], margin spinulose [to spiny toothed]. Outer bracts similar to leaves; inner bracts more divided. Phyllaries entire; inner phyllaries longer than florets, with a scarious and colored distal portion spreading when dry. Receptacle flat, areolate, with linear scales and bristles basally concrescent in a honeycomb pattern to envelop achenes. Florets bisexual. Achene oblong, terete, costate, apex truncate. Pappus bristles plumose, all of one type, forming a ring, united groupwise at base.

About 28 species: N Africa, Asia, Europe, Macaronesia (Canary Islands); one species in China.

1. Carlina biebersteinii Bernhardi ex Hornemann, Suppl. Hort. Bot. Hafn. 94. 1819.

刺苞菊 ci bao ju

Carlina longifolia Reichenbach (1830), not Viviani (1824); *C. longifolia* var. *pontica* Boissier; *C. vulgaris* Linnaeus var. *longifolia* Grabowski; *C. vulgaris* var. *microcephala* Ledebour.

Herbs 20–120 cm tall, biennial. Stem solitary, apically branched, weakly cobwebby. Basal leaves long petiolate. Cauline leaves sessile, undivided, green, concolorous or abaxially paler, lanceolate to linear-lanceolate, 4–15 × 0.5–2 cm, ± thickly papery, glabrous or abaxially sparsely cobwebby, margin with spinules alternating with distant groups of stouter spines. Uppermost cauline leaves grading into bracts. Bracts very numerous, surrounding capitulum; outer bracts similar to leaves, green, cobwebby; inner bracts gradually smaller upward, brown or dark purple, progressively reduced to bipinnate spines. Capitula 1 to several, corymbose. Involucre hemispheric-obconic, 3.5–4.5 cm in diam. Phyllaries linear, margin entire; outer phyllaries few, completely hidden by bracts, abaxially densely sericeous cobwebby, margins long interwoven ciliate, distal portion purplish, apex acuminate; inner phyllaries much longer, much exceeding florets, abaxially sparsely cobwebby, margin proximally appressed ciliate, distal portion adaxially yellow, scarious, spreading hygroscopically and showy when dry. Corolla purple, 7–9 mm. Achene oblong, 2–4 mm. Pappus bristles connate to varying lengths in groups of 2–4, all basally united into a ring. Fl. and fr. Jun–Sep. $2n = 20$.

Dry meadows, thickets, river terraces; ca. 1000 m. N Xinjiang (Burqin) [Kazakhstan, Russia; Europe].

12. ATRACTYLODES Candolle, Prodr. 7: 48. 1838.

苍术属 cang shu shu

Giraldia Baroni.

Herbs, perennial, rhizomatous. Rhizome with homomorphic adventitious roots. Leaves undivided to pinnatipartite, margin spinulose or with spine-tipped teeth. Bracts (except outermost leaflike ones) pectinately pinnatisect to pinnatipartite. Receptacle flat or concave, densely covered with linear scales. Florets bisexual. Achene obovoid to ovoid, compressed, apex truncate. Pappus bristles in 1 row, plumose, all of one type, basally connate into a ring.

About six species: E Asia; four species (two endemic) in China.

1a. Cauline leaves sessile.

2a. Cauline leaves undivided; corolla white, ca. 0.8 cm ..... 1. *A. koreana*
2b. Cauline leaves pinnately lobed or pinnatifid with 6–9 pairs of segments; corolla yellow, ca. 1.3 cm ..... 3. *A. carlinoides*
1b. Cauline leaves petiolate.
3a. Corolla white or yellow, to 1.3 cm ..... 2. *A. lancea*
3b. Corolla purplish red, ca. 1.7 cm ..... 4. *A. macrocephala*

1. Atractylodes koreana (Nakai) Kitamura, Acta Phytotax. Geobot. 4: 178. 1935.

朝鲜苍术 chao xian cang shu

Atractylis koreana Nakai, Bot. Mag. (Tokyo) 42: 478. 1928; *A. amplexicaulis* Nakai ex T. Mori (1923), not Poiret (1804).

Herbs 25–50 cm tall. Rhizome long, stout. Stems solitary or tufted, unbranched or apically branched, glabrous. Leaves ± thickly papery, green, subconcolorous, glabrous, undivided, apex acuminate to subacute. Basal and lowermost cauline leaves withered at anthesis. Lower and middle cauline leaves ± narrowly elliptic to ovate-lanceolate, 3.5–10 × 2–4 cm, base rounded and semiamplexicaul. Upper cauline leaves similar but smaller. Capitula 1 to several. Involucre campanulate to obconic-campanulate, ca. 1 cm in diam. Phyllaries imbricate, abaxially glabrous, apex obtuse to rounded; outer phyllaries ovate, 2–4 × 1–2 mm; middle phyllaries gradually longer; innermost phyllaries ± narrowly oblanceolate, ca. 11 × 4 mm. Corolla white, ca. 8 mm. Achene obovoid, ca. 4 mm. Pappus brown, 6–7 mm. Fl. and fr. Jul–Aug.

Thickets, dry slopes; 200–700 m. Liaoning, Shandong [Korea].

2. Atractylodes lancea (Thunberg) Candolle, Prodr. 7: 48. 1838.

苍术 cang shu

Atractylis lancea Thunberg in Murray, Syst. Veg., ed. 14, 729. 1784; *Acarna chinensis* Bunge; *Atractylis chinensis* (Bunge) Candolle; *A. chinensis* var. *liaotungensis* Kitagawa; *A. chinensis* var. *loeseneri* Kitagawa; *A. japonica* (Koidzumi) Kitagawa; *A. ovata* Thunberg; *A. ovata* f. *pinnatifolia* Komarov; *A. ovata* var. *simplicifolia* Loesener; *A. ovata* f. *ternata* Komarov; *A. pinnatifolia* (Komarov) S. Y. Hu; *A. separata* L. H. Bailey; *Atractylodes chinensis* (Bunge) Koidzumi; *A. erosodentata* Koidzumi; *A. japonica* Koidzumi; *A. lancea* var. *simplicifolia* (Loesener) Kitamura; *A. lyrata* Siebold & Zuccarini; *A. ovata* (Thunberg) Candolle; *A. ovata* var. *ternata* (Komarov) Koidzumi; *Giraldia stapfii* Baroni.

Herbs (15–)30–100 cm tall. Rhizome thick, horizontal or ascending. Stems solitary or tufted, unbranched or apically few branched, ± glabrous. Leaves ± rigidly papery, green, concolorous, glabrous or abaxially sparsely cobwebby. Basal leaves withered at anthesis. Lower and middle cauline leaves petiolate but lower ones sometimes subsessile; petiole 0.5–8 cm; leaf blade 8–12 × 5–8 cm, undivided or divided almost to base into 3–5(–9) pinnately arranged segments; segments undivided or sometimes near base with few small spiny lobes, ± narrowly elliptic to oblanceolate or obovate, 3–9 × 2–6 cm, base cuneate, apex shortly acuminate to rounded. Upper cauline leaves similar but smaller. Outer bracts few, leaflike; inner bracts numerous, homomorphic, reduced to pectinately arranged pinnate spines, exceeding but not completely hiding involucre. Involucre campanulate, 1–1.5 cm in diam. Phyllaries numerous, imbricate, margin cobwebby, apex rounded to obtuse; outer phyllaries ovate, 3–6 × 1–3 mm; middle phyllaries gradually longer; innermost phyllaries elliptic to linear, 11–12 × 2–4 mm. Corolla white or yellowish, 0.9–1.2 cm. Achene obovoid, ca. 5 mm, hairs white. Pappus brown to dirty white, 7–9 mm. Fl. and fr. Jun–Oct.

Grasslands, forests, thickets, rock crevices; 200–2500 m. Anhui, Chongqing, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Zhejiang [Japan, Korea, Russia].

Atractylodes lancea is widely cultivated throughout China. The rhizomes are used medicinally.

3. Atractylodes carlinoides (Handel-Mazzetti) Kitamura, Acta Phytotax. Geobot. 7: 119. 1938 [*"carolinoides"*].

鄂西苍术 e xi cang shu

Atractylis carlinoides Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 642. 1937.

Herbs 30–50 cm tall. Rhizome horizontal. Stem solitary, usually purplish red, unbranched. Leaves papery, green, concolorous, glabrous. Basal leaves rosulate, petiolate; leaf blade elliptic to oblanceolate, 15–21 × 3–4 cm, pinnately lobed or pinnatifid; segments triangular; lateral segments 6–9 pairs; terminal segment largest. Cauline leaves several, sessile, elliptic to lanceolate, 5–12 × 1–3 cm, pinnately lobed to pinnatipartite, apex with a long spine. Bracts pinnatipartite. Capitula 1 or 2. Involucre campanulate, 2.5–3 cm in diam. Phyllaries few, imbricate; outer phyllaries ± narrowly elliptic, 7–11 × 3–4 mm; middle phyllaries gradually longer; innermost phyllaries linear to broadly linear, ca. 21 × 3 mm. Corolla yellow, ca. 1.3 cm. Achene obovoid, ca. 6 mm. Pappus white, 7–8 mm. Fl. and fr. Sep.

● Slopes; ca. 1600 m. W Hubei (Zigui).

4. Atractylodes macrocephala Koidzumi, Fl. Symb. Orient.-Asiat. 5. 1930.

白术 bai shu

Atractylis macrocephala (Koidzumi) Nemoto (1936), not Desfontaines (1799); *A. macrocephala* var. *hunanensis* Y. Ling.

Herbs 20–60 cm tall. Rhizome thick. Stem branched from base, glabrous. Leaves papery, glabrous. Middle cauline leaves petiolate; petiole 3–6 cm; leaf blade divided almost to base into 3–5 segments; lateral segments entire or bipartite, oblanceolate to ± narrowly elliptic, 4.5–7 × 1.5–2 cm; terminal segment largest. Upper cauline leaves similar but smaller. Outer bracts

sessile, elliptic to narrowly elliptic, margin entire; inner bracts pinnatisect. Capitula 6–10. Involucre broadly campanulate, 3–4 cm in diam. Phyllaries numerous, imbricate, margin white cobwebby, apex obtuse; outer phyllaries ovate to triangular, 6–8 × 3–4 mm; innermost phyllaries lanceolate to broadly linear, 11–20 × 2–3 mm. Corolla purplish red, ca. 1.7 cm. Achene obconic, ca. 7.5 mm, hairs white. Pappus dirty white, ca. 1.7 cm. Fl. and fr. Aug–Oct. $2n = 24$*.

• Grasslands, forests; 600–2800 m. W Anhui, Chongqing, N Fujian, Guizhou, Hubei, Hunan, W Jiangxi, Zhejiang.

Atractylodes macrocephala is cultivated throughout China. The rhizomes are used medicinally.

13. TUGARINOVIA Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 356. 1928.

革苞菊属 ge bao ju shu

Herbs, perennial, dioecious, stemless. Taproot crowned by a thick woody stock. Leaves all basal, tufted, petiolate; leaf blade leathery, pinnately divided; segments spiny. Flowering scapes lateral, axillary, short. Capitulum solitary, homogamous, female or functionally male. Receptacle naked. Male florets small; female florets larger, with staminodes. Anthers basally with long filiform tails. Pappus elements of two types; inner pappus of distinct scabrid bristles; outer pappus shorter, of few slender tortuous hairs.

One species: China, Mongolia.

1. Tugarinovia mongolica Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 357. 1928.

革苞菊 ge bao ju

Woody stock 6–7 cm in diam., densely beset with persistently lanate petiole remains. Petiole 1.5–7 cm, proximal half with dense long silky indumentum; leaf blade elliptic, oblong, or ovate, 3–15 × 1–4 cm, pinnatipartite to pinnately lobed, both surfaces sparsely to densely cobwebby or lanate; segments wide and short, with irregular shallow spine-tipped teeth; spines rigid, 2–4 mm. Flowering scapes solitary or few, decumbent or ascending, unbranched, leafless, 2–4 cm, densely whitish lanate. Bracts leathery, with shallow spiny lobes, abaxially cobwebby; outer bracts leaflike, not always present; inner bracts smaller, grading into phyllaries, with yellow spinules. Male capitula ca. 1 cm; female capitula ca. 2 cm. Involucre obconic to obovoid, ca. 1 cm in diam. Phyllaries few, imbricate, linear-lanceolate, abaxially subglabrous, margin entire and ciliate, apex spiny. Corolla whitish, 0.7–1.4 cm. Style distally thickened, in female florets smooth and with ± divergent triangular-ovate branches, in functionally male florets covered with sweeping hairs at tip; branches coherent, linear. Achene oblong, 8–10 mm, densely sericeous-villous. Pappus dirty white, inner pappus to 1.5 cm. Fl. and fr. May–Jun.

Stony hillsides, sandy sloping fields, gravelly slopes; 800–1500 m. Nei Mongol [Mongolia].

The roots are used medicinally.

1a. Leaf blade narrowly elliptic to oblong ..... 1a. var. *mongolica*
1b. Leaf blade ovate ..... 1b. var. *ovatifolia*

1a. Tugarinovia mongolica var. **mongolica**

革苞菊(原变种) ge bao ju (yuan bian zhong)

Leaf blade narrowly elliptic to oblong.

Stony hillsides, sandy sloping fields; ca. 1500 m. Nei Mongol [Mongolia].

1b. Tugarinovia mongolica var. **ovatifolia** Y. Ling & Ma, Fl. Reipubl. Popularis Sin. 75: 248. 1979.

卵叶革苞菊 luan ye ge bao ju

Leaf blade ovate.

• Gravelly slopes; ca. 800 m. Nei Mongol (Ih Ju Meng).

4. Tribe **CARDUEAE**

飞廉族 fei lian zu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube, Werner Greuter, Ludwig Martins

Herbs, annual to perennial. Leaves alternate, sometimes all basal. Capitula homogamous or heterogamous, bisexual, sometimes unisexual in dioecious plants, persistent or deciduous, solitary or clustered at end of stem and branches, sometimes surrounded by ± leaflike spiny bracts. Phyllaries imbricate, undivided. Receptacle densely covered with bristles, rarely with short scales, or naked. Florets few to numerous. Corolla usually actinomorphic or slightly zygomorphic, equally or unequally 5-lobed or sometimes strongly zygomorphic in radiant florets of heterogamous capitula. Stamen filaments glabrous, papillose, or hairy; anther sagittate, base caudate; connective with a sterile apical appendage. Style branches distinct and divergent or coherent medially for most of their length and only seceding along stigmatic margins; sweeping hairs usually confined to a ringlike sometimes swollen zone at base of style branches or longest there and distally abruptly shorter. Achene usually glabrous, rarely ± hairy, apex with a peripheral rim surrounding an apical plate on which pappus is inserted; rim sometimes salient as an entire or dentate crown, sometimes inconspicuous.

About 75 genera and ca. 2,400 species: E and N Africa, Asia, Australia, Europe, North and South America; 37 genera (four endemic, three introduced) and 440 species (237 endemic, five introduced) in China.

1a. Achene attachment scar lateral or subbasal and oblique; capitula homogamous or heterogamous and mostly with radiant outer florets ..... 5. Subtribe Centaureinae
1b. Achene attachment scar ± basal; capitula always homogamous.
2a. Leaf margin unarmed, entire or with blunt to mucronulate non-pungent teeth, apex of phyllaries sometimes recurved but never hooked ..... 1. *Saussurea* group
2b. Leaf margin spiny or spinulose, or if ± entire then apex of phyllaries hooked.
3a. Pappus of distinct scabrid bristles falling off singly or (rarely) pappus absent; style branches distinct and divergent ..... 2. *Arctium* group
3b. Pappus of scabrid to plumose bristles (rarely scales) basally connate into a ring and falling off together; style branches coherent for most of their length.
4a. Achene with apical rim either inconspicuous or forming a conspicuous and crenulate (rarely entire) crown, apical plate lacking an elaiosome ..... 3. *Onopordum* group
4b. Achene with apical rim forming a smooth-margined upright crown, apical plate with a prominent oleaginous central umbo (elaiosome) ..... 4. Subtribe Carduinae

1. **SAUSSUREA** group

风毛菊群 feng mao ju qun

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Cauliferous herbs, stemless rosette herbs, or subshrubs, biennial, perennial, or rarely annual. Leaves without spines; leaf blade undivided to pinnatisect, margin entire or with blunt to mucronate non-pungent teeth. Capitula homogamous, bisexual. Phyllaries in several rows, without spines, apically sometimes with a green or purplish membranous or herbaceous appendage or mucronate. Receptacle densely covered with long subulate bristles, short scales, apiculate papillae, or naked and alveolate. Florets bisexual, all fertile. Corolla ± actinomorphic. Filaments distinct, glabrous. Style branches usually distinct and divergent, rarely partly coherent. Achene usually glabrous, sometimes glandular, rarely pubescent or papillose, apical rim inconspicuous or forming a ± developed crenulate or denticulate crown. Pappus homomorphic or heteromorphic, in 1 to several distinct or connate rows of scabrid to plumose bristles or rarely of small scales; inner pappus long, usually overtopping involucre.

About 15 genera and ca. 700 species: NW Africa, Asia, Europe, North America; nine genera (two endemic, one introduced) and 323 species (205 endemic, one introduced) in China.

1a. Plants annual; outer pappus an incomplete row of small scales and inner pappus a ring of plumose bristles ..... 21. *Hemisteptia*
1b. Plants perennial or biennial; pappus of only bristles.
2a. Pappus bristles in several rows, of different length, usually scabrid or barbellate, rarely plumose; receptacle with short scales or naked and alveolate, rarely with bristles.
3a. Pappus bristles silvery, dirty white, or white, inserted on a conic cupule, 0.5–1.5 cm; receptacle with short scales or bristles ..... 14. *Jurinea*
3b. Pappus bristles dirty white, yellowish, brown, or reddish, not inserted on a conic cupule, 1.5–4 cm; receptacle either alveolate or with long bristles.
4a. Capitula several and clustered or solitary in center of leaf rosette; phyllaries not densely lanate; receptacle alveolate, naked or with very short apiculate papillae, without bristles ..... 17. *Dolomiaea*
4b. Capitulum solitary on a subscapose stem; phyllaries densely lanate; receptacle with long bristles ..... 18. *Bolocephalus*

2b. Pappus bristles in 1 or 2 rows, with bristles of inner row of same length and always plumose; receptacle usually with ± long, subulate bristles, sometimes naked and alveolate, or with short apiculate papillae.
5a. Pappus in 2 rows; achene smooth, ribbed, or sometimes wrinkled, apical rim inconspicuous or rarely with a short crown.
6a. Outer pappus a row of scabrid or rarely plumose caducous bristles (rarely lacking), inner pappus a ring of plumose bristles ..... 22. *Saussurea*
6b. Outer and inner pappus bristles both plumose and connate with each other into a ring ..... 15. *Diplazoptilon*
5b. Pappus in 1 row; achene wrinkled or muricate, apical rim always forming a distinct crown.
7a. Corolla limb with sessile glands; achene blackish, 2–5 mm, with a dentate crown ..... 16. *Himalaiella*
7b. Corolla limb glabrous; achene straw-colored or brown with black spots, 5–8 mm, with a crenulate crown.
8a. Capitulum solitary, long pedunculate; petiole of basal leaves unwinged ..... 19. *Frolovia*
8b. Capitula 2–7 and clustered, sessile or subsessile; petiole of basal leaves with a broad lobed wing ..... 20. *Aucklandia*

14. JURINEA Cassini, Bull. Sci. Soc. Philom. Paris 1821: 140. 1821.

苓菊属 ling ju shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Pilostemon Iljin.

Herbs, perennial [or shrublets]. Leaves undivided to pinnatisect. Capitula solitary or several in a corymbiform synflorescence. Involucre bowl-shaped, ovoid, campanulate, hemispheric, or cylindric. Phyllaries herbaceous or leathery, appressed or reflexed. Receptacle with broad rigid shortly acuminate scales or bristles. Corolla red to purple, with sessile glands. Anther tails lacerate-caudate. Style branches short, divergent. Achene isodiametric, narrowly obovoid, narrowly ellipsoid, or obconic, 3- or 4-angled, glabrous or glandular, sometimes spinulose-tuberculate, apical rim forming a crown. Pappus bristles in several rows, white, scabrid, barbellate, or plumose, unequal in length, sometimes 2–5 inner bristles much longer than others; bristles inserted on a conspicuous conical cupule, persistent or caducous as a whole.

About 250 species: NW Africa, C and SW Asia, Europe; ten species (one endemic) in China.

The genus *Pilostemon* differs from *Jurinea* only in the pilose anther connectives. All other diagnostic characters given in the protologue of the genus, especially concerning the receptacle, achene, and pappus structure, can be found at least in some sections of *Jurinea* as well. *Pilostemon* is therefore not accepted in this treatment.

1a. Achene not spinulose-tuberculate.
2a. Leaf blade linear-filiform, 1–2 mm wide; involucre obconic; pappus plumose, 1–1.5 cm ..... 3. *J. filifolia*
2b. Leaf blade broadly linear to elliptic, more than 3 mm wide; involucre cylindric or bowl-shaped; pappus scabrid or barbellate, 0.8–1.2 cm.
3a. Leaf blade broadly linear, abaxially grayish white, adaxially green, undivided; involucre cylindric; phyllaries scarious ..... 1. *J. multiflora*
3b. Leaf blade elliptic, obovate, or ovate, green to grayish green, almost concolorous, pinnately dentate, pinnately lobed, or pinnately divided; involucre bowl-shaped; phyllaries leathery ..... 2. *J. mongolica*
1b. Achene spinulose-tuberculate.
4a. Pappus elements not connate into a ring, persistent.
5a. Outer and middle phyllaries with reflexed or slightly bent apex ..... 6. *J. dshungarica*
5b. Outer and middle phyllaries straight, appressed, apex not reflexed.
6a. Involucre cylindric, 1.2–1.5 cm in diam.; leaf blade grayish green, almost concolorous, arachnoid floccose ..... 4. *J. adenocarpa*
6b. Involucre bowl-shaped, 2–3 cm in diam.; leaf blade abaxially grayish white and densely tomentose, adaxially green to pale green and glabrous or sparsely arachnoid tomentose ..... 5. *J. lanipes*
4b. Pappus elements basally connate into a ring, caducous.
7a. Phyllaries straight, appressed, apex not reflexed ..... 7. *J. lipskyi*
7b. Outer and middle phyllaries with reflexed to patent apex.
8a. Herbs (10–)20–45 cm tall; leaf blade of rosette leaves 4–11 × 1–3 cm, green to grayish white, almost concolorous ..... 10. *J. chaetocarpa*
8b. Herbs stemless or with shorter stems 2–10(–20) cm tall; leaf blade of rosette leaves 2–4 × 0.3–1 cm, abaxially grayish white, adaxially green.
9a. Herbs stemless or shortly stemmed, to 10 cm tall; leaf blade of rosette leaves lyrately pinnatipartite, lyrately pinnatisect, or pinnately divided, usually some undivided; outer phyllaries sparsely arachnoid, glabrescent, 5–15 mm ..... 8. *J. algida*

9b. Herbs with developed stems, 7–18 cm tall; leaf blade of rosette leaves pinnately dentate to pinnately lobed; outer phyllaries densely arachnoid, 2–5 mm ..... 9. *J. kaschgarica*

1. Jurinea multiflora (Linnaeus) B. Fedtschenko, Consp. Fl. Turkestan. 4: 295. 1911.

多花苓菊 duo hua ling ju

Serratula multiflora Linnaeus, Sp. Pl. 2: 817. 1753; *Jurinea linearifolia* Candolle; *Saussurea multiflora* (Linnaeus) Candolle.

Herbs 10–20[–50] cm tall, perennial. Caudex long, slender, usually branched. Stems several or solitary, erect, apically branched. Basal and lower stem leaves shortly petiolate; leaf blade abaxially grayish white, densely tomentose, and gland-dotted, adaxially green and glabrous or ± gland-dotted, margin entire and revolute, apex acute. Middle stem leaves sessile; leaf blade linear to broadly linear, 4–8[–15] × 0.3–0.6[–1] cm, base semiamplexicaul. Bracts linear-subulate, smaller than lower stem leaves. Capitula many, in a terminal corymbose synflorescence. Involucre cylindric, 3–5 mm in diam. Phyllaries in 5 or 6 rows, scarious, appressed, glabrous or sparsely arachnoid pubescent, gland-dotted; outer phyllaries broadly to narrowly triangular, 3–5 × 1–2.5 mm; middle phyllaries elliptic to narrowly elliptic, 5–9 × 2–2.5 mm; inner phyllaries linear, 9–12 × 1–1.5 mm. Corolla pink to purple, 1.3–1.7 cm, tube 5–7.5 mm, limb 8–9 mm, lobes 4–5 mm. Achene brown to pale red, obconic, 3.5–5 mm, 4-ribbed, glabrous. Pappus bristles white, scabrid, 8–10 mm, not connate into a ring, persistent. Fl. Jun–Aug, fr. Jul–Sep.

Forests, saline steppes, meadows, wastelands, fields; 1800–2000 m. NW Xinjiang [Kazakhstan, Mongolia, Russia; E Europe].

2. Jurinea mongolica Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 19: 519. 1874.

蒙疆苓菊 meng jiang ling ju

Herbs 6–25 cm tall, perennial. Caudex stout, branched, apically covered with remains of petioles, densely white lanate. Stems erect, branched from base. Basal leaves petiolate; petiole 2–4 cm, base densely lanate; leaf blade elliptic to narrowly ovate-elliptic, 2–7 × 0.5–1.5 cm, pinnately divided, pinnately lobed, or pinnately dentate, green to grayish green, almost concolorous, glabrous or sparsely arachnoid, margin entire and revolute; lateral lobes 3 or 4 pairs, narrowly elliptic to narrowly triangular-ovate; terminal lobe narrowly ovate-elliptic, longer than lateral ones. Stem leaves sessile, similar to basal leaves or undivided. Capitulum solitary at end of branches. Involucre bowl-shaped, 1.5–2.5 cm in diam. Phyllaries in 4–6 rows, leathery, appressed, gland-dotted, apex acuminate; outer phyllaries narrowly triangular, 4–6 × 1.5–2.5 mm; middle phyllaries narrowly triangular-subulate, 7–11 × 1.5–2.5 mm; inner phyllaries linear, 15–20 × 2–3 mm. Corolla red, 2–2.5 cm, gland-dotted, tube 6–9 mm, limb 1.4–1.6 cm, lobes 5–7 mm. Achene brown, obconic, 4–6 mm, apically sparsely gland-dotted. Pappus bristles dirty white, barbellate, 5–12 mm, with 2–4 of inner ones much longer than others, not connate into a ring, persistent. Fl. Jun–Jul, fr. Jul–Aug.

Desert steppes; 1000–1500 m. Nei Mongol, Ningxia, Shaanxi, Xinjiang [Mongolia].

3. Jurinea filifolia (Regel & Schmalhausen) C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 170. 1890.

毛蕊苓菊 mao rui ling ju

Saussurea filifolia Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 312. 1880; *Jurinea argentata* C. Shih & S. Y. Jin; *J. pilostemonoides* Iljin; *Pilostemon filifolius* (Regel & Schmalhausen) Iljin.

Herbs 25–70 cm tall, perennial. Stems solitary or few, grayish green, erect, virgately branched from base. Leaves sessile, linear to filiform, 1–7[–10] × 0.1–0.2 cm, abaxially grayish white and densely arachnoid tomentose, adaxially green and glabrous, margin revolute, apex acute. Capitulum solitary at end of branches. Involucre obconic, 1–2 cm in diam. Phyllaries in 5–8 rows, purplish red, appressed, tomentose, apex not reflexed, acuminate, and cartilaginous; outer phyllaries narrowly ovate-elliptic, 3–5 × 1–1.5 mm; middle phyllaries narrowly ovate to narrowly elliptic, 5–13 × 1.5–2 mm; inner phyllaries broadly linear, ca. 14 × 1.5 mm. Corolla purplish red, 1.5–2 cm, tube 7–9 mm, limb 6–7 mm, lobes 3–4 mm. Anther connectives with few very fine long unicellular hairs. Achene blackish brown, obconic, 3–5 mm, apically densely glandular and with a dentate crown. Pappus bristles white or dirty white, plumose, 1–1.5 cm, not connate into a ring, persistent. Fl. Jul–Aug, fr. Aug–Oct.

Gravelly riversides, moist gorges, sandy places; 700–1000 m. C Xinjiang [Kazakhstan].

Jurinea pilostemonoides does not differ from *J. filifolia*, except by the glabrous anther connectives, which, however, can be glabrescent in *J. filifolia* as well.

Jurinea karategina (Lipsky) O. Fedtschenko, described from Tajikistan and also treated as *Pilostemon karateginus* (Lipsky) Iljin, is said to occur in Xinjiang as well (G. M. Shen, Fl. Xinjiang. 5: 258. 1999; Iljin, Fl. URSS 27: 711. 1962), but no specimens from China are known. It differs from *J. filifolia* by its broader, elliptic or oblong leaves, to ca. 10 × 1.5 cm, and by its smaller florets, with a corolla of 1–1.3 cm.

4. Jurinea adenocarpa Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 46. 1841.

腺果苓菊 xian guo ling ju

Herbs 15–40 cm tall, perennial. Caudex stout, branched, apically lanate tomentose. Stems several, erect, divaricately branched in apical half. Lower and middle stem leaves shortly petiolate; leaf blade elliptic, 5–10 × 1–2 cm, pinnately lobed or pinnately divided, both surfaces grayish green and arachnoid floccose; segments narrowly elliptic to linear, margin sinuate. Upper stem leaves sessile, elliptic to linear, gradually smaller upward on stem, undivided. Capitulum solitary at end of branches. Involucre cylindric, [0.8–]1.2–1.5 cm in diam. Phyllaries in ca. 6 rows, appressed, sparsely arachnoid floccose; outer phyllaries ovate, ca. 3 × 1 mm, apex acute; middle phyllaries narrowly ovate, 5–7 × 1–2 mm, apex spiniform-acuminate; inner phyllaries narrowly ovate, 10–14 × 2–3 mm, apex long acuminate. Corolla purple, 1–1.4 cm, tube 3.5–7.5 mm,

limb 2–3 mm. Achene cylindric to obconic, 4.5–6.5 mm, minutely glandular, apically sparsely spinulose-tuberculate. Pappus bristles barbellate, 5–10 mm, not connate into a ring, persistent. Fl. May–Aug, fr. Jul–Sep.

Sandy steppes, rocky slopes, scree slopes; ca. 1500 m. N Xinjiang (Burqin) [Kazakhstan].

5. Jurinea lanipes Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 58. 1869.

绒毛苓菊 rong mao ling ju

Jurinea flaccida C. Shih.

Herbs 15–50 cm tall, perennial. Caudex stout, apically covered with remains of petioles, densely lanate. Stems solitary or several, erect, simple or branched from base. Basal leaves petiolate; petiole 4–6 cm; leaf blade narrowly obovate to elliptic, 5–10 × 2–3 cm, lyrately pinnately lobed, abaxially grayish white and densely tomentose, adaxially green and glabrous or sparsely arachnoid and gland-dotted; lateral lobes 3–10 pairs, ovate to elliptic, margin entire, apex obtuse to rarely acute; terminal lobe larger than lateral ones. Lower and middle stem leaves few, shortly petiolate to sessile, similar to basal leaves. Uppermost stem leaves linear, usually undivided. Capitulum solitary at end of branches. Involucre bowl-shaped, 2–3 cm in diam. Phyllaries in ca. 6 rows, appressed, sparsely arachnoid, gland-dotted, apex spiniform-acuminate; outer phyllaries triangular, 6–10 × 1–2 mm; middle and inner phyllaries narrowly triangular-ovate, 10–18 × 1–2 mm. Corolla reddish purple, 1.6–1.7 cm, tube 4–7 mm, limb 1–1.2 cm, lobes ca. 5 mm. Achene cylindric-obconic, 5–6 mm, apically spinulose-tuberculate. Pappus bristles white, barbellate, 0.8–1.2 cm, with 1 or 2 of inner ones much longer than others, not connate into ring, persistent. Fl. May–Aug, fr. Jun–Sep.

Alpine and subalpine forest meadows, steppes, wastelands, roadsides; 1200–2900 m. NW Xinjiang (Zhaosu) [Kazakhstan, Kyrgyzstan, Tajikistan].

6. Jurinea dshungarica (N. I. Rubtzov) Iljin in Schischkin & Bobrov, Fl. URSS 27: 683. 1962.

天山苓菊 tian shan ling ju

Jurinea chaetocarpa (Ledebour) Ledebour subsp. *dshungarica* N. I. Rubtzov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 65. 1940.

Herbs 10–40(–60) cm tall, perennial. Caudex stout, apically covered with remains of petioles. Stems solitary or few, erect, simple or branched. Basal leaves petiolate; petiole 1.5–4(–8) cm, base adaxially densely lanate; leaf blade elliptic, 5–7(–12) × 1–2.5 cm, pinnately lobed to undivided, abaxially grayish white and densely tomentose, adaxially grayish green, arachnoid, and gland-dotted; lateral lobes 4–7 pairs, ovate, elliptic, or broadly triangular, margin entire or dentate, apex rounded to acute. Stem leaves few, similar to basal leaves, gradually smaller upward on stem. Capitulum solitary at end of branches. Involucre bowl-shaped, 1.5–2 cm in diam. Phyllaries in ca. 5 rows, yellowish green, arachnoid; outer and middle phyllaries narrowly triangular-ovate to narrowly elliptic, 3–10 × 1–3 mm, apex spiniform-acuminate and reflexed; inner phyllaries elliptic to elliptic-linear, 8–14 × 1–2 mm, apex acuminate and not reflexed. Corolla reddish purple, 1.4–1.9 cm, tube 4–7 mm, limb 1–1.2 cm, lobes 4–6 mm. Achene obconic, 5–6 mm, apically spinulose-tuberculate. Pappus bristles white, barbellate, 0.8–1.2 cm, with 2 of inner ones much longer than others, not connate into a ring, persistent. Fl. May–Jun, fr. Jun–Aug.

Mountain slopes, sandy soils; 1800–2700 m. NW Xinjiang (Huocheng, Zhaosu) [Kazakhstan].

"Jurinea suidunensis" belongs here, but, to our knowledge, has never been validated by a description or diagnosis. When regarded as conspecific with *J. dshungarica* (e.g., by Tscherneva, Bot. Zhurn. 86 (12): 88–89. 2001), a concept which is followed here, the latter name has to be adopted as the correct one for this taxon.

7. Jurinea lipskyi Iljin, Trudy Turkestansk. Nauchn. Obshch. Sredne-Aziatsk. Gosud. Univ. 2: 23. 1925.

苓菊 ling ju

Herbs 35–50 cm tall, perennial. Stems solitary or few, erect, simple or few branched. Basal leaves petiolate; petiole 1–2 cm; leaf blade elliptic to narrowly obovate, 2–4 × 1.5–2 cm, pinnately lobed, abaxially grayish white and sparsely tomentose, adaxially green to grayish green and glabrous or sparsely arachnoid; lateral lobes 3 or 4 pairs, narrowly elliptic to narrowly triangular-ovate, margin undulate or serrulate, apex obtuse. Stem leaves few, gradually smaller upward on stem; lower stem leaves similar to basal leaves; upper stem leaves linear to subulate. Capitulum solitary at end of branches. Involucre bowl-shaped, 1.5–2 cm in diam. Phyllaries in ca. 4 rows, appressed, glabrous or sparsely arachnoid, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, 4–6 × 2–3 mm; middle and inner phyllaries narrowly ovate-elliptic to linear, 10–15 × 3–4 mm. Corolla purple, ca. 1.5 cm, tube 4.5–5.5 mm, limb ca. 1 cm, lobes 4–5 mm. Achene obconic, 6–7 mm, gland-dotted, apically spinulose-tuberculate. Pappus bristles white, scabrid to barbellate, to 9 mm, with 2 of inner ones much longer than others, basally connate into a ring, caducous. Fl. May–Jun, fr. Jun–Jul.

Montane steppes and meadows; ca. 1900 m. NW Xinjiang (Zhaosu) [Kazakhstan].

8. Jurinea algida Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 5: 170. 1924.

矮小苓菊 ai xiao ling ju

Jurinea pamirica C. Shih.

Herbs 2–10 cm tall, perennial, stemless or shortly stemmed. Caudex simple or branched, covered with remains of petioles. Rosette leaves petiolate; petiole 1.5–3 cm, base adaxially lanate; leaf blade elliptic to narrowly obovate, 2.5–4 × 0.5–1 cm, lyrately pinnately lobed to divided or pinnately divided, abaxially grayish white and densely tomentose, adaxially green, sparsely arachnoid, and gland-dotted but glabrescent; lateral lobes 2–4 pairs, narrowly ovate, elliptic, or obliquely triangular, margin revolute and entire or sinuately dentate, apex obtuse to rounded; terminal lobe usually larger than lateral ones. Capitulum solitary, in center of leaf rosette or terminal on

stem. Involucre bowl-shaped, 1.5–2.5 cm in diam. Phyllaries in 3–5 rows, sparsely arachnoid tomentose; outer and middle phyllaries narrowly triangular-ovate, 5–15 × 1–3 mm, apex spiniform-acuminate and reflexed; inner phyllaries narrowly triangular-ovate to linear, 10–14 × 1–3 mm, apex acuminate and not reflexed. Corolla purplish red, 1.4–2 cm, tube 6–8.5 mm, limb 8–10 mm, lobes 3.5–5 mm. Achene brown, narrowly ellipsoid, 4–7 mm, glabrous, apically spinulose-tuberculate. Pappus bristles white, scabrid to barbellate, 1.2–1.6 cm, with 3 or 4 of inner ones much longer than others, basally connate into a ring, caducous. Fl. Jul–Sep, fr. Aug–Sep.

Subalpine and alpine scree slopes; 2800–3100 m. W Xinjiang (Wuqia) [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

Jurinea pamirica does not differ from *J. algida*, except for the stronger branched caudex, which leads to a more densely caespitose or even pulvinate habit. Leaf division is quite variable in *J. algida* so that this character cannot be used to separate *J. pamirica* from it.

9. Jurinea kaschgarica Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 81. 1928.

南疆苓菊 nan jiang ling ju

Herbs 7–18 cm tall, perennial. Caudex stout, simple or few branched, covered with remains of petioles. Stems solitary or several, erect or ascending, simple. Rosette leaves petiolate; petiole 5–10 mm; leaf blade linear-elliptic to narrowly obovate, 1.5–4 × 0.3–1 cm, pinnately lobed or pinnately dentate, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid; lobes triangular. Stem leaves few, similar to rosette leaves or linear, pinnately lobed or undivided; upper and uppermost stem leaves linear, smaller than lower ones, undivided. Capitulum solitary at end of stem. Involucre bowl-shaped, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, densely arachnoid tomentose to glabrescent; outer phyllaries narrowly triangular-ovate, 2–5 × 1–2 mm, apex spiniform-acuminate and reflexed to patent; middle phyllaries narrowly ovate, 5–12 × 2–3 mm, apex acuminate; inner phyllaries linear, 12–15 × 2–3 mm, apex acuminate and not reflexed. Corolla reddish purple, 1.2–1.4 cm, tube ca. 7.5 mm, limb to 9 mm, lobes 3–4 mm. Achene obconic, 5–6 mm, apically spinulose-tuberculate. Pappus bristles white, barbellate, 2–11 mm, with 2–5 of inner ones much longer than others, basally connate into a ring, caducous. Fl. and fr. Jun.

• Scree slopes, gullies; ca. 2300 m. W Xinjiang (Wuqia).

Jurinea kaschgarica is closely related to and possibly not clearly separable from *J. algida*.

10. Jurinea chaetocarpa (Ledebour) Ledebour in Candolle, Prodr. 6: 676. 1838.

刺果苓菊 ci guo ling ju

Serratula chaetocarpa Ledebour, Fl. Altaic. 4: 42. 1833; *Jurinea scapiformis* C. Shih.

Herbs 10–45 cm tall, perennial. Caudex apically covered with remains of petioles, densely lanate. Stems usually several or rarely solitary, erect, simple or few branched. Rosette leaves petiolate; petiole to 9 cm; leaf blade elliptic, 4–11 × 1–3 cm, pinnately lobed, green to grayish white, almost concolorous, glabrous to densely arachnoid tomentose; lobes 4–6 pairs, narrowly elliptic, narrowly ovate, or obliquely triangular, margin entire or sinuate, apex acute to acuminate; terminal lobe narrowly ovate-elliptic, longer than lateral ones. Stem leaves few or absent, similar to rosette leaves but sessile and sometimes linear-subulate and undivided. Capitulum solitary at end of branches. Involucre bowl-shaped, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, narrowly triangular-ovate to linear-subulate, apex spiniform-acuminate; outer and middle phyllaries 6–11 × 2–3 mm, apex reflexed to patent; inner phyllaries 1.4–2 × 0.3–0.4 cm. Corolla purplish red, 1.2–1.5 cm, tube ca. 4 mm, limb ca. 9 mm, lobes 3–4 mm. Achene ellipsoid-obconic, 4–6 mm, densely spinulose-tuberculate. Pappus bristles white, barbellate, 7.5–10 mm, with 1 or 2 of inner ones much longer than others, basally connate into a ring, caducous. Fl. May–Jun, fr. Jun–Jul.

Gravelly deserts, saline and sandy steppes; 500–2000 m. N Xinjiang [Kazakhstan, W Mongolia].

15. DIPLAZOPTILON Y. Ling, Acta Phytotax. Sin. 10: 85. 1965.

重羽菊属 chong yu ju shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs, perennial, stemless. Leaves in basal rosette, undivided. Capitulum solitary. Receptacle alveolate, with unequal subulate processes. Corolla purple, glabrous. Anther tails long, fimbriate-lacerate, caudate. Style branches linear, long, divergent, apex acute. Achene obconic, 4-angled, glabrous, with apical rim forming a short crown. Pappus homomorphic, in 2 rows; bristles subequal, plumose, basally connate into a ring, caducous as a whole.

• One species: China.

1. Diplazoptilon picridifolium (Handel-Mazzetti) Y. Ling, Acta Phytotax. Sin. 10: 85. 1965.

重羽菊 chong yu ju

Jurinea picridifolia Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 69. 1925.

Herbs 3–9 cm tall, perennial, stemless or rarely shortly stemmed. Caudex to 1.2 cm in diam., simple, densely covered with remains of petioles. Stem (if present) solitary, ca. 3 mm in diam., erect, simple. Rosette leaves petiolate; petiole 0.5–2 cm; leaf blade elliptic, narrowly ovate, or narrowly obovate, 8–15(–27) × 1–5 cm, both surfaces green, abaxially glabrous, adaxially sparsely strigose, base attenuate, margin entire or sparsely dentate with mucronulate teeth, apex acute to obtuse and mucronulate. Capitulum solitary in center of leaf rosette.

Involucre campanulate, 2.5–3.5 cm in diam. Phyllaries in 4 or 5 rows, apex acuminate; outer and middle phyllaries triangular-ovate, 1.5–2 × 0.4–0.5 cm; inner phyllaries narrowly ovate, elliptic, or linear, 2.5–3 × 0.2–0.4 cm. Corolla 2.5–2.7 cm, tube 1.5–1.7 cm, limb ca. 1 cm, lobes ca. 5 mm. Achene 5–6 mm. Pappus bristles pale brown, 2–2.3 cm. Fl. and fr. Aug–Sep.

● Alpine grasslands, mountain slopes; 3600–3800 m. SE Xizang, NW Yunnan.

16. HIMALAIELLA Raab-Straube, Willdenowia 33: 390. 2003.

须弥菊属 xu mi ju shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Saussurea sect. *Elatae* J. D. Hooker, Fl. Brit. India 3: 373. 1881.

Herbs, biennial or perennial, tall or rarely stemless. Stems usually densely leafy or rarely scapiform. Basal leaves often lyrately pinnately lobed to pinnately divided. Capitulum solitary and terminal on stem or in a racemiform, paniculiform, or corymbiform synflorescence, often nodding or sometimes erect, sessile or pedunculate. Involucre hemispheric to campanulate. Phyllaries sometimes reflexed. Receptacle densely covered with subulate alveolate bristles and rarely also with subulate paleae. Corolla reddish purple, purple, pink, or white, gland-dotted. Anther tails moderately lacerate. Achene blackish, 2–5.5 mm, 4- or 5-angled, glabrous, wrinkled, squamulate, or muricate, apical rim forming a conspicuous crown. Pappus homomorphic, in 1 row; bristles snow white, dirty white, or brownish, plumose, basally connate into a ring, caducous as a whole.

Thirteen species: Afghanistan, Bhutan, China, N India, Kashmir, Laos, Myanmar, Nepal, Pakistan, N Thailand, N Vietnam; SW Asia (Iran); seven species (one endemic) in China.

In C. Shih and S. Y. Jin (FRPS 78(2): 57–66. 1999), most species of *Himalaiella* are included in *Saussurea* subg. *Frolovia* (Candolle) Lipschitz. They are, however, more closely related to *Jurinea* than to *Saussurea*.

1a. Leaf blade of basal and lower stem leaves pinnately or bipinnately divided, terminal lobe not much larger than lateral ones.
2a. Plants almost stemless; capitula few, clustered in center of leaf rosette ..... 1. *H. yakla*
2b. Plants with tall stems; capitula many, in a racemiform or paniculiform synflorescence ..... 7. *H. peguensis*
1b. Leaf blade of basal and lower stem leaves lyrately pinnately lobed or lyrately pinnately divided, terminal lobe much larger than lateral ones or blade undivided.
3a. Stem simple, scapiform with reduced leaves; capitulum always solitary; leaf blade adaxially grayish green, arachnoid tomentose ..... 2. *H. abnormis*
3b. Stem branched or rarely simple, leafy, not scapiform; capitula numerous or solitary; leaf blade adaxially green, scabrous, strigose, or glabrescent.
4a. Receptacle with bristles and long subulate paleae; pappus brown ..... 3. *H. auriculata*
4b. Receptacle with bristles but without paleae; pappus white or straw-colored.
5a. Plants few branched, with 2–4 capitula; outer phyllaries without appendage, long acuminate ..... 4. *H. qinghaiensis*
5b. Plants usually much branched, capitula numerous; outer phyllaries with a green, herbaceous appendage.
6a. Involucre 1–2 cm in diam.; capitula solitary or clustered, subsessile or shortly pedunculate; corolla 1–1.2 cm; pappus 0.8–1 cm ..... 6. *H. nivea*
6b. Involucre 2–4 cm in diam.; capitulum mostly solitary, long pedunculate; corolla 1.5–2 cm; pappus 1.4–1.6 cm ..... 5. *H. deltoidea*

1. Himalaiella yakla (C. B. Clarke) Fujikawa & H. Ohba, J. Jap. Bot. 82: 133. 2007.

亚东须弥菊 ya dong xu mi ju

Saussurea yakla C. B. Clarke, Compos. Ind. 227. 1876; *Diplazoptilon cooperi* (J. Anthony) C. Shih; *Dolomiaea cooperi* (J. Anthony) Y. Ling; *Jurinea cooperi* J. Anthony.

Herbs, perennial, stemless or shortly stemmed. Rosette leaves petiolate; petiole 2–6[–10] cm; leaf blade ovate, elliptic, or oblong in outline, 5–40 × 3–8 cm, bipinnately lobed to bipinnately divided, abaxially white with distinct dark veins, arachnoid tomentose, and glandular, adaxially green, puberulent, and sparsely glandular; segments 5–10 pairs, triangular, ovate, or oblong, 1–3.3 × 0.8–3.4 cm, margin dentate and mucronate, apex acute or obtuse and mucronate. Capitula (1–)3–8(–10), in a condensed corymbiform synflorescence in center of leaf rosette, sessile or subsessile. Involucre campanulate, 0.8–3 cm in diam. Phyllaries in 4–6 rows, light brown, green, or reddish, apex erect or reflexed; outer phyllaries narrowly triangular-ovate, 5–10 × 2–4 mm, apex acute; middle phyllaries narrowly ovate-elliptic, 10–18 × 2–4 mm; inner phyllaries narrowly elliptic to linear, 1.8–3 × 0.1–0.3 cm, apex obtuse. Receptacle bristles 3–5 mm. Corolla purple, 1.7–2.7 cm, tube 1.3–1.5 cm, limb ca. 5 mm, lobes 4–6 mm. Achene 2.5–5.5 mm, 4- or 5-angled, muricate, apex with a dentate crown. Pappus bristles dirty white to light brown, 1.6–2.5 cm. Fl. and fr. Aug–Nov. $2n = 34$.

Alpine meadows, grasslands; ca. 4100 m. S Xizang (Yadong) [Bhutan, India (Sikkim), Nepal].

2. Himalaiella abnormis (Lipschitz) Raab-Straube, Willdenowia 33: 390. 2003.

普兰须弥菊 pu lan xu mi ju

Saussurea abnormis Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 56: 826. 1971; *S. neglecta* Ludlow.

Herbs 8–15[–30] cm tall, perennial. Stems solitary or several, grayish white, 2–3 mm in diam., erect or ascending, simple, densely arachnoid tomentose. Basal leaves petiolate; petiole 2–3 cm; leaf blade obovate to elliptic, 6–12[–25] × 1.5–5[–8] cm, lyrately pinnately lobed, abaxially grayish white, with conspicuous veins, and densely arachnoid tomentose, adaxially grayish green and arachnoid; lateral lobes 2–6 pairs, elliptic, proximal ones small, apex obtuse to rounded; terminal lobe ovate, margin sinuate or denticulate, apex obtuse to acute. Capitulum solitary, terminal on stems, erect in bud, nodding at anthesis and in fruit. Involucre hemispheric to campanulate, 1.2–2 cm in diam. Phyllaries in 4 or 5 rows, arachnoid tomentose, apex long acuminate; outer phyllaries narrowly ovate-triangular, 8–9 × 1.2–1.5 mm, apically reflexed or erect; middle and inner phyllaries narrowly elliptic to linear, 10–12 × 1–1.5 mm. Receptacle bristles ca. 5 mm. Corolla pink, 1.4–1.7 cm. Achene cylindric, 2–3 mm, apex with a dentate crown. Pappus bristles white, ca. 1 cm. Fl. and fr. Jul.

Alpine scree slopes; 3800–4400 m. S and SW Xizang (Burang, Gyirong) [NW India, W Nepal].

3. Himalaiella auriculata (Candolle) Raab-Straube, Willdenowia 33: 390. 2003.

白背须弥菊 bai bei xu mi ju

Aplotaxis auriculata Candolle, Prodr. 6: 541. 1838; *Saussurea auriculata* (Candolle) Schultz Bipontinus; *S. hypoleuca* Sprengel ex C. B. Clarke, nom. illeg. superfl.

Herbs 0.4–1.5 m tall, perennial. Stem solitary, 2–5 mm in diam., erect, simple or few branched. Basal to middle stem leaves sessile, obovate, 8–22 × 2.5–10 cm, lyrately pinnately parted, abaxially grayish green and sparsely arachnoid tomentose, adaxially black when dry and puberulent, base auriculate and amplexicaul; lateral lobes 1–3 pairs, obliquely triangular; terminal lobe triangular, large, margin dentate, apex acute. Upper stem leaves usually shortly petiolate; leaf blade narrowly ovate to elliptic, 3–11 × 0.5–5 cm, undivided. Capitula solitary or few, terminal on stem and branches, nodding at anthesis. Involucre broadly campanulate, 2–3 cm in diam. Phyllaries in ca. 5 rows, sparsely pubescent, margin ciliate, apex long acuminate; outer phyllaries narrowly triangular, 8–14 × 1.5–2.5 mm; middle and inner phyllaries narrowly triangular to linear, 12–17 × 1–2 mm. Receptacle bristles 2–5 mm; paleae yellowish brown, subulate, 1.2–1.5 cm, ciliate in distal half. Corolla dark purple, 8–10 mm, tube 3–5 mm, limb 4–6 mm, lobes 1.5–2(–3) mm. Achene blackish brown, cylindric, 3–3.5 mm, 4- or 5-ribbed, apically spinulose, apex with a denticulate crown. Pappus bristles brown, 7–10 mm. Fl. and fr. Aug–Sep. $2n = 58$.

Mixed forests; 2700–4000 m. S Xizang [Bhutan, N India, Kashmir, Nepal].

Saussurea hypoleuca is illegitimate because C. B. Clarke, in the protologue, cited the validly published earlier name *Aplotaxis auriculata* in synonymy.

4. Himalaiella qinghaiensis (S. W. Liu & T. N. Ho) Raab-Straube, **comb. nov.**

青海须弥菊 qing hai xu mi ju

Basionym: *Saussurea qinghaiensis* S. W. Liu & T. N. Ho, Fl. Qinghai. 3: 511. 1996.

Herbs, 80–90 cm tall, perennial. Stem solitary, apically few branched, erect, ca. 5 mm in diam. Basal and lower stem leaves often withered at anthesis, petiolate; petiole to 3 cm; leaf blade 2.5–7 × 3–4 cm, abaxially grayish green, tomentose, adaxially green, pubescent, base truncate, margin sparsely dentate, apex acute. Middle and upper stem leaves sessile, 4–10 × 0.5–3.5 cm, base auriculate, amplexicaul, apex acute to acuminate. Capitula 2–4, very long pedunculate, nodding, in racemiform synflorescence. Involucre broadly hemispheric, 2–3 cm in diam. Phyllaries in 7–9 rows, straw-colored, blackish brown at margin, arachnoid, narrowly ovate-subulate to subulate-filiform, 1–1.5 mm wide, apex long acuminate and reflexed. Corolla bluish purple, 1–1.3 cm, tube 6–7 mm, limb 6–7 mm, lobes 2–3 mm. Achene black, ca. 4 mm, 4-angled, transversely rugose, apex with a denticulate crown. Pappus pale brown, outer bristles ?short, inner bristles to 1.2 cm. Fl. Aug.

• Near mountain streams; ca. 3600 m. S Qinghai (Yushu).

This species has been described as having a row of short outer pappus bristles. However, on the image available to us, no such bristles can be seen. The nodding, large capitula and achene characters are typical for the genus *Himalaiella*; therefore, this taxon is excluded from *Saussurea* and included here in *Himalaiella*.

5. Himalaiella deltoidea (Candolle) Raab-Straube, Willdenowia 33: 391. 2003.

三角叶须弥菊 san jiao ye xu mi ju

Aplotaxis deltoidea Candolle, Prodr. 6: 541. 1838; *Frolovia formosana* (Hayata) Lipschitz; *Saussurea deltoidea* (Candolle) Schultz Bipontinus; *S. formosana* Hayata; *S. kouytcheensis* H. Léveillé; *S. lamprocarpa* Hemsley; *S. radiata* Franchet; *Synurus taiwanianus* S. S. Ying.

Herbs 0.6–2(–3) m tall, biennial. Stem solitary, 0.5–1.5 cm in diam., erect, simple or branched. Lower and middle stem leaves petiolate; leaf blade ovate-elliptic in outline, lyrately pinnately divided, abaxially grayish white, arachnoid tomentose, gland-dotted, and with brown articulate hairs, adaxially green and scabrous; lateral segments 1 or 2 pairs, narrowly elliptic to triangular, 1–3 × 0.5–2 cm; terminal segment triangular-hastate, 7–35 × 6–25 cm, margin dentate, apex acute. Upper stem leaves shortly petiolate or sessile, ovate-elliptic, margin lobed or dentate. Capitula usually numerous, in an ample paniculiform synflorescence, nodding, long pedunculate. Involucre broadly campanulate, (2–)3–4 cm in diam. Phyllaries in 5–7 rows, arachnoid tomentose; outer phyllaries triangular-ovate, 4–9 × 1.5–2 mm, apically with a triangular-ovate fimbriate appendage; middle phyllaries narrowly ovate-elliptic, 8–15 × 1.5–2.5 mm, with an apical appendage; inner phyllaries narrowly ovate to linear, 15–20 × 1.5–2.3 mm, apex acuminate and without an ap-

pendage. Receptacle bristles 7–10 mm. Corolla pink or white, (1.2–)1.5–2.1 cm, tube 0.9–1.2 cm, limb 6–9 mm, lobes 2.5–4 mm. Achene black, obconic, 3–4(–5) mm, 4-angled, apically muricate, apex with a denticulate crown. Pappus bristles white, (1.2–)1.4–1.6 cm. Fl. and fr. May–Nov. $2n = 34$*.

Mountain slopes, grasslands, forests, thickets, wastelands, pastures, forest margins; 700–3400 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, N India, Laos, Myanmar, Nepal, Pakistan, N Thailand, N Vietnam].

6. Himalaiella nivea (Candolle) Raab-Straube, Willdenowia 33: 391. 2003.

小头须弥菊 xiao tou xu mi ju

Aplotaxis nivea Candolle, Prodr. 6: 541. 1838; *Saussurea cirsium* H. Léveillé; *S. crispa* Vaniot; *S. deltoidea* (Candolle) Schultz Bipontinus var. *nivea* (Candolle) C. B. Clarke; *S. deltoidea* subsp. *polycephala* (C. B. Clarke) H. Koyama; *S. deltoidea* var. *polycephala* C. B. Clarke; *S. microdeltoidea* Kitamura; *S. nivea* (Candolle) Schultz Bipontinus (1846), not Turczaninow (1837).

Herbs (0.3–)0.5–1.8 m tall, biennial. Stem solitary, 5–10 mm in diam., erect, simple or branched. Lower stem leaves petiolate; leaf blade lyrately pinnately parted, abaxially grayish green, with dark veins, and tomentose, adaxially green, scabrous or sparsely arachnoid, and gland-dotted; lateral lobes 1 or 2 pairs, oblong-triangular; terminal lobe triangular-hastate, 7–11 × 5–11 cm, margin dentate, apex acute. Middle and upper stem leaves petiolate; leaf blade triangular-hastate, narrowly ovate, or elliptic. Capitula numerous, in a racemiform to paniculiform synflorescence, subsessile to pedunculate. Involucre campanulate, 1–2(–2.5) cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries ovate-elliptic, 3–5 × 1.5–2 mm, arachnoid tomentose and gland-dotted, with an orbicular fimbriate appendage; middle phyllaries narrowly ovate-elliptic, 5–9 × 1.5–2 mm, with an apical appendage; inner phyllaries narrowly ovate to linear, 12–13 × 1–1.5 mm, apex acuminate and without an appendage. Receptacle bristles 4–5 mm. Corolla purple, 0.9–1.2 cm, tube 5–7 mm, limb 4–6 mm, lobes 2–3 mm. Achene black, obconic, 2–3.5 mm, 4-angled, apically muricate, apex with a denticulate crown. Pappus bristles straw-colored, 8–10 mm. Fl. and fr. Aug–Oct. $2n = 34$.

Grasslands on mountain slopes, forests and forest margins in mountain valleys; 200–2800 m. Guizhou, Sichuan, Xizang, Yunnan [NE India, Laos, Myanmar, Nepal, N Thailand, N Vietnam].

There are intermediate forms between *Himalaiella deltoidea* and *H. nivea* in those areas where both species occur. Further investigation is needed to clarify the status of these two taxa.

7. Himalaiella peguensis (C. B. Clarke) Raab-Straube, Willdenowia 33: 391. 2003.

叶头须弥菊 ye tou xu mi ju

Saussurea peguensis C. B. Clarke, Compos. Ind. 235. 1876; *S. dealbata* Collett & Hemsley; *S. deltoidea* (Candolle) Schultz Bipontinus var. *peguensis* (C. B. Clarke) J. D. Hooker; *S. leontopodium* H. Léveillé & Vaniot; *S. phyllocephala* Collett & Hemsley.

Herbs 0.5–1.5[–2.5] m tall, biennial. Stem solitary, 7–10 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade elliptic to obovate in outline, 8–30[–40] × 5–10[–15] cm, bipinnately lobed to bipinnately divided, abaxially grayish green and densely tomentose, adaxially green, scabrous, and with brown articulate hairs; primary lobes 5–10 pairs; secondary lobes 1–4 pairs, ovate-elliptic to obliquely triangular, apex mucronate. Middle and upper stem leaves sessile, gradually smaller upward on stem, pinnately lobed to pinnately divided, base auriculate and semiamplexicaul, apex acute. Capitula numerous in a racemiform or paniculiform synflorescence, subsessile to pedunculate. Involucre campanulate, 1.5–2(–2.5) cm in diam. Phyllaries in 4 or 5 rows, apex acute; outer phyllaries grayish green, oblong-linear, 9–15 × 1–5 mm, herbaceous, arachnoid lanate, margin crenulate; middle phyllaries narrowly triangular-ovate, 8–10[–15] × 1–1.5 mm; inner phyllaries linear, 8–10[–20] × 1–1.5 mm. Corolla purple, 1.3–1.5 cm, tube 6–7 mm, limb 6–7 mm, lobes 2–2.5 mm. Achene blackish brown, cylindric, 2–4 mm, apically muricate, apex with a crenulate crown. Pappus bristles dirty white, 1.1–1.2 cm. Fl. and fr. Sep–Oct. $2n = 34$.

Forests; 1200–1600 m. Guizhou, Yunnan [Myanmar, N Thailand].

17. DOLOMIAEA Candolle, Arch. Bot. (Paris) 2: 330. 1833.

川木香属 chuan mu xiang shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Mazzettia Iljin; *Vladimiria* Iljin.

Herbs, perennial, rosulate and stemless or shortly stemmed. Capitula solitary or several, clustered in center of leaf rosette or terminal on stem and subtended by bracts, large. Involucre campanulate. Phyllaries in several rows, imbricate, leathery to subleathery, margin ciliate. Receptacle flat, alveolate, naked or margin of alveolae with very short subulate cartilaginous processes. Corolla gland-dotted. Anther tails lacerate. Style branches divergent or coherent. Achene trigonous or tetragonous, sometimes cylindric, with an apical rim. Pappus bristles in 2 to several rows, scabrid to shortly plumose, basally connate into a ring, caducous as a whole.

Thirteen species: China, NW India, Kashmir, Myanmar, Nepal; 12 species (ten endemic) in China.

1a. Capitulum solitary, in center of leaf rosette or terminal on stem.
2a. Leaf blade undivided.
3a. Leaves 4–9 × 1.2–2 cm, margin entire; pappus bristles in 2 rows, barbellate ..... 1. *D. georgei*

3b. Leaves 7–20 × 4–19 cm, margin dentate; pappus bristles in many rows, scabrid ..... 4. *D. berardioidea*
2b. Leaf blade pinnately lobed, pinnatifid, or pinnatipartite.
4a. Leaf blade green, concolorous, strigose or glabrous.
5a. Leaf blade 2.5–10 × 1–2.5 cm, glabrous; involucre 1.5–2.5 cm in diam. ..... 2. *D. salwinensis*
5b. Leaf blade 5–20 × 3–17 cm, strigose; involucre 4–6 cm in diam. ..... 3. *D. edulis*
4b. Leaf blade at least abaxially grayish white, densely tomentose.
6a. Leaf blade abaxially grayish white and densely tomentose, adaxially green and arachnoid only along midrib ..... 5. *D. platylepis*
6b. Leaf blade on both surfaces grayish green to grayish white and arachnoid tomentose ..... 10. *D. crispoundulata*
1b. Capitula 2–15, clustered in center of leaf rosette.
7a. Outermost pappus bristles recurved and covering achene ..... 7. *D. souliei*
7b. Outermost pappus bristles straight and not covering achene.
8a. Leaf blade green, almost concolorous, undivided or sometimes pinnately lobed, strigose ..... 6. *D. forrestii*
8b. Leaf blade at least abaxially grayish white, pinnately divided, densely tomentose.
9a. Leaf blade bipinnately lobed to bipinnatisect.
10a. Style branches oblong, short, ± coherent, apex rounded; pappus yellowish brown ..... 11. *D. calophylla*
10b. Style branches linear, long and slender, divergent, apex acute; pappus brick-colored ..... 12. *D. lateritia*
9b. Leaf blade pinnatipartite, pinnatisect, or lyrately pinnatisect.
11a. Leaf blade pinnatipartite, arachnoid tomentose on both surfaces ..... 10. *D. crispoundulata*
11b. Leaf blade lyrately pinnatisect or pinnatisect, abaxially grayish white and tomentose, adaxially green and glabrous or sparsely arachnoid.
12a. Leaf blade lyrately pinnatisect, terminal lobe much larger than lateral ones ..... 8. *D. wardii*
12b. Leaf blade pinnatisect, terminal lobe not much larger than lateral ones ..... 9. *D. scabrida*

1. Dolomiaea georgei (J. Anthony) C. Shih, Acta Phytotax. Sin. 24: 294. 1986.

腺叶川木香 xian ye chuan mu xiang

Jurinea georgei J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 21. 1934; *Vladimiria georgei* (J. Anthony) Y. Ling.

Herbs 5–12(–18) cm tall, perennial, stemless or shortly stemmed. Caudex to 1.5 cm in diam., simple or few branched. Rosette leaves petiolate; petiole 3–9 cm; leaf blade elliptic, narrowly obovate, or spatulate, 4–9 × 1.2–2 cm, both surfaces green and densely gland-dotted but otherwise glabrous, base attenuate, margin entire or shallowly undulate, apex acute to obtuse. Capitulum solitary, in center of leaf rosette or terminal on stem and subtended by bracts. Involucre campanulate or broadly cylindric, 2–3 cm in diam. Phyllaries in 4 or 5 rows, leathery, glabrous, margin purplish and scarious; outer and middle phyllaries ovate, narrowly ovate, or ovate-elliptic, 1.5–3 × 0.5–0.8(–1) cm, apex obtuse; inner phyllaries elliptic to broadly linear, 3–3.5 × 0.3–0.4 cm, apex acute to acuminate. Corolla purplish red, 3–3.5 cm, tube ca. 2.7 cm, limb 8–9 mm, lobes 3.5–4 mm. Style branches 3–4 mm, slender, divergent. Achene trigonous or quadrangular, 4–6 mm, glabrous. Pappus bristles in ca. 2 rows, dirty white to pale yellowish brown, barbellate, 2.5–3.2 cm. Fl. and fr. Aug–Oct.

• Grasslands on mountain slopes; ca. 3200 m. NW Yunnan.

2. Dolomiaea salwinensis (Handel-Mazzetti) C. Shih, Acta Phytotax. Sin. 24: 295. 1986.

怒江川木香 nu jiang chuan mu xiang

Jurinea salwinensis Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 69. 1925; *Mazzettia salwinensis* (Handel-Mazzetti) Iljin; *Vladimiria salwinensis* (Handel-Mazzetti) Iljin.

Herbs 4–10 cm tall, perennial, stemless or shortly stemmed. Caudex 0.5–1.5 cm in diam., unbranched. Rosette leaves petiolate; petiole long, winged; leaf blade elliptic, narrowly elliptic, narrowly ovate, or spatulate, 2.5–10 × 1–2.5 cm, both surfaces green and glabrous, base attenuate, margin entire, obtusely dentate, or ± pinnately lobed, apex obtuse to acute. Upper stem leaves similar to basal leaves, subtending and overtopping capitulum. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre 1.5–2.5 cm in diam. Phyllaries in 3 or 4 rows, apex obtuse to acute; outer phyllaries ovate, 10–13 × 3–6 mm; middle phyllaries ovate to narrowly ovate, 14–15 × 3–5 mm; inner phyllaries narrowly ovate, 1.6–2 × 0.2–0.3 cm. Corolla purplish red, 2–2.5 cm, tube 1–1.7 cm, limb 7–8 mm, lobes 4–5 mm. Style divergent, 1.5–2 mm. Achene black, trigonous, 3.5–4 mm. Pappus bristles in several rows, yellowish brown, scabrid to barbellate, 1.2–2.3 cm, apically shortly plumose. Fl. and fr. Jul–Sep.

Forest margins, grasslands on mountain slopes; 2900–3800 m. NW Yunnan (Dêqên, Gongshan) [Myanmar].

3. Dolomiaea edulis (Franchet) C. Shih, Acta Phytotax. Sin. 24: 294. 1986.

菜川木香 cai chuan mu xiang

Saussurea edulis Franchet, J. Bot. (Morot) 2: 337. 1888; *Jurinea edulis* (Franchet) Franchet; *J. edulis* var. *caulescens* Franchet; *Vladimiria edulis* (Franchet) Y. Ling.

Herbs 8–30 cm tall, perennial, stemless or shortly stemmed. Rosette leaves petiolate; petiole 1–11 cm; leaf blade obovate, elliptic, broadly ovate-elliptic, or suborbicular, 5–20 × 3–17 cm, pinnately divided, pinnately lobed, or sometimes undivided, both surfaces green to yellowish green and sparsely to densely strigose, base cordate, cuneate, or truncate; lobes 3–7 pairs, ovate, falcate, or obliquely triangular, margin apiculate or spinulose dentate. Capitulum solitary, in center of leaf rosette or

terminal on stem and subtended by uppermost leaves. Involucre broadly campanulate, 4–6 cm in diam. Phyllaries in 4 or 5 rows, rigid; outer and middle phyllaries ovate to elliptic, 1.2–2.6 × 0.8–1.7 cm, apex rounded to obtuse; inner phyllaries narrowly ovate, elliptic, or broadly linear, 2.5–4 × 0.3–0.6 cm, apex acuminate. Corolla purplish red to bluish purple, 2.8–3.2 cm, tube 2–2.7 cm. Achene pale brown, trigonous, 7–8 mm, wrinkled. Pappus bristles in many rows, yellowish brown, scabrid to barbellate, 2–2.6 cm. Fl. and fr. Jun–Oct.

Forest margins, grasslands, fallow open areas; 2600–4700 m. W Sichuan, SE Xizang, NW Yunnan [N Myanmar].

4. Dolomiaea berardioidea (Franchet) C. Shih, Acta Phytotax. Sin. 24: 294. 1986.

厚叶川木香 hou ye chuan mu xiang

Jurinea edulis (Franchet) Franchet var. *berardioidea* Franchet, J. Bot. (Morot) 8: 338. 1894; *J. berardioidea* (Franchet) Diels; *Vladimiria berardioidea* (Franchet) Y. Ling.

Herbs 5–17 cm tall, perennial, stemless or shortly stemmed. Caudex to 2 cm in diam., simple. Rosette leaves petiolate; petiole 1–13 cm; leaf blade elliptic, ovate, or oblong, 7–20 × 4–19 cm, both surfaces green to yellowish green and densely strigose and gland-dotted, base shallowly cordate to truncate, margin undulate or sparsely spinulose-dentate, apex rounded to acute. Bracts 4–7, sessile, smaller than rosette leaves. Capitulum solitary, in center of leaf rosette, sessile or shortly pedunculate. Involucre campanulate, 4–6(–8) cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries elliptic, narrowly obovate-elliptic, or narrowly ovate-elliptic, 1.5–2.5 × 1–1.3 cm; middle and inner phyllaries narrowly ovate-elliptic, 2.5–4 × 0.6–0.8 cm. Corolla purplish red, 3–3.2 cm, tube 2–2.3 cm, limb ca. 1 cm. Achene trigonous, 7–10 mm. Pappus bristles in many rows, yellowish brown, scabrid to barbellate, 2.5–2.8 cm. Fl. and fr. Jun–Oct.

• Grasslands or thickets on mountain slopes; 2800–3300(–5200) m. NW Yunnan (Dali, Lijiang, Yangbi).

5. Dolomiaea platylepis (Handel-Mazzetti) C. Shih, Acta Phytotax. Sin. 24: 295. 1986.

平苞川木香 ping bao chuan mu xiang

Jurinea platylepis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 658. 1937; *Vladimiria platylepis* (Handel-Mazzetti) Y. Ling.

Herbs 7–12 cm tall, perennial, stemless or shortly stemmed. Rosette leaves petiolate; petiole to 10 cm; leaf blade obovate, ovate, or elliptic, 5–18 × 5–13 cm, pinnately lobed or pinnatifid, abaxially grayish white and densely tomentose, adaxially green and arachnoid only along midrib, base truncate or cuneate, margin pinnately dentate; lobes 2 or 3 pairs, obliquely broadly triangular to obliquely ovate, margin spinulose-denticulate, apex rounded, obtuse, or acute; terminal lobe semiorbicular to irregularly rhombic, apex obtuse to rounded. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre broadly bowl-shaped, 3.5–6 cm in diam. Phyllaries in ca. 4 rows, leathery; outer phyllaries broadly ovate, 1.4–1.8 × 1–1.5 cm, apex rounded to obtuse; middle phyllaries narrowly elliptic to elliptic, 2–2.5 × 0.5–1 cm, apex obtuse to acute; inner phyllaries narrowly ovate-elliptic to linear, 2.5–3 × 0.3–0.5 cm, apex acute. Corolla purplish red, ca. 3 cm, tube ca. 2 cm and slender, limb 8–10 mm, lobes 4.5–5 mm. Style branches 3.5–4.5 mm, slender. Achene obconic, ca. 8 mm. Pappus bristles in many rows, yellowish white, barbellate, 2.5–3 cm. Fl. and fr. Sep–Oct.

• Grasslands, thickets on mountain slopes; 3100–3400 m. SW Sichuan.

6. Dolomiaea forrestii (Diels) C. Shih, Acta Phytotax. Sin. 24: 293. 1986.

膜缘川木香 mo yuan chuan mu xiang

Jurinea forrestii Diels, Notes Roy. Bot. Gard. Edinburgh 5: 200. 1912; *Dolomiaea denticulata* (Y. Ling) C. Shih; *Vladimiria denticulata* Y. Ling; *V. forrestii* (Diels) Y. Ling.

Herbs 6–15 cm tall, perennial, stemless or shortly stemmed. Caudex 1–1.5 cm in diam., simple. Rosette leaves petiolate; petiole 3–10 cm; leaf blade elliptic, obovate, ovate, or subtriangular, 10–20(–30) × 5–15 cm, pinnately lobed to undivided, green or yellowish green, almost concolorous, sparsely strigose, base subcordate, truncate, or cuneate-attenuate, margin spinulose-dentate to sinuate-denticulate, apex rounded to acuminate; lobes 4–8 pairs, ovate, broadly triangular, or falcate. Upper leaves smaller, pale yellowish green, base cuneate-attenuate, apex acute. Capitula 3–9, clustered in center of leaf rosette, sessile or shortly pedunculate. Involucre campanulate, 2–2.5(–3) cm in diam. Phyllaries in 5 or 6 rows, leathery, glabrous, margin dark brown and scarious; outer phyllaries ovate to elliptic, 7–15 × 5–9 mm, apex rounded to obtuse; middle and inner phyllaries elliptic to narrowly elliptic, 1.5–3 × 0.4–0.7 cm, apex obtuse, acute, or acuminate. Corolla purplish red, 2.3–2.8(–3.5) cm, tube 1.4–2 cm, limb 8–10 mm, lobes 5–6 mm. Achene cylindric, 4–7 mm, 4-angled, apically verrucose. Pappus bristles in many rows, yellowish brown, scabrid to barbellate, 2–2.5 cm. Fl. and fr. Jul–Nov.

• Grasslands on mountain slopes, thickets, forests, forest margins; 3000–4200 m. SW Sichuan, SE Xizang, NW Yunnan.

Dolomiaea denticulata was described from a specimen without basal leaves and is only known from two collections. The diagnostic characters, exclusively of the upper leaves, do not seem to be sufficient to treat these plants as specifically different from *D. forrestii*.

7. Dolomiaea souliei (Franchet) C. Shih, Acta Phytotax. Sin. 24: 294. 1986.

川木香 chuan mu xiang

Herbs, perennial, stemless. Caudex 1.5–2 cm in diam., simple. Rosette leaves petiolate; petiole 2–6(–16) cm; leaf blade elliptic, narrowly elliptic, narrowly ovate, or narrowly obovate, 10–30 × 5–13 cm, pinnately lobed, pinnatisect, or sometimes bipinnatisect, green, pale green, or grayish white, concolorous or abaxially grayish white, both surfaces sparsely strigose and gland-dotted or abaxially sparsely arachnoid to tomentose, margin lobed and spinulose-dentate, rarely entire; lateral lobes 4–7 pairs, obliquely triangular to narrowly ovate; terminal lobe

similar to lateral ones but smaller. Capitula 2–12, clustered in center of leaf rosette, pedunculate. Involucre broadly campanulate, 2.5–4(–6) cm in diam. Phyllaries in ca. 6 rows, apex acuminate and spinulose; outer phyllaries ovate to ovate-elliptic, 2–2.5 × 0.8–1 cm; middle phyllaries elliptic to narrowly ovate-elliptic, 2.5–3 × 0.6–1.1 cm; inner phyllaries narrowly ovate-elliptic, 3–3.5 × 0.5–0.8 cm. Corolla dark red, 3–4 cm, tube 2–3 cm, limb 1–1.2 cm, lobes 6–7 mm. Achene cylindric, 7–8 mm, glabrous or apically gland-dotted. Pappus bristles in many rows, yellowish brown, scabrid to barbellate, 2.5–4 cm; outermost pappus recurved, plicate and covering achene. Fl. and fr. Jul–Oct.

• Alpine grasslands or thickets, grasslands on mountain slopes; 3500–4800 m. W Sichuan, E Xizang, NW Yunnan.

The roots are used medicinally.

1a. Leaf blade green to pale green, ± concolorous ..... 7a. var. *souliei*
1b. Leaf blade abaxially grayish white, adaxially green to pale green ..... 7b. var. *cinerea*

7a. Dolomiaea souliei var. **souliei**

川木香(原变种) chuan mu xiang (yuan bian zhong)

Jurinea souliei Franchet, J. Bot. (Morot) 8: 337. 1894; *Vladimiria souliei* (Franchet) Y. Ling.

Leaf blade green to pale green, ± concolorous, sparsely strigose, gland-dotted.

• Alpine grasslands or thickets; 3700–4800 m. W Sichuan, E Xizang.

7b. Dolomiaea souliei var. **cinerea** (Y. Ling) Q. Yuan, Acta Bot. Yunnan. 30: 439. 2008.

灰毛川木香 hui mao chuan mu xiang

Vladimiria souliei var. *cinerea* Y. Ling, Acta Phytotax. Sin. 10: 79. 1965; *Dolomiaea souliei* var. *mirabilis* (J. Anthony) C. Shih; *Jurinea mirabilis* J. Anthony; *J. muliensis* Handel-Mazzetti; *J. trachyloma* Handel-Mazzetti; *V. muliensis* (Handel-Mazzetti) Y. Ling; *V. trachyloma* (Handel-Mazzetti) Y. Ling.

Leaf blade abaxially grayish white, sparsely arachnoid to arachnoid tomentose, and gland-dotted, adaxially green to pale green, sparsely strigose, and gland-dotted.

• Grasslands on mountain slopes; 3500–4200 m. W Sichuan, E Xizang, NW Yunnan.

Jurinea muliensis and *J. trachyloma* were described on account of their leaf shape and indumentum, which is quite different from that of *Dolomiaea souliei* and seems to be a constant character at least in *J. trachyloma* from SW Sichuan. More material is needed to clarify the taxonomic status of these plants.

8. Dolomiaea wardii (Handel-Mazzetti) Y. Ling, Acta Phytotax. Sin. 10: 88. 1965.

西藏川木香 xi zang chuan mu xiang

Jurinea wardii Handel-Mazzetti, J. Bot. 76: 290. 1938.

Herbs 3–5 cm tall, perennial, stemless. Rosette leaves petiolate; petiole 1.5–7.5 cm; leaf blade obovate, narrowly obovate, or oblong, 5–20 × 2–5 cm, lyrately pinnatisect, abaxially grayish white and densely tomentose, adaxially green and glabrous or sparsely arachnoid; lateral segments in 3–6 pairs, broadly elliptic, oblong, or suborbicular, 0.7–1.5 × 0.7–1.5 cm, margin serrate-dentate or denticulate or rarely shallowly crenate, apex rounded; terminal segment ovate to broadly ovate, 2.5–5 × 1.5–3 cm. Capitula 4–8, clustered in center of leaf rosette, forming a hemispheric synflorescence, sessile or subsessile. Involucre campanulate, 1.5–2(–3) cm in diam. Phyllaries in 4 or 5 rows, herbaceous, basally straw-colored, apically purple, apex acute to acuminate; outer phyllaries obovate to elliptic, 4–8 × 3.5–4 mm; middle phyllaries elliptic to narrowly ovate-elliptic, 10–15 × 2–3(–5) mm; inner phyllaries linear-elliptic to broadly linear, 1.5–2.3 × 0.2–0.3 cm. Corolla purplish red, 1.6–2 cm, tube 7.5–11 mm, limb 8–9 mm, lobes 3–3.5 mm. Style branches ca. 3 mm, slender. Achene grayish brown, obconic, 6–7 mm, wrinkled. Pappus bristles in many rows, dirty white but basally pale brown, scabrid, 1.5–2 cm. Fl. and fr. Jul–Sep.

• Thickets on mountain slopes, gravelly and sandy riversides; 3800–4500 m. SE Xizang.

9. Dolomiaea scabrida (C. Shih & S. Y. Jin) C. Shih, Acta Phytotax. Sin. 24: 293. 1986.

糙羽川木香 cao yu chuan mu xiang

Vladimiria scabrida C. Shih & S. Y. Jin, Acta Phytotax. Sin. 21: 91. 1983.

Herbs, perennial, stemless. Rosette leaves petiolate; petiole 2–4.5 cm; leaf blade narrowly elliptic, 4–12 × 1–3 cm, pinnately divided, abaxially grayish white and densely arachnoid tomentose, adaxially green and glabrous or sparsely arachnoid on veins; lateral segments 4–6 pairs, elliptic, obliquely ovate, or obovate, 0.5–2 × 0.4–1.5 cm, margin denticulate; terminal segment narrowly ovate, 2–3 × 1–2 cm. Capitula 2 or 3, clustered in center of leaf rosette, shortly pedunculate. Involucre ca. 3 cm in diam. Phyllaries in ca. 4 rows, glabrous, apex acuminate; outer phyllaries narrowly triangular, ca. 15 × 4 mm; middle phyllaries narrowly ovate to elliptic, 16–19 × 2–3 mm; inner phyllaries broadly linear, ca. 1.9 × 0.2 cm, apex acuminate. Corolla purple, ca. 2 cm, tube ca. 1.1 cm, limb ca. 9 mm. Style branches ca. 2.5 mm, apex acuminate. Achene brown, obconic, 6–7 mm, glabrous. Pappus bristles in 2 rows, pale brown to dirty brown, scabrid, ca. 3 cm. Fl. and fr. Aug.

• Gravelly places by rivers; 4400–4500 m. SC Xizang (Ngamring).

This species is only known from a single locality and is probably close to *Dolomiaea wardii*.

10. Dolomiaea crispoundulata (C. C. Chang) Y. Ling, Acta Phytotax. Sin. 10: 9. 1965.

皱叶川木香 zhou ye chuan mu xiang

Jurinea crispoundulata C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 67. 1935; *Dolomiaea crispoundulata* var. *chienii* Y. Ling; *Vladimiria crispoundulata* (C. C. Chang) C. Shih & S. Y. Jin.

Herbs to 6 cm tall, perennial, stemless or shortly stemmed. Caudex stout, simple or branched. Rosette leaves petiolate; petiole 1–3 cm; leaf blade elliptic to broadly linear, 2–7 × 0.7–1.3 cm, pinnately divided, abaxially grayish white and densely arachnoid tomentose, adaxially grayish green and arachnoid tomentose, base obtuse to rounded; segments in 3–15 pairs, obtusely triangular, broadly ovate, or semiorbicular; terminal lobe ovate, to 1 cm, apex obtuse. Capitula solitary or to 3, in center of leaf rosette, sessile or subsessile. Involucre campanulate, 2–3 cm in diam. Phyllaries in 4 or 5 rows, pale green, apically purplish, leathery, sparsely arachnoid, glabrescent, apex acuminate; outer phyllaries triangular to ovate-triangular, 6–13 × 1.5–2.5 mm; middle and inner phyllaries triangular to narrowly ovate, 1.4–2.5 × 0.3–0.4 cm. Corolla pale purple, 2.1–2.3 cm, tube 1.2–1.5 cm, limb 8–10 mm, lobes 4–6 mm. Style branches linear, ca. 2 mm; divergent, apex obtuse. Achene cylindric, 3–5 mm, wrinkled, glabrous. Pappus bristles in 2–4 rows, basally yellowish brown and apically purplish, scabrid, 1.5–1.6 cm. Fl. Jul.

• Thickets, open ground; 4100–4400 m. SC Xizang (Gyangzê, Nyêmo).

11. Dolomiaea calophylla Y. Ling, Acta Phytotax. Sin. 10: 88. 1965.

美叶川木香 mei ye chuan mu xiang

Herbs, perennial, stemless. Rosette leaves petiolate; petiole 2–4 cm; leaf blade elliptic to narrowly obovate, 6–30 × 2–5 cm, bipinnately lobed, abaxially white and densely tomentose, adaxially green and strigose or sparsely arachnoid; primary lobes 5–10 pairs, ovate to elliptic; secondary lobes elliptic, obliquely ovate, or semiorbicular, margin spinulose-dentate. Capitula 5–15, clustered in center of leaf rosette, forming a hemispheric synflorescence. Involucre 1.5–2 cm in diam. Phyllaries in 5 or 6 rows, apically purplish red, apex mucronate; outer phyllaries elliptic, 9–11 × ca. 5 mm; middle phyllaries narrowly ovate-elliptic, 12–17 × ca. 5 mm; inner phyllaries narrowly ovate-elliptic to linear, 1.8–2 × 0.2–0.3 cm. Corolla purplish red, 1.5–2.2 cm, tube ca. 1.2 cm, lobes 4–5 mm. Style branches ca. 1 mm, ± coherent, apex obtuse. Achene tetragonous, obconic, 4–5 mm, ± wrinkled. Pappus bristles in many rows, blackish to yellowish brown, barbellate, ca. 2 cm. Fl. and fr. Aug.

• Alpine grasslands, scree slopes; 3300–4700 m. SC Xizang.

Dolomiaea calophylla is very close to *D. macrocephala* Royle, which occurs to the SW of Xizang in Nepal, NW India, and Kashmir. That species is said to differ from *D. calophylla* by larger capitula (involucre to 2.5 cm in diam.; phyllaries to 3.5 cm; corolla 2.5–3 cm; achene 6–8 mm; pappus ca. 2.5 cm), scabrous phyllaries with serrulate margin, and a brown or purplish brown pappus. Further studies are needed to investigate whether these plants actually represent two different species. *Dolomiaea macrocephala* has been recorded from Xizang (Yadong and Lhasa) (S. Y. Liang, Fl. Xizang. 4: 917. 1985), but no specimens were seen.

12. Dolomiaea lateritia C. Shih, Acta Phytotax. Sin. 32: 190. 1994.

红冠川木香 hong guan chuan mu xiang

Herbs, perennial, stemless. Rosette leaves petiolate; petiole ca. 5 cm; leaf blade elliptic, 9–24 × 5–8 cm, bipinnately lobed to bipinnately divided, abaxially grayish white and densely tomentose, adaxially green and glabrous; primary lobes ca. 8 pairs, narrowly ovate to elliptic; secondary lobes triangular, narrowly triangular, or ovate, margin spinulose-denticulate. Capitula ca. 8, clustered in center of leaf rosette, forming a hemispheric synflorescence, shortly pedunculate. Involucre campanulate, ca. 2.5 cm in diam. Phyllaries in ca. 6 rows, dark red, leathery, glabrous, apex acuminate; outer phyllaries narrowly ovate-triangular, ca. 10 × 2 mm; middle phyllaries narrowly triangular, 1.5–2.5 × 0.5–0.6 cm; inner phyllaries narrowly ovate-elliptic to elliptic, 2.3–3.5 × 0.6–0.7 cm. Corolla purplish red, ca. 3 cm, tube ca. 2.2 cm, limb 8–10 mm, lobes 4–5 mm. Style branches linear, narrowed, divergent. Achene (ripe) unknown. Pappus bristles in many rows, brownish in basal half and brick-colored in apical half, scabrid, ca. 1.8 cm. Fl. Sep.

• Alpine meadows, thickets; ca. 3400 m. S Xizang (Gyirong).

Dolomiaea lateritia is only known from the type collection. Except for the divergent and narrowed style branches and for the pappus color, this species is very similar to *D. calophylla* and *D. macrocephala*. Lack of material does not permit a decision here about whether these plants are conspecific or not.

18. BOLOCEPHALUS Handel-Mazzetti, J. Bot. 76: 291. 1938.

球菊属 qiu ju shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs, perennial. Stems subscapose. Capitulum large. Involucre densely white lanate. Phyllaries imbricate, herbaceous. Receptacle with long subulate bristles. Corolla limb 3 × as long as tube. Anther tails filiform-acuminate, undivided. Style branches long, slender, divergent, apex truncate to obtuse. Pappus homomorphic, in several rows, inner bristles longer than outer ones, fragile, basally connate into a ring, caducous.

• One species: China.

The character combination for this genus is rather unique within the *Saussurea* group, but *Bolocephalus* is probably closely related to *Dolomiaea* and *Frolovia*. In the protologue, the receptacle was described as naked, whereas by C. Shih (FRPS 78(1): 44. 1987) that description was corrected to a receptacle having long bristles. *Bolocephalus* is preliminarily maintained here as a distinct genus because morphological data of receptacle, achene, and pappus structure are not sufficient to attribute it to another genus, and molecular data are lacking.

1. Bolocephalus saussureoides Handel-Mazzetti, J. Bot. 76: 292. 1938.

球菊 qiu ju

Dolomiaea saussureoides (Handel-Mazzetti) Y. L. Chen & C. Shih.

Herbs 10–30 cm tall, perennial. Caudex stout, unbranched. Stem solitary, 4–6 mm in diam., erect, simple, hollow, basally sparsely arachnoid, apically densely lanate. Basal leaves many, petiolate; petiole 3–6 cm; leaf blade elliptic to broadly linear, 10–20 × 1–1.5 cm, runcinate, pinnately lobed, or pinnatifid, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid tomentose but glabrescent; lobes 2–5 pairs, broadly or obliquely triangular, margin entire; terminal lobe elliptic to narrowly elliptic, apex acute to rounded. Stem leaves few, similar to basal leaves. Uppermost stem leaves linear, undivided. Capitulum solitary, drooping. Involucre globose, 5–6 cm in diam. Phyllaries in 5 or 6 rows, densely and fluffily lanate, apex long acuminate; outer and middle phyllaries triangular-subulate, 1.5–2.5 × 0.1–0.3 cm; inner phyllaries linear-subulate, 2.5–3.5 × 0.1–0.3 cm. Receptacle bristles to 1.1 cm. Corolla purplish red, ca. 1.6 cm, tube ca. 4 mm, limb ca. 1.2 cm, lobes ca. 2.5 mm. Achene brown, obconic, ca. 5 mm, 4- or 5-ribbed, apically with a rim. Pappus bristles scabrid, to 1.5 cm. Fl. and fr. Aug.

• Alpine scree slopes, cliffs, rocks, *Rhododendron* thickets; 4000–5000 m. Xizang (Nangxian).

19. FROLOVIA (Candolle) Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 461. 1954.

齿冠属 chi guan shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Aplotaxis sect. *Frolovia* Candolle, Prodr. 6: 538. 1838.

Herbs to 1 m tall, perennial. Stems stout, erect, hollow. Basal leaves large, lyrately pinnatisect with large terminal lobe or undivided and ovate to narrowly ovate-elliptic. Capitula solitary or few, 2–8 cm in diam., long pedunculate. Phyllaries in many rows, narrowly ovate-elliptic to linear, subequal in length, apex long acuminate; outer phyllaries ± reflexed. Receptacle with numerous bristles. Corolla bluish or reddish purple, glabrous. Anther tails lacerate. Achene large, obtusely 4-angled, wrinkled, glabrous, apex with an obtusely crenulate crown. Pappus homomorphic, in 1 row; bristles numerous, snow white or light brown, plumose, basally connate into a ring, caducous as a whole.

Five species: Afghanistan, China, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Uzbekistan; one species in China.

Frolovia is very closely related to *Aucklandia* (see note under that genus). In G. M. Shen (Fl. Xinjiang. 5: 273. 1999), the species of this genus is included in *Saussurea*. Molecular analysis by Y. J. Wang et al. (Ann. Bot. 99: 311–322. 2007) has shown that *Frolovia* and *Aucklandia* are more closely related to *Dolomiaea* than to *Saussurea*.

1. Frolovia frolowii (Ledebour) Raab-Straube, Willdenowia 33: 391. 2003.

大序齿冠 da xu chi guan

Saussurea frolowii Ledebour, Icon. Pl. 4: 16. 1833; *Aplotaxis frolowii* (Ledebour) Candolle.

Herbs 25–80[–110] cm tall, perennial. Stem solitary, 5–8 mm in diam., simple, apically sparsely leafy or leafless. Basal and lower stem leaves petiolate; petiole to 15 cm; leaf blade obovate-elliptic, 10–35 × 5–20 cm, lyrately pinnatisect, abaxially grayish green and arachnoid tomentose, adaxially green and sparsely pilose; lateral lobes 1–4 pairs, ovate-triangular, gradually smaller toward base; terminal lobe ovate to triangular-hastate, large, margin crenate-dentate or subentire, apex acuminate. Middle and upper stem leaves narrowly ovate-oblong to linear, 3–15 × 0.2–2 cm, margin dentate or entire. Capitula solitary or rarely 2, nodding. Involucre broadly campanulate to hemispheric, 2–3 cm in diam. Phyllaries in ca. 6 rows, blackish green, narrowly triangular-ovate to linear, 2.5–2.8 × 0.15–0.3 cm, subequal in length, apex long acuminate; outer phyllaries reflexed; inner phyllaries erect. Receptacle bristles filiform, 6–12 mm. Corolla reddish purple, 1.5–1.6 cm, tube 7–9 mm, limb 6–8 mm, lobes (2.5–)5–6 mm. Achene brown to straw-colored with dark spots, cylindric to obconic, 5–8 mm, wrinkled, apex with a short obtusely crenulate crown. Pappus straw-colored, bristles 1.1–1.3 cm. Fl. Jul–Aug. $2n = 36$.

Alpine and subalpine meadows, forest meadows, coniferous forests; ca. 2000 m. N Xinjiang [Kazakhstan, Russia (S Siberia)].

The specific epithet of *Saussurea frolowii* is spelled in the protologue with a "w" (except on the accompanying figure, which, however, does not have nomenclatural impact), whereas the sectional and hence the generic names are spelled with a "v." As both spellings are transcriptions from a Russian personal name, the former in German and the latter in Latin, they cannot be treated as correctable errors but have to be accepted as they are.

20. AUCKLANDIA Falconer, Ann. Mag. Nat. Hist. 6: 475. 1841.

云木香属 yun mu xiang shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs 0.3–2 m tall, perennial. Stem stout, erect, hollow. Basal leaves very large, lyrate with winged petiole shallowly pinnately

lobed or undivided; leaf blade cordate, triangular-ovate, or ovate. Capitula usually clustered at stem apex, large. Involucre hemispheric. Phyllaries blackish, imbricate, narrowly ovate-elliptic to linear, apex long acuminate and often reflexed. Receptacle with many long subulate bristles. Corolla glabrous, tube as long as limb. Anther tails lacerate, lanate. Achene glabrous, wrinkled, apically crowned. Pappus homomorphic, in 1 row; bristles numerous, straw-colored to brownish, plumose, flattened, basally connate into a ring, caducous as a whole.

One species: N India, Kashmir, N Pakistan; introduced to China.

Aucklandia and *Frolovia* are very closely related. In a molecular study by Y. J. Wang et al. (Ann. Bot. 99: 311–322. 2007), the two genera form together a small clade, which is nested within the morphologically much different genus *Dolomiaea*. However, as sampling and analysis of this group is not yet complete, we prefer not to make generic rearrangements of these species here. In C. Shih and S. Y. Jin (FRPS 78(2): 58. 1999), the species of this genus is included in *Saussurea* subg. *Frolovia*.

1. Aucklandia costus Falconer, Ann. Mag. Nat. Hist. 6: 475. 1841.

云木香 yun mu xiang

Aplotaxis lappa Decaisne; *Saussurea costus* (Falconer) Lipschitz; *S. lappa* (Decaisne) Schultz Bipontinus.

Herbs (0.4–)1–1.5(–2) m tall, perennial. Rootstock 1–5 cm in diam. Stems 1.5–2 cm in diam., simple or apically branched. Basal and lower stem leaves petiolate; petiole 10–40 cm, broadly winged and lobate; leaf blade lyrate, cordate, or triangular-hastate, 20–50 × 10–30 cm, abaxially sparsely pubescent and gland-dotted, adaxially sparsely strigose, margin sinuate-dentate and mucronate, apex acute. Middle and upper stem leaves petiolate or sessile; leaf blade lyrate, ovate, or triangular-ovate, (5–)10–45 × (3–)5–25 cm. Capitula (1 or)2–5, clustered in a synflorescence or sometimes solitary, sessile. Involucre hemispheric, 2–4 cm in diam. Phyllaries in 7–10 rows, dark purple to black, apically arachnoid but glabrescent, apex spiniform and reflexed; outer phyllaries narrowly triangular-ovate, (8–)15–20 × 1–2 mm; middle phyllaries narrowly ovate-elliptic, 1.5–2 × 0.2–0.3 cm; inner phyllaries narrowly elliptic-linear, 1.8–2.5 × 0.2–0.3 cm. Receptacle bristles subulate, 5–12 mm. Corolla dark blackish purple, 1.5–2 cm, tube 7–12 mm, limb 7–10 mm, lobes 4–5 mm. Achene brown with black spots, obconic to cylindric, 6–8 mm, apically wrinkled, apex with a crenulate or dentate crown. Pappus straw-colored, 1.2–1.7 cm. Fl. and fr. May–Aug. $2n = 36$.

Cultivated in Anhui, Fujian, Guangxi, Guizhou, Shaanxi, Sichuan, Yunnan, and Zhejiang [native to and also cultivated in NW India, Kashmir, and NE Pakistan].

The roots of *Aucklandia costus* are used medicinally.

21. HEMISTEPTIA Bunge ex Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 2: 38. 1836.

泥胡菜属 ni hu cai shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs, annual. Involucre campanulate to hemispheric. Phyllaries imbricate; outer and middle phyllaries apically with a purplish red crista. Receptacle densely covered with subulate alveolate bristles. Corolla glabrous. Anther tails sagittate, lacerate or undivided. Style branches short, divergent, apex truncate. Achene obovoid, laterally compressed, with 10–16 distinct ribs, glabrous, with apical rim forming a crenulate crown. Pappus heteromorphic, in 2 rows; outer pappus row of small scales; inner pappus row of plumose bristles, basally connate into a ring.

One species: E and S Asia, E Australia.

1. Hemisteptia lyrata (Bunge) Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 2: 38. 1836.

泥胡菜 ni hu cai

Cirsium lyratum Bunge, Enum. Pl. China Bor. 36. 1833; *Aplotaxis australasica* F. Mueller; *A. bungei* Candolle, nom. illeg. superfl.; *A. carthamoides* Candolle; *A. multicaulis* Candolle; *Hemisteptia carthamoides* (Candolle) Kuntze; *Saussurea carthamoides* (Candolle) Bentham; *S. lyrata* (Bunge) Franchet; *Serratula carthamoides* Buchanan-Hamilton ex Roxburgh (1832), not (Willdenow) Poiret (1805).

Herbs 20–150 cm tall, annual. Stems solitary or rarely several, erect, apically branched or rarely simple. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; leaf blade narrowly elliptic to narrowly obovate, 4–15 × 1.5–5 cm, lyrately pinnately divided, abaxially grayish white and ± tomentose, adaxially green and glabrous, margin dentate or entire; segments 1–6 pairs, narrowly obovate to narrowly ovate; terminal segment rhombic, triangular, or ovate, larger than lateral ones. Upper stem leaves sessile, narrowly ovate-elliptic to linear, gradually smaller upward on stem. Capitula many, in a lax corymbiform synflorescence or rarely solitary, long pedunculate. Involucre 1.5–3 cm in diam. Phyllaries in 4–10 rows, apex acuminate and purplish red; outer phyllaries triangular-ovate, 2–3 × 1–1.5 mm; middle phyllaries ovate-elliptic to elliptic, 3–7 × 1.3–1.5 mm; inner phyllaries elliptic to linear-elliptic, 7–13 × 1.5–1.8 mm. Receptacle bristles white, 2–4 mm. Corolla rose-purple, 1.2–1.4 cm, tube 1–1.1 cm, limb 2.5–3 mm, lobes 2–2.5 mm. Achene brown, 2.2–3 mm, glabrous. Pappus white; outer pappus row of 3–9 minute flat rectangular scales on abaxial side of achene, 0.2–0.5 mm, persistent; inner pappus row of plumose bristles, 1–1.3 cm, caducous. Fl. and fr. Mar–Aug. $2n = 36$*.

Forests, forest margins, grasslands, wastelands, farmlands, riversides, roadsides; near sea level to 3300 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Si-

chuan, Taiwan, Yunnan, Zhejiang [?Bangladesh, Bhutan, India, Japan, Korea, Laos, Myanmar, Nepal, Thailand, Vietnam; E Australia].

The earlier publication of the name *"Hemistepta* [sic!] *lyrata"* by Bunge in Ledebour (Dorpater Jahrb. Litt. 1: 221. 1833) was not valid because the generic name had not been previously validly published (*Vienna Code*, Art. 43.1); nor were the generic and specific names simultaneously validated there (Art. 42.1: "Reference to an earlier description is not acceptable in place of a descriptio generico-specifica").

"*Saussurea affinis* Spreng." and "*S. stricta* Spreng." (Candolle, Prodr. 6: 540. 1838) both belong here but were not validly published because they were merely cited as synonyms of *Aplotaxis carthamoides* and *A. multicaulis*, respectively (*Vienna Code*, Art. 34.1(c)).

22. SAUSSUREA Candolle, Ann. Mus. Natl. Hist. Nat. 16: 156, 198. 1810, nom. cons., not *Saussuria* Moench (1794).

风毛菊属 feng mao ju shu

Shi Zhu (石铸 Shih Chu); Eckhard von Raab-Straube

Herbs, usually perennial or sometimes biennial, sometimes subshrubs, cauliferous or stemless, often with woody caudex. Capitulum solitary or to very numerous and in a corymbiform, hemispheric, paniculiform, or racemiform synflorescence, sessile or pedunculate. Involucre campanulate, globose, ovoid, cylindric, or tubular. Phyllaries imbricate, sometimes with an apical appendage. Receptacle flat or convex, usually with subulate bristles or sometimes with short papillae, rarely naked. Corolla usually purple, often bluish or reddish, sometimes brownish, blackish, or pink, rarely white, usually glabrous, sometimes with sessile glands or papillae. Anthers dark purple, dark blue, or black; anther tails sagittate, entire, lacerate, or lanate. Achene straw-colored, sometimes with black spots, brown or black, ± ribbed, smooth or transversely wrinkled, usually glabrous, rarely with glands, papillae, or hairs; apical rim inconspicuous, entire or sometimes forming a short crown. Pappus in 2 rows, heteromorphic, dirty white, yellowish, straw-colored, brown, dark gray, or black; outer bristles usually more numerous and shorter than inner ones, often of different lengths, scabrid, very rarely barbellate or plumose, individually caducous, very rarely lacking; inner bristles fewer and longer than outer ones, usually of same length, basally connate into a ring, always plumose, caducous or persistent.

About 415 species: Asia, C, E, and N Europe, W North America; 289 species (191 endemic) in China.

By far, the greatest diversity of the genus is in high mountains of temperate Asia, particularly in Siberia, C Asia, the Himalaya, and the Qinghai-Xizang Plateau. In China, the Hengduan Shan area is the center of diversity of *Saussurea*, with more than one hundred species, many of them endemic.

The taxonomy of the genus *Saussurea* in this treatment follows largely the monograph by Lipschitz (Rod *Saussurea*, 1–284. 1979), although it is quite clear that his infrageneric taxa do not represent natural groups. Despite some recent attempts to clarify the evolution of *Saussurea*, also with the help of molecular methods (Raab-Straube, Willdenowia 33: 379–402. 2003; Kita et al., Taxon 53: 679–690. 2004; Y. J. Wang & J. Q. Liu, Biochem. Syst. Ecol. 32: 1009–1023. 2004; Y. J. Wang et al., Biol. J. Linn. Soc. 97: 893–903. 2009), a well-supported phylogeny of the whole genus is still lacking. Therefore, and because of the pragmatic need to subdivide the large genus into manageable and recognizable groups, we still adopt to a large extent the infrageneric subdivision by Lipschitz, keeping in mind that this classification is a highly artificial one. However, those species placed by him in *Saussurea*, which are now thought to belong to *Aucklandia*, *Frolovia*, and *Himalaiella* (see Raab-Straube, loc. cit.), are excluded from this treatment and can be found under the respective segregate genera. *Saussurea* is divided here into four subgenera: *S.* subg. *Eriocoryne*, *S.* subg. *Amphilaena*, *S.* subg. *Theodorea*, and *S.* subg. *Saussurea*. *Saussurea* subg. *Saussurea* is further divided into eight sections: *S.* sect. *Jurineiformes*, *S.* sect. *Jacea*, *S.* sect. *Gymnocline*, *S.* sect. *Laguranthera*, *S.* sect. *Lagurostemon*, *S.* sect. *Strictae*, *S.* sect. *Rosulascentes*, and *S.* sect. *Saussurea*. Some of the sectional names used by Lipschitz have to be replaced by older ones that have priority at this rank.

Many *Saussurea* species are used medicinally, as for example: *S. arenaria*, *S. epilobioides*, *S. involucrata*, *S. laniceps*, *S. leucoma*, *S. medusa*, *S. obvallata*, and *S. stella*. Some of them are collected and marketed in large quantities and need strong protection in their natural habitats.

1a. Capitula or synflorescence enclosed, half-enclosed, or subtended by yellowish, red, or purple, membranous uppermost leaves; leaves always undivided ..... 2. *S.* subg. *Amphilaena* (p. 67)

1b. Capitula or synflorescence not enclosed, half-enclosed, nor subtended by colored, membranous uppermost leaves; leaves undivided to pinnatisect.

2a. Capitula usually clustered in densely congested hemispheric or rarely an interrupted spiciform or corymbiform synflorescence, rarely solitary terminal on stem or in rosette of leaves, usually surrounded or half-surrounded by densely lanate subtending leaves or subtended and exceeded by stellately arranged uppermost leaves; stems usually hollow, apically widened and club-shaped ..... 1. *S.* subg. *Eriocoryne* (p. 57)

2b. Capitula in a corymbiform, paniculiform, or racemiform synflorescence or solitary terminal on stem, not surrounded by densely lanate subtending leaves nor by stellately arranged uppermost leaves; stems solid or hollow but not apically widened.

3a. Phyllaries or at least inner phyllaries with a conspicuous appendage; appendage often colored and membranous, or herbaceous and callose-serrulate, or cartilaginous spiniform; herbs mostly biennial, rarely perennial ..... 3. *S.* subg. *Theodorea* (p. 75)

3b. Phyllaries without an appendage or with a green herbaceous appendage but neither callose-serrulate nor spiniform, rarely with a long cusp or pectinate; plants always perennial ..... 4. *S.* subg. *Saussurea* (p. 82)

1. Saussurea subg. **Eriocoryne** (Wallich ex Candolle) J. D. Hooker, Fl. Brit. India 3: 376. 1881.

雪兔子亚属 xue tu zi ya shu

Aplotaxis sect. *Eriocoryne* Wallich ex Candolle, Prodr. 6: 541. 1838.

Herbs, perennial or rarely biennial, monocarpic or polycarpic, cauliferous, stemless, or substemless, often densely lanate, rarely glabrous or subglabrous. Stem erect, usually hollow, apex usually club-shaped and inflated. Leaves densely lanate, cottony, sericeous, tomentose, or glabrous, margin entire, denticulate, dentate, pinnately lobed, or pinnately divided. Capitula numerous or rarely solitary, usually aggregated in a densely congested hemispheric synflorescence in center of leaf rosette or terminal on stem, enclosed or subtended by uppermost stem leaves or rarely in an interrupted spiciform or corymbiform synflorescence. Phyllaries without an appendage. Receptacle usually with subulate bristles, sometimes with short papillae, or naked. Corolla usually glabrous, sometimes papillose. Achene smooth or wrinkled, usually glabrous, sometimes papillose, rarely thinly arachnoid or gland-dotted, usually without apical crown (in *Saussurea stella* with dentate crown). Pappus dirty white, straw-colored, light to dark brown, gray, or blackish, usually in 2 rows; outer bristles usually scabrid or rarely plumose, sometimes lacking.

Thirty-four species: Afghanistan, Bhutan, China, India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia (Siberia), Tajikistan; 30 species (14 endemic) in China.

Saussurea subg. *Eriocoryne* occurs mainly on the Qinghai-Xizang Plateau and adjacent areas.

1a. Plants stemless or shortly stemmed, monocarpic; caudex simple, bearing a single terminal rosette.
2a. Leaves yellowish green or grayish green, densely sericeous or lanate.
3a. Leaves spatulate or elliptic, more than 5 mm wide; receptacle without bristles; pappus in 1 row ..... 11. *S. depsangensis*
3b. Leaves narrowly triangular or linear, usually less than 5 mm wide; receptacle with bristles; pappus in 2 rows.
4a. Leaves densely lanate in basal part, glabrous in apical part, apex long acuminate ..... 9. *S. wellbyi*
4b. Leaves densely sericeous or lanate throughout, apex obtuse ..... 10. *S. aster*
2b. Leaves green and often with a red or purplish base or reddish, glabrous or sparsely arachnoid floccose.
5a. Capitulum solitary, large, 3–4 cm in diam., in center of leaf rosette ..... 6. *S. grandiceps*
5b. Capitula numerous, much smaller, in a clustered hemispheric synflorescence.
6a. Leaves pinnately lobed to pinnately divided ..... 5. *S. thoroldii*
6b. Leaves undivided, margin entire or crenulate.
7a. Leaves sessile, narrowly triangular to linear, 2.5–20 cm, apex very long acuminate ..... 7. *S. stella*
7b. Leaves petiolate, elliptic, ovate, or spatulate, 1–2.5 cm, apex obtuse or rounded ..... 8. *S. thomsonii*
1b. Plants usually with a developed stem, monocarpic or polycarpic, if almost stemless then polycarpic with branched caudex bearing several sterile leaf rosettes and flowering shoots.
8a. Leaves glabrous or sparsely pilose or tomentose and glabrescent.
9a. Plants 40–90 cm tall, not caespitose; capitula in a ± congested corymbiform synflorescence ..... 1. *S. uliginosa*
9b. Plants 10–20 cm tall, caespitose; capitula in a densely clustered hemispheric synflorescence ..... 2. *S. fistulosa*
8b. Leaves densely lanate, villous, sericeous, or tomentose, sometimes adaxially glabrous.
10a. Annuals or biennials; stem diffusely branched; capitula in a lax corymbiform synflorescence ..... 4. *S. kingii*
10b. Perennials; stem simple; capitula in a densely congested corymbiform, hemispheric, or spiciform synflorescence or rarely solitary (in *S. conaensis* and *S. tridactyla* var. *maiduoganla* and sometimes in *S. paxiana*).
11a. Stem 15–35 cm tall, not hidden by leaves or lanate indumentum ..... 3. *S. delavayi*
11b. Stem usually less than 15 cm tall, if taller then entirely hidden by leaves and lanate indumentum.
12a. Synflorescence at anthesis concealed in lanate indumentum; capitula surrounded and much exceeded by densely lanate bracts.
13a. Capitulum solitary ..... 28. *S. conaensis*
13b. Capitula numerous, in a ± aggregated synflorescence.
14a. Synflorescence interrupted spiciform; capitula not clustered on stem apex ..... 25. *S. laniceps*
14b. Synflorescence hemispheric; capitula clustered on stem apex.
15a. Capitula loosely clustered on obovoid stem apex ..... 29. *S. topkegolensis*
15b. Capitula densely aggregated on flat or convex stem apex.
16a. Phyllaries in 3–6 rows, unequal in length ..... 26. *S. gossipiphora*
16b. Phyllaries in 1–4 rows, almost equal in length.
17a. Plants monocarpic, not caespitose; caudex simple; leaves with white hairs; phyllaries in 3 or 4 rows ..... 27. *S. nishiokae*
17b. Plants polycarpic, caespitose; caudex branched; leaves with yellowish golden hairs; phyllaries in 1 row ..... 30. *S. bhutkesh*

12b. Synflorescence at anthesis not concealed in lanate indumentum; capitula exposed on stem apex, not exceeded by densely lanate bracts.
18a. Pappus dull dark brown, mouse-gray, or blackish.
19a. Plants not caespitose; caudex long, creeping, fragile, branched below ground level; leaf blade elliptic to narrowly elliptic, pinnately lobed to pinnately divided, 5–15 mm wide ..... 16. *S. quercifolia*
19b. Plants usually caespitose; caudex short, branched at ground level; leaf blade obovate, spatulate, or linear-oblong, undivided, 2–8 mm wide.
20a. Rosette and lower stem leaves green, glabrescent; petioles green, elongated; leaf margin obtusely sinuate-dentate; outer pappus bristles always reflexed and appressed on achene ..... 13. *S. inversa*
20b. Rosette and lower stem leaves whitish, densely tomentose; petioles purple, short; leaf margin entire or shallowly crenate; outer pappus bristles usually erect ..... 14. *S. gnaphalodes*
18b. Pappus white, dirty white, straw-colored, light brown, or brown.
21a. Plants shortly stemmed, less than 10 cm tall.
22a. Leaf blade very small, less than 1 cm ..... 15. *S. sugongii*
22b. Leaf blade larger, more than 1 cm.
23a. Upper stem leaves elliptic, not reflexed, apex obtuse to rounded ..... 12. *S. glacialis*
23b. Upper stem leaves linear, reflexed, apex acuminate ..... 19. *S. gyacaensis*
21b. Plants with a distinct elongate erect flowering stem, usually more than 10 cm tall.
24a. Rosette and lower stem leaves adaxially densely yellowish or white lanate throughout.
25a. Leaf margin apically 3–6-lobed; corolla glabrous ..... 22. *S. tridactyla*
25b. Leaf margin pinnately lobed or dentate; corolla ± papillose.
26a. Lower stem leaves fan-shaped to rhombic, more than 1 cm wide, margin dentate or pinnately lobed; achene glabrous or sparsely papillose on rim ..... 23. *S. medusa*
26b. Lower stem leaves narrowly spatulate, less than 1 cm wide, margin pinnately lobed; achene densely papillose on rim ..... 24. *S. namikawae*
24b. Rosette and lower stem leaves adaxially dark green or purplish, arachnoid floccose, tomentose, or glabrescent, sometimes only lanate toward base.
27a. All leaves deeply pinnatisect ..... 20. *S. leucoma*
27b. Leaves denticulate, dentate, or pinnately lobed.
28a. Rosette and lower stem leaves abaxially often reddish, glabrous; stem leaves erect or spreading; capitula solitary or 2–5; involucre 1–2 cm in diam. ..... 18. *S. paxiana*
28b. Rosette and lower stem leaves abaxially dark green, arachnoid; stem leaves reflexed; capitula numerous (8–20); involucre 0.4–0.9 cm in diam.
29a. Plants not caespitose; leaves elliptic, to 3 cm; upper stem leaves arachnoid; achene glabrous ..... 17. *S. georgei*
29b. Plants usually caespitose; leaves narrowly elliptic to linear, to 6 cm; upper stem leaves densely white lanate; achene sparsely papillose ..... 21. *S. simpsoniana*

1. Saussurea uliginosa Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 16. 1925.

湿地雪兔子 shi di xue tu zi

Herbs 40–90 cm tall, perennial, polycarpic. Caudex stout, simple or few branched. Stem solitary, 5–7 mm in diam., erect, simple or apically branched. Basal and lower stem leaves sessile, narrowly ovate-elliptic to linear, 20–30(–40) × 0.8–4 cm, abaxially light green, gland-dotted, and thinly tomentose but glabrescent, adaxially dark green and sparsely pilose but glabrescent, margin remotely denticulate, apex acuminate. Middle and upper stem leaves narrowly elliptic to linear, 8–20 × 1–2.5 cm. Uppermost stem leaves linear, 4–8 × 0.2–1.2 cm. Capitula 6–17, in a densely congested or laxly corymbiform synflorescence, sessile or pedunculate. Involucre obovoid to globose, (0.8–)1–1.3 cm in diam. Phyllaries in 5 or 6 rows; outer phyllaries triangular-ovate, (7–)10–17 × 2–3.5 mm, apex long acuminate; middle phyllaries narrowly ovate, 6–8 × 1.5–2.5 mm, apex acute to obtuse; inner phyllaries linear, 9–10 × 1–1.5 mm, apex obtuse. Receptacle bristles 6–7 mm. Corolla blackish purple, 1–1.1 cm, tube 5–6 mm, limb 5–5.5 mm, lobes 2.5–3 mm. Achene (ripe) unknown. Pappus light brown; outer bristles 2–3 mm; inner bristles 8–9 mm. Fl. and fr. Jul–Aug.

• Grasslands on stony mountain slopes, forests, forest margins, thickets, marshes; 2000–4200 m. SW Sichuan, NW Yunnan.

1a. Leaves (1.5–)2–4 cm wide; capitula in a densely congested hemispheric corymbiform synflorescence, sessile or shortly pedunculate ..... 1a. var. *uliginosa*
1b. Leaves 0.8–1.5 cm wide; capitula in an ample widely spreading corymbiform synflorescence, long pedunculate ..... 1b. var. *vittifolia*

1a. Saussurea uliginosa var. **uliginosa**

湿地雪兔子(原变种) shi di xue tu zi (yuan bian zhong)

Saussurea dumetorum J. Anthony.

Leaves narrowly ovate-elliptic, (1.5–)2–4 cm wide. Capitula terminal on stem, in a densely congested hemispheric corymbiform synflorescence, sessile or shortly pedunculate with basalmost ones to 2.5 cm, overtopped by stellately arranged uppermost leaves.

• Grasslands on stony mountain slopes, forests, forest margins, thickets, marshes; 3600–4200 m. SW Sichuan (Muli), NW Yunnan (?Dêqên, Lijiang, Zhongdian).

1b. Saussurea uliginosa var. **vittifolia** (J. Anthony) Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 649. 1937.

线叶湿地雪兔子 xian ye shi di xue tu zi

Saussurea vittifolia J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 215. 1934.

Leaf blade linear, 0.8–1.5(–1.7) cm wide. Capitula in apical third of stem, in an ample widely spreading corymbiform synflorescence, long pedunculate with basalmost ones to 8 cm, subtended by uppermost leaves.

• Grasslands on stony mountain slopes; 2000–3400 m. NW Yunnan (Lijiang, Zhongdian).

2. Saussurea fistulosa J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 206. 1934.

管茎雪兔子 guan jing xue tu zi

Herbs 10–20 cm tall, perennial, polycarpic, caespitose. Caudex stout, branched, covered with dark remains of petioles. Stem solitary, 7–10 mm in diam., erect, simple, hollow and clavate at apex. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 3–10 × 0.3–1 cm, abaxially pale green and scabrous, adaxially dark green and sparsely pilose but glabrescent, margin dentate, apex acute. Middle and upper stem leaves sessile, 3–6 × 1–1.5 cm. Uppermost stem leaves stellately arranged, overtopping synflorescence, sessile, narrowly triangular-ovate, 2–6 × 1–2 cm. Capitula 10–15, in a hemispheric synflorescence 4–5 cm in diam., sessile. Involucre narrowly campanulate or cylindric, 6–9 mm in diam. Phyllaries in ca. 4 rows, narrowly ovate to obovate, apically villous, apex caudate; outer phyllaries 10–12 × 3–4 mm; middle phyllaries 8–10 × 2–3 mm; inner phyllaries 8–9 × 1.5–2 mm. Receptacle bristles 2–3 mm. Corolla reddish purple, 7–8 mm, tube 3–4 mm, limb 3.5–4 mm, lobes 1–1.5 mm. Achene obconic, ca. 3 mm, smooth, glabrous. Pappus brown; outer bristles 2–3 mm; inner bristles 6–7 mm. Fl. and fr. Aug–Sep.

• Grasslands on mountain slopes; 3400–4300 m. NW Yunnan (Dêqên, Zhongdian).

3. Saussurea delavayi Franchet, J. Bot. (Morot) 2: 355. 1888.

大理雪兔子 da li xue tu zi

Herbs (10–)15–35 cm tall, perennial, polycarpic. Caudex stout, simple or few branched, covered with remains of petioles. Stem solitary, 4–6 mm in diam., erect, simple. Basal and lower stem leaves petiolate; petiole to 4 cm; leaf blade linear, 5–18 × 0.2–0.8 cm, abaxially light or grayish green, sericeous, tomentose, and gland-dotted, adaxially dark green and glabrous or sericeous-villous, margin slightly revolute and entire or denticulate, apex acuminate. Middle and upper stem leaves sessile, linear, 5–10 × 0.2–0.8 cm. Uppermost stem leaves stellately arranged, overtopping synflorescence, narrowly triangular-linear, 1.5–6 × 0.4–0.8 cm, apex acuminate. Capitula 10–15, in a hemispheric synflorescence 3–6 cm in diam., sessile. Involucre campanulate, 0.8–1.2 cm in diam. Phyllaries in 4 or 5 rows, blackish, apex caudate to acuminate; outer phyllaries narrowly triangular-ovate, 9–11 × 2.5–3 mm; middle phyllaries narrowly elliptic, 7–9 × 2–2.5 mm; inner phyllaries linear, 8–9 × 1–1.5 mm. Receptacle bristles 5–6 mm. Corolla bluish purple, 7–9 mm, tube 4–5 mm, limb 3–4 mm, lobes ca. 2 mm. Achene dark brown, obconic, 3–5 mm, smooth, glabrous. Pappus brown; outer bristles 2–4 mm; inner bristles 6–8 mm. Fl. and fr. Aug–Oct. $2n = 34$*.

• Grasslands on mountain slopes; 3300–4400 m. NW Yunnan.

1a. Leaves adaxially glabrous; basal leaves usually less than 5 mm wide ..... 3a. var. *delavayi*
1b. Leaves adaxially sericeous-villous; basal leaves usually more than 5 mm wide ..... 3b. var. *hirsuta*

3a. Saussurea delavayi var. **delavayi**

大理雪兔子(原变种) da li xue tu zi (yuan bian zhong)

Stem appressed sericeous. Leaves abaxially light green, appressed sericeous, tomentose, and gland-dotted, adaxially glabrous. Basal leaves 2–5 mm wide.

• Grasslands on mountain slopes; 3300–4000 m. NW Yunnan (Dali, Gongshan, Lijiang).

3b. Saussurea delavayi var. **hirsuta** (J. Anthony) Raab-Straube, **stat. nov.**

硬毛大理雪兔子 ying mao da li xue tu zi

Basionym: *Saussurea delavayi* f. *hirsuta* J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 205. 1934; *S. hirsuta* (J. Anthony) Handel-Mazzetti.

Stem densely sericeous-villous. Leaves abaxially grayish green, sericeous-villous, tomentose, and gland-dotted, adaxially sericeous-villous. Basal leaves 5–8 mm wide.

• Grasslands on mountain slopes; 4300–4400 m. NW Yunnan (Fugong, Lijiang).

4. Saussurea kingii C. E. C. Fischer, Bull. Misc. Inform. Kew 1937: 98. 1937.

拉萨雪兔子 la sa xue tu zi

Saussurea erecta S. W. Liu, J. T. Pan & J. Quan Liu.

Herbs 2–15(–25) cm tall, biennial or annual, monocarpic. Stem solitary, 2–4 mm in diam., sometimes erect, diffusely branched from base, apically branched or stem almost absent. Rosette leaves petiolate; petiole 0.5–5 cm; leaf blade narrowly oblong-elliptic to linear, 2–14 × 0.3–1.7 cm, pinnately lobed, both surfaces green, abaxially gland-dotted and arachnoid tomentose but glabrescent, adaxially sparsely arachnoid and gland-dotted, apex mucronate; lateral lobes 5–10 pairs, margin dentate or entire. Capitula 8–25, in a corymbiform synflorescence 3–15 cm in diam.; peduncle 0.3–1 cm. Involucre narrowly campanulate, 7–10 mm in diam. Phyllaries in 3 or 4 rows, apically purple, arachnoid, gland-dotted, apex acute and mucronate; outer phyllaries ovate to narrowly ovate-elliptic, 6–9 × 3–3.5 mm, appendage rhombic-spatulate and tridentate; middle and inner phyllaries narrowly ovate-elliptic, 5.5–9 × 1.5–2.5 mm. Receptacle without bristles. Corolla purplish red, rose, or white, 7–11 mm, tube 2.5–5.5 mm, limb 4–5.5 mm, lobes 3–4 mm and gland-dotted. Achene grayish with a dark wavy pattern, obconic, 3–4 mm, wrinkled, with thin long crisp hairs, glabrescent. Pappus white; outer bristles 2–2.5 mm; inner bristles (6–)8–9 mm, basally straw-colored. Fl. and fr. Aug–Sep. $2n = 34$*.

• Sandy river edges and mountain slopes, sand dunes; 2900–5000 m. Xizang.

Saussurea erecta, described from a single specimen, differs from *S. kingii* only by its more erect habit and glabrous achenes. *Saussurea kingii* is variable in growth habit, and glabrous achenes have been observed in some specimens of *S. kingii* as well. As long as these characters are not found to be stable in a larger population, we regard *S. erecta* as synonymous with *S. kingii*.

5. Saussurea thoroldii Hemsley, J. Linn. Soc., Bot. 30: 115. 1894.

草甸雪兔子 cao dian xue tu zi

Herbs 2–6 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot 1–3 mm in diam. Caudex densely covered with fibrous remains of petioles. Rosette leaves shortly petiolate; petiole purplish, basally widened; leaf blade narrowly triangular-ovate to linear, 2–10 × 0.2–1.5 cm, both surfaces green but purple in basal part, glabrous, pinnately lobed to pinnately divided, margin entire or sparsely dentate, apex acute and mucronate; lateral lobes 5–10 pairs, narrowly elliptic to linear, 1–4(–10) mm, recurved or patent. Capitula 8–40, clustered in a corymbiform to hemispheric synflorescence 2–8(–15) cm in diam., subsessile or on a peduncle to 3 cm. Involucre cylindric, 5–7 mm in diam. Phyllaries in ca. 4 rows, glabrous, margin apically ciliate, apex obtuse; outer phyllaries elliptic, 4–7 × 1.5–2 mm; middle and inner phyllaries oblong, 6–8 × 1.5–2 mm. Receptacle bristles 1–2 mm. Corolla rose to bluish purple, 8–11 mm, tube 3.5–6 mm, limb 4–6 mm, lobes 2–3 mm. Achene ivory-colored with a dark wavy pattern, cylindric to obconic, 2–3 mm, wrinkled, glabrous, apex with a lacerate crown to 2 mm. Pappus pale brown; outer bristles 2–4 mm; inner bristles (6–)8–10 mm. Fl. and fr. Jul–Sep. $2n = 32$*.

• Sandy and gravelly soil by lakes, river terraces, open steppes, saline marshlands; 3100–5200 m. Gansu, Qinghai, S Xinjiang, Xizang.

6. Saussurea grandiceps S. W. Liu, Acta Biol. Plateau Sin. 3: 69. 1984.

硕首雪兔子 shuo shou xue tu zi

Herbs 7–12 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot conic, fleshy. Caudex covered with remains of petioles. Rosette and stem leaves petiolate; petiole 0.5–3.5 cm, straw-colored with purple wings, widened at base; leaf blade narrowly elliptic-oblong to linear, 2–8 × 0.2–0.8 cm, abaxially pale or grayish green and thinly arachnoid to densely villous, adaxially green and glabrous, margin often revolute and entire or sparsely dentate, apex acuminate. Capitulum solitary, in center of leaf rosette. Involucre hemispheric to broadly campanulate, 3–4(–5) cm in diam. Phyllaries in 4 or 5 rows, straw-colored, apically and near margin dark purple, sparsely pilose, apex acuminate; outer phyllaries narrowly triangular-ovate, 1.5–1.7 × 0.4–0.6 cm; middle phyllaries narrowly elliptic, 1.8–2 × 0.3–0.4 cm; inner phyllaries narrowly elliptic, 2–2.3 × 0.2–0.3 cm. Receptacle bristles brownish, subulate, 2–3 mm, hyaline. Corolla bluish purple, 1.9–2.1 cm, tube 1.3–1.4 cm, limb 6–7 mm, lobes 3–4.5 mm. Achene brown with a blackish wavy pattern, rectangular, 7–8 mm, 4-angled, wrinkled, glabrous. Pappus straw-colored; outer bristles (2–)4–6 mm; inner bristles 1.4–1.6 cm. Fl. and fr. Aug.

• Alpine scree slopes; 5000–5300 m. S Xizang (Saga).

7. Saussurea stella Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 490. 1882.

星状雪兔子 xing zhuang xue tu zi

Herbs 2–5 cm tall, perennial, monocarpic, stemless. Rosette leaves sessile; leaf blade very narrowly triangular-ovate to linear but basally ovately widened, 2.5–20 × 0.3–1.3 cm, both surfaces glabrous, adaxially purplish red in basal part but green in apical part, margin entire, apex long acuminate. Capitula 2–25, in center of leaf rosette, in a hemispheric synflorescence 2–6 cm in diam., sessile. Involucre cylindric, 8–10 mm in diam. Phyllaries in ca. 5 rows, glabrous, basally hyaline, apically purple, apex rounded to obtuse and ciliate; outer phyllaries oblong or spatulate, 6–9 × 2–3(–5) mm; middle phyllaries narrowly oblong, 7–12 × 1.5–2 mm; inner phyllaries linear, 12–14 × 1–1.5 mm. Receptacle bristles white, 1–3 mm. Corolla purple, 1.3–1.7 cm, tube 0.8–1.2 cm, limb 5–6 mm, lobes 3–3.5 mm. Achene ivory-colored with dark spots, obconic, 2–3(–5) mm, obtusely 5-ribbed, glabrous, apex with a few-dentate ca. 1 mm crown. Pappus dirty white to light brown, in 1 row; bristles 0.9–1.3 cm, unequal in width, plumose, persistent. Fl. and fr. Jul–Sep.

Alpine grasslands, marshlands near rivers and lakes, wet meadows, bogs; 2000–5400 m. Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim)].

8. Saussurea thomsonii C. B. Clarke, Compos. Ind. 227. 1876.

肉叶雪兔子 rou ye xue tu zi

Saussurea acaulis Klatt; *S. amblyophylla* C. Winkler.

Herbs 1–4 cm tall, perennial, monocarpic, stemless. Taproot 1–2 mm in diam. Caudex short, with brown remains of petioles. Rosette leaves petiolate; petiole 5–10(–30) mm, basally widened; leaf blade elliptic, ovate, or spatulate, 1–3 × 0.5–1.7 cm, fleshy but leathery and rigid when dry, both surfaces green, abaxially glabrous, adaxially sparsely arachnoid but glabrescent, base cuneate-attenuate, margin crenulate to subentire, apex obtuse, rounded, or rarely acute. Uppermost leaves suborbicular. Capitula 2–10, in center of leaf rosette, in a hemispheric synflorescence 1.5–3 cm in diam., sessile. Involucre campanulate, (6–)8–10 mm in diam. Phyllaries in 3 or 4 rows, membranous, purplish red, glabrous, apex obtuse to rounded; outer phyllaries elliptic to obovate, 5–6(–8) × 2.5–3 mm; middle phyllaries obovate, 6–7 × 2.5–3 mm; inner phyllaries narrowly elliptic, 7–8 × 1.5–2 mm. Receptacle bristles brown, 0.2–0.8 mm. Corolla bluish purple, 6–7 mm, tube 3–3.5 mm, limb 3.5–4 mm, lobes 1.5–2 mm. Achene brown, cylindric to obconic, ca. 4 mm, wrinkled, glabrous. Pappus brown; outer bristles 2–4 mm, plumose, corkscrewlike twisted; inner bristles 6–7 mm. Fl. and fr. Jun–Sep.

High mountain pastures and meadows by rivers and lakes, marshlands; 4000–5200 m. Qinghai, S Xinjiang, Xizang [NW India, Kashmir, ?Pakistan].

9. Saussurea wellbyi Hemsley, Hooker's Icon. Pl. 26: t. 2588. 1899.

羌塘雪兔子 qiang tang xue tu zi

Saussurea hyperiophora Handel-Mazzetti.

Herbs 2–7 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot conic, fleshy. Caudex 0.5–1.5 cm in diam., simple, covered with remains of leaf bases; leaf bases brown, adaxially white sericeous-villous. Rosette leaves sessile, narrowly ovate-linear but base ovately widened, 2–5(–7) × 0.1–0.8(–1) cm, abaxially sericeous, adaxially sericeous-villous to densely lanate in basal part and glabrous in apical part, margin entire, apex long acuminate to caudate. Capitula 8–30, in center of leaf rosette, in a hemispheric synflorescence 2.5–4 cm in diam., sessile or shortly pedunculate. Involucre cylindric, ca. 6 mm in diam. Phyllaries in 3 or 4 rows, membranous, apically purple, apex acute; outer phyllaries narrowly obovate to oblong, 7–10 × 3–4 mm, apically villous; middle and inner phyllaries narrowly elliptic to linear, 10–12 × 2–2.5 mm, glabrous. Receptacle bristles 1–3 mm. Corolla purplish red, 8–10 mm, tube 3–5 mm, limb 4–6 mm, lobes 2–3 mm. Achene gray with some dark spots or blackish brown, cylindric to obconic, 3–5 mm, smooth, glabrous. Pappus brown; outer bristles 2–4 mm; inner bristles 7–10 mm. Fl. and fr. Jul–Sep. $2n = 28$*.

• Alpine scree slopes, alpine meadows; 4300–5500 m. Qinghai, W Sichuan, S Xinjiang, Xizang.

10. Saussurea aster Hemsley, J. Linn. Soc., Bot. 30: 115. 1894.

云状雪兔子 yun zhuang xue tu zi

Herbs 2–7 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot conic, fleshy. Caudex 0.5–1.5 cm in diam., simple, covered with remains of petioles. Rosette leaves petiolate; leaf blade narrowly elliptic, spatulate, or linear, 0.5–2(–4) × 0.1–0.4(–1) cm, abaxially white and densely sericeous to lanate, adaxially grayish green or yellowish green, base attenuate, margin entire, apex obtuse. Capitula 5–25, in center of leaf rosette, in a hemispheric synflorescence 2.5–5 cm in diam., sessile. Involucre cylindric to campanulate, 5–8 mm in diam. Phyllaries in 3 or 4 rows, apically purple and villous, margin purplish, hyaline, and entire or apically with 1 or 2 lateral teeth, apex acute to acuminate; outer phyllaries narrowly oblong to obovate, 8–10 × 2.5–3 mm; middle and inner phyllaries linear, 9–10 × 0.5–2 mm. Receptacle bristles 1–2 mm. Corolla rose-purple, 7–9 mm, tube 3–4 mm, limb 4.5–5 mm, lobes 1.5–2 mm. Achene brown or gray with dark spots, cylindric to fusiform, 4–6 mm, glabrous. Pappus in 2 rows; outer bristles dirty white, 3–4 mm; inner bristles brown, 7–8 mm. Fl. and fr. Jun–Aug.

Alpine scree slopes; 3900–5400 m. Qinghai, W Sichuan, Xizang [?NW India, Kashmir].

11. Saussurea depsangensis Pampanini, Lav. Ist. Bot. Reale Univ. Cagliari 22 [Aggiunte Fl. Caracorùm]: 176. 1934.

昆仑雪兔子 kun lun xue tu zi

Herbs 2–5 cm tall, perennial, monocarpic, stemless or shortly stemmed. Taproot slender, fleshy. Rosette leaves shortly petiolate; leaf blade obovate, spatulate, or suborbicular, 1–3 × 0.5–1.4 cm, abaxially sparsely whitish lanate but glabrescent, adaxially densely lanate with yellowish brown or whitish articulate matted hairs in basal part but arachnoid floccose and glabrescent in apical part, base cuneate-attenuate, margin entire or sparsely denticulate, apex rounded to obtuse. Capitula numerous, in center of leaf rosette, in a hemispheric synflorescence 2–4 cm in diam., sessile. Involucre cylindric to campanulate, 4–8 mm in diam. Phyllaries in ca. 3 rows, subequal, apex acuminate; outer phyllaries narrowly ovate-oblong, 8–9 × 2–3 mm, herbaceous, apically densely yellowish brown lanate; middle and inner phyllaries narrowly oblong to linear, 7–9 × 1–2 mm, light brown, scarious, glabrous. Receptacle without bristles. Corolla rose-purple to purplish red, 9–10(–13) mm, tube 3.5–4 mm, limb 5–6 mm, lobes 2–2.5 mm. Achene (ripe) unknown, ca. 4 mm, glabrous. Pappus yellowish brown, in 1 row; bristles plumose, 0.9–1.1 cm. Fl. and fr. Aug–Sep.

Alpine scree slopes; 4800–5400 m. Qinghai, S Xinjiang, Xizang [Kashmir].

12. Saussurea glacialis Herder, Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 144. 1867.

冰川雪兔子 bing chuan xue tu zi

Saussurea chtonocephala Bornmüller; *S. pamirica* C. Winkler; *S. violacea* Pampanini.

Herbs 2–6(–10) cm tall, perennial, polycarpic, shortly stemmed. Caudex slender, branched, with several leaf rosettes and flowering stems, covered with remains of petioles. Stem solitary, 1–3 mm in diam., erect, simple. Rosette and stem leaves shortly petiolate; leaf blade narrowly elliptic to obovate, 1.5–4 × 0.4–1 cm, abaxially white lanate, adaxially yellowish or white lanate, base cuneate-attenuate, margin crenate or entire, apex obtuse. Capitula 3–15, in a hemispheric synflorescence

1.5–4 cm in diam., sessile. Involucre cylindric to narrowly campanulate, (5–)7–10 mm in diam. Phyllaries in 3 or 4 rows, scarious, apically purple or blackish, apex acute to acuminate; outer phyllaries narrowly ovate-elliptic, 9–13 × 2.5–3 mm, apically lanate; middle phyllaries narrowly oblong, 8–13 × 1.5–2.5 mm; inner phyllaries narrowly elliptic to linear, 9–13 × 1–1.5 mm, glabrous. Receptacle bristles white, 0.5–2.5 mm. Corolla purple, 9–10 mm, tube 3–4 mm, limb 6–6.5 mm, lobes 2–2.5 mm. Achene cylindric to obconic, 3–4 mm, glabrous. Pappus in 2 rows; outer bristles dirty white, 2–5 mm, scabrid to plumose, sometimes lacking; inner bristles basally brown, apically dirty white, 8–11 mm. Fl. and fr. Jul–Aug.

Alpine scree slopes; 3800–5200 m. Qinghai, Xinjiang, Xizang [E Afghanistan, NW India, Kashmir, E Kazakhstan, Kyrgyzstan, Mongolia, N Pakistan, Russia (Siberia), Tajikistan].

13. Saussurea inversa Raab-Straube, Willdenowia 41: 92. 2011.

黑毛雪兔子 hei mao xue tu zi

Saussurea sorocephala (Schrenk ex Fischer & C. A. Meyer) Schrenk var. *glabrata* J. D. Hooker, Fl. Brit. India 3: 377. 1881, not *S. glabrata* (Candolle) C. Shih (1999); *S. gnaphalodes* (Royle ex Candolle) Schultz Bipontinus var. *glabrata* (J. D. Hooker) Handel-Mazzetti; *S. hypsipeta* Diels var. *glabrata* (J. D. Hooker) Lipschitz.

Herbs 3–15 cm tall, perennial, polycarpic, sometimes caespitose. Caudex simple or branched at ground level. Stem solitary, 2–5 mm in diam., erect, simple. Rosette and lower stem leaves long petiolate; petiole green; leaf blade narrowly obovate-spatulate, elliptic, or oblong, 1–3 × 0.3–1 cm, both surfaces green but sometimes tinged purple and glabrous or sparsely white arachnoid, base attenuate, margin obtusely dentate or entire, apex obtuse. Upper stem leaves sessile, narrowly triangular-ovate, usually reflexed, both surfaces white and blackish lanate, margin crenate or entire, apex obtuse to acuminate. Capitula 5–15, in a hemispheric synflorescence 2–4 cm in diam., sessile. Involucre cylindric, 5–6 mm in diam. Phyllaries in ca. 3 rows, membranous; outer phyllaries narrowly elliptic-linear, 8–9 × 1.5–2 mm, densely black and white lanate, apex subacute; middle and inner phyllaries obovate-elliptic, 8–9 × 2–3 mm, apex acute. Receptacle bristles 0.5–1.5 mm. Corolla rose-purple, 7–8(–9) mm, tube 3–4(–5) mm, limb 3.5–4(–5) mm, lobes (1.2–)1.5–2 mm. Achene brown, cylindric to obconic, 4–5 mm, smooth, glabrous. Pappus mouse-gray to blackish; outer bristles 1–3 mm, reflexed and appressed on achene; inner bristles 7–8 mm. Fl. and fr. Jul–Sep.

Alpine scree slopes, alpine meadows; 3700–5400 m. Qinghai, S Xinjiang, Xizang [Kashmir].

The type material of *Saussurea hypsipeta*, now present at WRSL and WU, was not seen by Lipschitz, who assumed that the type had been lost at B, though that was not the case. His choice of a neotype is therefore superseded (*Vienna Code*, Art. 9.17). Unfortunately, the type of *S. hypsipeta* differs taxonomically from the neotype. The original material of *S. hypsipeta* belongs in part to *S. gnaphalodes* and in part to *S. quercifolia*, both of which have priority over *S. hypsipeta*, so the taxon formerly widely known as *S. hypsipeta* (e.g., in Lipschitz, Rod *Saussurea*, 30. 1979; Y. L. Chen, Fl. Xizang. 4: 876. 1985; S. W. Liu, Fl. Qinghai. 3: 458. 1996; C. Shih & S. Y. Jin, FRPS 78(2): 11. 1999) had to be given a new name at the species level, which cannot be *"glabrata"* as this name is already occupied in *Saussurea*.

14. Saussurea gnaphalodes (Royle ex Candolle) Schultz Bipontinus, Linnaea 19: 331. 1846.

鼠曲雪兔子 shu qu xue tu zi

Aplotaxis gnaphalodes Royle ex Candolle, Prodr. 6: 542. 1838; *A. sorocephala* Schrenk ex Fischer & C. A. Meyer; *Saussurea sorocephala* (Schrenk ex Fischer & C. A. Meyer) Schrenk.

Herbs 1.5–6(–10) cm tall, perennial, polycarpic, caespitose. Caudex branched at ground level, usually with many leaf rosettes and flowering shoots. Stem solitary, 1–3 mm in diam., erect, simple. Rosette and stem leaves shortly petiolate; petiole purple; leaf blade obovate, spatulate, or linear-oblong, 5–20 × 2–8 mm, abaxially whitish with dark midvein and arachnoid tomentose, adaxially white or brownish arachnoid lanate, base cuneate-attenuate, margin entire, crenate, or obtusely dentate, apex obtuse to rounded. Capitula 5–20, in a hemispheric synflorescence 2–4 cm in diam., sessile. Involucre cylindric, (3–)5–8 mm in diam. Phyllaries in 3 or 4 rows, membranous, straw-colored to light brown, apically dark brown strigose, apex obtuse to acuminate; outer phyllaries ovate-oblong, 7–8 × 2–3.5 mm; middle and inner phyllaries narrowly ovate-elliptic to linear, 6–9 × 1–2 mm. Receptacle bristles 0.5–1.5 mm. Corolla rose-purple, 8–9 mm, tube 4–5 mm, limb 4–4.5 mm, lobes 2–2.5 mm. Achene brown to dirty white with dark spots, cylindric to obconic, 3–4 mm, smooth, glabrous or gland-dotted. Pappus mouse-gray to blackish; outer bristles 2–4 mm, sometimes reflexed; inner bristles 8–9 mm. Fl. and fr. Jun–Sep. $2n = 48$*.

Alpine scree slopes; 2700–5800 m. Gansu, Qinghai, W Sichuan, S and W Xinjiang, Xizang [NE Afghanistan, NW India, Kashmir, E Kazakhstan, Kyrgyzstan, W Nepal, N Pakistan, Tajikistan].

The basionym was not validly published by Royle (Ill. Bot. Himal. Mts. 251, t. 59, f. 1. 1835). There was no written description or diagnosis, or reference to such, and the illustration was lacking an analysis (*Vienna Code*, Art. 32.1(d), 44.1, 42.4).

15. Saussurea sugongii S. W. Liu & T. N. Ho, Novon 20: 174. 2010.

武素功雪兔子 wu su gong xue tu zi

Herbs 1.5–2 cm tall, perennial, polycarpic, almost stemless. Caudex slender, trailing, usually branched, usually with several sterile leaf rosettes and flowering stems, apically covered with remains of petioles. Rosette leaves petiolate; petiole purple, base widened; leaf blade ovate, fan-shaped, spatulate, or orbicular, (1–)3–10 × (1–)2–7 mm, abaxially grayish green and densely arachnoid tomentose, adaxially green and sparsely arachnoid or glabrous, base cuneate, margin entire or crenulate, apex rounded. Capitula 3–8, terminal in center of leaf rosette, in a hemispheric synflorescence 1–2.5 cm in diam., sessile. Involucre narrowly campanulate, 3–5 mm in diam. Phyllaries in 2 or 3 rows, membranous, apically purple or brown, apex acute to acuminate and dentate; outer phyllaries narrowly elliptic-oblong, 6–7 × 2–3 mm, apically sparsely arachnoid; middle and inner phyllaries narrowly elliptic to narrowly obovate, 6–8 × 1–

2.5 mm. Receptacle without bristles. Corolla 6–8 mm, tube 3–4 mm, limb 3–4 mm, lobes 1.5–2 mm. Achene dark brown, obconic, 3.5–4 mm, smooth, glabrous. Pappus pale yellowish brown, in 1 row; bristles 6–7 mm, plumose. Fl. Jul–Aug.

• Scree slopes, gravelly or sandy areas; 4800–5200 m. SE Xinjiang (Ruoqiang).

16. Saussurea quercifolia W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 115. 1913.

槲叶雪兔子 hu ye xue tu zi

Saussurea chionophora Handel-Mazzetti; *S. hypsipeta* Diels; *S. quercifolia* var. *major* J. Anthony.

Herbs 4–15(–22) cm tall, perennial, polycarpic. Caudex 3–5 mm in diam., creeping, branched, with sterile leaf rosettes and flowering stems. Stem solitary, 0.5–1.5 cm in diam., erect, simple, hidden by reflexed leaves. Rosette and lower stem leaves petiolate; leaf blade elliptic to narrowly elliptic, 0.8–4.5(–8) × 0.5–1.5 cm, abaxially whitish with dark veins, tomentose, and gland-dotted, adaxially green and sparsely arachnoid, base cuneate-attenuate, margin obtusely dentate to pinnately divided, apex acute to obtuse. Upper stem leaves oblong to linear, 1–5 × 0.2–0.8 cm, abaxially and basally densely lanate, adaxially glabrescent, margin pinnately divided or entire, apex acuminate. Capitula 10–20, in a hemispheric synflorescence 2.5–5 cm in diam., sessile. Involucre cylindric, 5–8 mm in diam. Phyllaries in 3 or 4 rows, apically grayish villous, apex acute; outer phyllaries narrowly ovate-elliptic, 6–10 × 2.5–4 mm; middle and inner phyllaries narrowly elliptic to linear, (6–)9–12 × 1.5–4 mm. Corolla bluish purple, 0.8–1.2 cm, tube 4–6 mm, limb 4–6 mm, lobes 2–3 mm. Achene brown, obconic, 4–6 mm, smooth, glabrous. Pappus mouse-gray; outer bristles 1–5 mm, barbellate to plumose; inner bristles 7–12 mm. Fl. and fr. Jul–Oct.

• Alpine scree slopes; 3300–5300 m. Qinghai, W Sichuan, EC and SE Xizang, NW Yunnan (Dêqên, Gongshan, Zhongdian).

Comparison of type material of *Saussurea chionophora* and *S. quercifolia* has shown that this is in fact a single species. No characters could be found to separate the two. *Saussurea quercifolia* is very variable in leaf size and division; the large specimens described as *S. quercifolia* var. *major* are included here.

For a synonymization of *Saussurea hypsipeta* see the discussion under *S. inversa*.

17. Saussurea georgei J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 207. 1934.

川滇雪兔子 chuan dian xue tu zi

Herbs 5–15 cm tall, perennial, polycarpic. Caudex 3–10 mm in diam., creeping, branched, with sterile leaf rosettes and flowering stems. Stem solitary, 2–5 mm in diam., erect, simple, hidden by reflexed leaves. Rosette and stem leaves petiolate; leaf blade elliptic, 1.5–3 × 0.5–1.5 cm, both surfaces dark green, abaxially arachnoid but glabrescent, adaxially arachnoid but lanate in proximal part, margin dentate to subentire, apex acute. Uppermost stem leaves sessile, linear, 1–3 × 0.2–0.5 cm, reflexed, margin entire, apex acuminate. Capitula 8–20, in a hemispheric synflorescence 2.5–6 cm in diam., sessile. Involucre narrowly campanulate, 7–9 mm in diam. Phyllaries in 3 or 4 rows, light brown but apically blackish purple, margin hyaline; outer phyllaries obovate-oblong, 14–15 × 4–4.5 mm, apically arachnoid, apex acuminate; middle and inner phyllaries narrowly elliptic, (13–)15–16 × 3–4 mm, glabrous, apex acute. Receptacle bristles straw-colored, 4–5 mm. Corolla purplish red, 1.2–1.4 cm, tube 6–7 mm, limb 6–7 mm, lobes 3–3.5 mm. Achene brown, cylindric, 5–6 mm, smooth, glabrous. Pappus light brown; outer bristles few, 1.5–4 mm, scabrid or smooth, sometimes lacking; inner bristles 1.2–1.3 cm. Fl. and fr. Jul–Aug.

• Alpine scree slopes; 3400–5300 m. S Qinghai (Yushu), SW and W Sichuan (Litang, Muli), ?Xizang, NW Yunnan (Dêqên, Zhongdian).

18. Saussurea paxiana Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 512. 1922.

红叶雪兔子 hong ye xue tu zi

Herbs 5–15 cm tall, perennial, polycarpic. Caudex 1–4 mm in diam., branched, with sterile leaf rosettes and flowering stems. Stem solitary, 2–3 mm in diam., erect, simple. Rosette and lower stem leaves distinctly petiolate; leaf blade obovate, elliptic, ovate, or orbicular, 1.5–10 × 0.5–3(–5) cm, green but becoming purplish red, abaxially usually reddish and glabrous, adaxially sparsely white arachnoid but glabrescent, base cuneate-attenuate, margin dentate, apex rounded to acuminate. Uppermost stem leaves sessile, narrowly elliptic to linear, both surfaces white and brownish lanate, apex acuminate and usually reflexed. Capitula (1 or)2–5(–13), in a hemispheric synflorescence 2–5 cm in diam. or rarely solitary, sessile. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in ca. 4 rows, straw-colored, apically white and brown lanate, apex acuminate; outer phyllaries narrowly triangular-ovate, 10–12(–18) × 3–4 mm; middle and inner phyllaries narrowly elliptic-linear, 12–14(–18) × 1.5–3 mm Receptacle bristles filiform, to 1 mm. Corolla dark red or pink, 1.2–1.7 cm, tube 6–11 mm, limb 6–7 mm, lobes 3–4 mm. Achene ivory-colored, cylindric, (5–)7–8 mm, 5-ribbed, smooth, glabrous. Pappus straw-colored; outer bristles 0.5–1.5 mm; inner bristles 1–1.3(–1.6) cm. Fl. and fr. Jun–Sep. $2n$ = 28*.

• Alpine scree slopes and meadows; 3500–5000 m. Gansu, Qinghai, W Sichuan, E Xizang, NW Yunnan.

19. Saussurea gyacaensis S. W. Liu, Acta Biol. Plateau Sin. 3: 69. 1984.

加查雪兔子 jia cha xue tu zi

Herbs 6–10 cm tall, perennial, polycarpic, caespitose. Caudex slender, branched, with several sterile leaf rosettes and flowering stems. Stem solitary, 2–5 mm in diam., erect or ascending, simple. Rosette and lower stem leaves petiolate; leaf blade spatulate to linear, 0.4–2 × 0.5–1.1 cm, white lanate, base attenuate, margin entire or crenate, apex obtuse to acuminate. Upper stem leaves linear, 1.5–3 × 0.2–0.3 cm, both surfaces densely white or yellowish lanate, margin entire or apically lobed, apex acuminate. Uppermost stem leaves narrowly triangular to linear, 1.5–3 × 0.2–0.3 cm, reflexed, both surfaces densely white or yellowish lanate, base purplish and widened, margin entire, apex acuminate. Capitula numerous, in a hemispheric synflorescence 3.5–4.5 cm in diam., sessile. Involucre

cylindric, ca. 5 mm in diam. Phyllaries in several rows, narrowly obovate-linear, 1–1.4 cm, dark purple, subglabrous, apex acute. Receptacle without bristles. Corolla bluish purple, ca. 1.2 cm, tube 6–7 mm, limb ca. 5 mm, lobes ca. 2 mm. Achene black, 6–6.5 mm. Pappus pale brown, in 1 row; bristles ca. 1.1 cm, plumose. Fl. and fr. Jul–Aug.

• Alpine scree slopes; ca. 4800 m. Xizang (Gyaca).

Saussurea gyacaensis is known only from the type collection.

20. Saussurea leucoma Diels, Notes Roy. Bot. Gard. Edinburgh 5: 197. 1912.

羽裂雪兔子 yu lie xue tu zi

Saussurea franchetiana H. Léveillé.

Herbs 10–18 cm tall, perennial, monocarpic. Caudex to 2 cm in diam., unbranched. Stem solitary, erect, simple, hidden by leaves. Lower and middle stem leaves petiolate; leaf blade narrowly elliptic, 3–5 × 0.5–2.5 cm, pinnatisect, abaxially grayish white, arachnoid tomentose to lanate, and gland-dotted, adaxially green and arachnoid to glabrescent; lobes 5–10 pairs, linear, 5–10 × 1–2 mm, margin entire, apex acute. Uppermost stem leaves sessile, linear, 2–3 × 0.1–0.2 cm, reflexed, both surfaces densely yellowish white lanate, margin entire, apex acute. Capitula numerous, in a hemispheric synflorescence 4–6 cm in diam., sessile. Involucre cylindric, 0.5–0.8 mm in diam. Phyllaries in 3 or 4 rows; outer phyllaries narrowly triangular-ovate, 10–15 × 3–5 mm, apically yellowish lanate, apex acuminate; middle and inner phyllaries narrowly elliptic to linear, 9–15 × 2–3 mm, apically sparsely pilose, margin membranous, apex acute. Receptacle bristles brown, 1–3 mm. Corolla blackish purple, 1–1.4 cm, tube 7–8 mm, limb 6–7 mm, lobes 2–3 mm. Achene black, obconic, 4–5 mm, smooth, glabrous. Pappus straw-colored; outer bristles 3–4 mm; inner bristles 1–1.3 cm. Fl. and fr. Aug–Oct.

• Alpine scree slopes; 3200–5300 m. SW Sichuan (Muli), SE Xizang, NW Yunnan (Dêqên, Lijiang, Zhongdian).

21. Saussurea simpsoniana (Fielding & Gardner) Lipschitz, Novosti Sist. Vyssh. Rast. 1964: 319. 1964.

小果雪兔子 xiao guo xue tu zi

Aplotaxis simpsoniana Fielding & Gardner, Sert. Pl. t. 26. 1844; *A. gossypina* Candolle var. *minor* Candolle; *Saussurea sacra* Edgeworth; *S. yushuensis* S. W. Liu & T. N. Ho.

Herbs 2–12[–25] cm tall, perennial, caespitose, polycarpic. Caudex stout, branched, with several sterile leaf rosettes and flowering stems. Stem solitary, ca. 6 mm in diam., erect, simple, usually hidden by leaves. Rosette and lower stem leaves petiolate; leaf blade narrowly oblong or narrowly elliptic to linear, 2–6 × 0.3–0.6[–1.2] cm, both surfaces green or purplish and sparsely arachnoid, base cuneate-attenuate, margin dentate to pinnately lobed, apex acute. Uppermost stem leaves linear, 10–25 × 1–2 mm, usually reflexed, both surfaces densely white lanate, margin entire or denticulate, apex acute. Capitula numerous, in a hemispheric synflorescence 2–3.5 cm in diam., sessile or shortly pedunculate. Involucre cylindric, 4–6 mm in diam. Phyllaries in 3 or 4 rows, membranous, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, 11–13 × ca. 3 mm, apically lanate; inner phyllaries narrowly ovate-elliptic to linear, 9–10 × 1.5–2 mm, apically sparsely pilose. Receptacle bristles ca. 1.5 mm. Corolla purple, 0.9–1.1 cm, tube 3.5–5 mm, limb 5.5–6 mm, lobes 2–3 mm. Achene brown, 2–3 mm, wrinkled, apically sparsely papillose. Pappus straw-colored; outer bristles ca. 3 mm; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep. $2n = 32$.

Alpine scree slopes; 3700–5800 m. S Qinghai (Chindu, Nangqên), SW Xinjiang (Taxkorgan), S and SW Xizang (Burang, Yadong, Zhongba) [?Bhutan, NE and NW India, Kashmir, Nepal].

The characters that were used to distinguish *Saussurea yushuensis* from *S. simpsoniana* fall within the range of the latter, which has a large distribution area and exhibits a considerable morphological variability.

22. Saussurea tridactyla Schultz Bipontinus ex J. D. Hooker, Fl. Brit. India 3: 377. 1881.

三指雪兔子 san zhi xue tu zi

Herbs 8–15[–20] cm tall, perennial, polycarpic. Caudex usually branched. Stem solitary, 3–8 mm in diam., erect, simple, hidden by reflexed leaves. Rosette and lower stem leaves petiolate; leaf blade spatulate, 5–25 × 2–6 mm, both surfaces grayish green and densely white or yellowish lanate, margin apically 3–6-lobed, apex obtuse to rounded. Middle and upper stem leaves narrowly spatulate to linear, 1–3(–4.5) × 0.3–0.7(–1) cm, margin apically 2–6-lobed or entire, apex obtuse to rounded. Capitula usually numerous, in a hemispheric synflorescence 2–3(–5.5) cm in diam. or rarely solitary, sessile. Involucre oblong to cylindric, 3.5–4(–8) mm in diam. Phyllaries in 3 or 4 rows, linear-oblong, 9–13 × 1.5–3 mm, subequal, apex acute; outer phyllaries densely villous; middle and inner phyllaries membranous, apically sparsely pilose. Receptacle bristles 0.2–0.5(–1.5) mm. Corolla dark to blackish purple, 1–1.4 cm, tube 5–7.5 mm, limb 5–6 mm, lobes 1.5–2.7 mm. Achene brown, cylindric to obconic, [3.2–]5–7 mm, smooth, glabrous. Pappus straw-colored to light brown; outer bristles thin, plumose, 2–4 mm; inner bristles 1–1.2 cm. Fl. and fr. Aug–Sep. $2n = 36$*.

Alpine scree slopes, among boulders, grasslands on mountain slopes; 4300–5300 m. S Xizang [Bhutan, India (Sikkim), Nepal].

1a. Capitula numerous; involucre oblong ..... 22a. var. *tridactyla*

1b. Capitulum solitary; involucre hemispheric ..... 22b. var. *maiduoganla*

22a. Saussurea tridactyla var. **tridactyla**

三指雪兔子(原变种) san zhi xue tu zi (yuan bian zhong)

Plants with a single flowering stem. Capitula numerous in a hemispheric synflorescence. Involucre oblong.

Alpine scree slopes, among boulders, grasslands on mountain slopes; 4300–5300 m. S Xizang [Bhutan, India (Sikkim), Nepal].

22b. Saussurea tridactyla var. **maiduoganla** S. W. Liu, Acta Biol. Plateau Sin. 3: 71. 1984.

丛株雪兔子 cong zhu xue tu zi

Plants caespitose, with several flowering stems. Capitulum solitary. Involucre hemispheric.

• Alpine scree slopes; 4600–4700 m. S Xizang (Gyirong).

Saussurea tridactyla var. *maiduoganla* is only known from the type collection.

23. Saussurea medusa Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 488. 1882.

水母雪兔子 shui mu xue tu zi

Saussurea dainellii Pampanini; *S. trullifolia* W. W. Smith; *S. trullifolia* var. *pinnatibracteata* J. Anthony.

Herbs 6–20 cm tall, perennial, polycarpic. Caudex 3–8 mm in diam., usually branched. Stem solitary, 0.5–1.5 cm in diam., erect, simple, hidden by reflexed leaves. Rosette and lower stem leaves petiolate; leaf blade obovate, fan-shaped, rhombic, or orbicular, 1–7.5 × (0.5–)1–5 cm, both surfaces grayish green and white or yellowish arachnoid lanate, margin dentate to pinnately lobed, apex obtuse. Middle and upper stem leaves ovate-elliptic, pinnately lobed or divided, both surfaces densely lanate, apex acute to acuminate. Uppermost stem leaves narrowly ovate to linear, both surfaces densely lanate, margin dentate. Capitula numerous, in a hemispheric synflorescence 3–7 cm in diam., sessile. Involucre cylindric, 5–8 mm in diam. Phyllaries in 3 or 4 rows; outer phyllaries narrowly ovate-triangular, 1.5–2.5 × 0.5–0.6 cm, apically white or brown lanate, apex caudate; middle and inner phyllaries narrowly obovate-oblong, 10–14 × 1–4 mm, glabrous, apex rounded and ciliate. Receptacle bristles 0.5–2 mm. Corolla bluish purple, sparsely papillose, 1–1.3 cm, tube 5–7 mm, limb 3–6 mm, lobes 1–3 mm. Achene dark brown, narrowly fusiform, 8–10 mm, sparsely papillose on apical rim or glabrous. Pappus dirty white; outer bristles 3–6 mm; inner bristles 1–1.3 cm. Fl. and fr. Jul–Sep. 2*n* = 34*.

• Rocky slopes, alpine scree slopes; 3000–5600 m. Gansu, Qinghai, W Sichuan, S Xinjiang, Xizang, NW Yunnan (Dêqên, Zhongdian) [?Kashmir].

The whole plant of *Saussurea medusa* is used medicinally.

24. Saussurea namikawae Kitamura, Acta Phytotax. Geobot. 24: 5. 1969.

尼泊尔雪兔子 ni bo er xue tu zi

Herbs 7–9[–15] cm tall, perennial. Stem solitary, ca. 5 mm in diam., erect, simple, hidden by reflexed leaves. Lower and middle stem leaves petiolate; leaf blade spatulate, obovate, or elliptic, 8–15 × 7–8 mm, both surfaces yellowish green and densely white and yellowish lanate, base attenuate, margin pinnately lobed, apex obtuse; lobes 2 or 3 pairs, linear, 1–4 × ca. 1 mm. Uppermost stem leaves sessile, linear, 15–20 × 1–3 mm, margin sparsely dentate or entire. Capitula numerous, in a hemispheric synflorescence 3–5 cm in diam., sessile. Involucre cylindric, 5–6 mm in diam. Phyllaries in 3 or 4 rows, hyaline, apically purplish red, glabrous but apically ciliate, apex acute; outer phyllaries narrowly spatulate-linear, 10–11 × ca. 3 mm; middle and inner phyllaries linear, 13–14 × 1–2 mm. Receptacle bristles 1.5–2.5 mm. Corolla dark purple, densely papillose, 1.1–1.3 cm, tube 6–7 mm, limb 5–6 mm, lobes 1.5–2 mm. Achene brown, narrowly fusiform, 7–8 mm, densely papillose on apical rim. Pappus light brown; outer bristles 5–8 mm; inner bristles 1.2–1.3 cm. Fl. and fr. Aug–Sep.

Alpine scree slopes; ca. 4900[–5200] m. SC Xizang (Lhasa) [W Nepal].

Saussurea namikawae from Nepal is very close to *S. medusa*, from which it is said to differ mainly by dense papillae on the corolla limb and on the apical rim of the achene; however, this kind of papillae is sometimes present in *S. medusa* as well. A specimen from C Xizang (*Ludlow & Sherriff 9066*) additionally differs from *S. medusa* by its much narrower leaves, which approach those of *S. tridactyla* in shape and color. This plant is therefore tentatively included here as *S. namikawae*.

25. Saussurea laniceps Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 657. 1937.

绵头雪兔子 mian tou xue tu zi

Herbs 15–45 cm tall, perennial, monocarpic. Caudex to 2 cm in diam., unbranched. Stem solitary, to 2 cm in diam., erect, simple, hidden by leaves, basally covered with fibrous remains of petioles. Rosette and stem leaves petiolate; leaf blade narrowly obovate-elliptic, 5–15 × 1–2 cm, both surfaces green or blackish purple, abaxially brownish white tomentose, adaxially arachnoid in basal part but glabrous in apical part, margin dentate, apex acute. Uppermost stem leaves narrowly ovate-elliptic to linear, 3–6 × 0.2–0.5 cm, both surfaces densely yellowish white or blackish lanate, margin entire, apex acute. Capitula numerous, in an interrupted spiciform synflorescence to 8 cm in diam., hidden in lanate indumentum, pedunculate. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in 3 or 4 rows, apically lanate, apex acuminate-caudate; outer phyllaries subulate, 2–2.5 × 0.2–0.3 cm; middle and inner phyllaries subulate-linear, 15–20 × 1–2 mm. Receptacle bristles 1–2 mm. Corolla dark purple, 0.9–1.3 cm, tube 1.5–3 mm, limb 7–8 mm, lobes 1.5–3 mm. Achene dark brown, obconic, 2.5–3(–5.5) mm, smooth, glabrous. Pappus light brown or blackish; outer bristles 2–5 mm; inner bristles 1–1.2 cm. Fl. and fr. Aug–Oct.

Alpine scree slopes; 3200–5500 m. SW Sichuan, SE Xizang, NW Yunnan [India (Sikkim), ?N Myanmar].

The whole plant of *Saussurea laniceps* is used medicinally, and the species is threatened in many regions by over-collecting.

26. Saussurea gossipiphora D. Don, Mem. Wern. Nat. Hist. Soc. 3: 414. 1821.

雪兔子 xue tu zi

Aplotaxis gossypina (Wallich) Candolle; *Saussurea gossipiphora* var. *lilliputa* Lipschitz; *S. gossipiphora* subsp. *luxuriosa* Lipschitz; *S. gossypina* Wallich.

Herbs 9–30[–48] cm tall, perennial, monocarpic. Caudex unbranched. Stem solitary, ca. 1 cm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade linear-oblong to narrowly obovate, 5–22 × 0.6–2.8 cm, both surfaces green and sparsely pilose or glabrous, margin sparsely denticulate, apex acute. Middle and upper stem leaves sessile, narrowly ovate-elliptic to linear, gradually smaller upward on stem, both surfaces densely white or pale yellowish lanate, apex acute or acuminate. Capitula numerous, densely clustered on flat stem apex in a synflorescence [4–]7–10 cm in diam., hidden at anthesis in

a lanate indumentum, sessile. Involucre cylindric to campanulate, 5–10 mm in diam. Phyllaries in 3–6 rows, apex acute; outer phyllaries ovate, ca. 4 × 3 mm; inner phyllaries narrowly ovate-elliptic to linear, ca. 7.5 × 1.5 mm. Receptacle bristles ca. 2 mm. Corolla bright purple to reddish purple, 7–12.5 mm, tube 2–5.5 mm, limb 5–7 mm, lobes 1.5–2 mm. Achene cylindric, 2–4.5 mm, apically sparsely papillose or glabrous. Pappus pale brown; outer bristles 4–5 mm; inner bristles 8–10 mm. Fl. and fr. Aug–Oct. $2n = 36$.

Alpine scree slopes, rock crevices; 4200–5000 m. S Xizang (Yadong), ?Yunnan [Bhutan, NE and NW India, ?Kashmir, Nepal].

The whole plant of *Saussurea gossipiphora* is used medicinally.

No specimens of *Saussurea gossipiphora* from China were seen by the present authors, and this description is based on material from outside the Flora area and on the revision by Fujikawa (Makinoa, n.s., 8: 46–51. 2010). The record from Yunnan relies only on a picture, which was not seen by the authors, and not on an actual specimen. Also, from a chorological point of view, such a record is improbable and is probably due to a confusion with *S. laniceps*.

27. Saussurea nishiokae Kitamura, Acta Phytotax. Geobot. 24: 6. 1969.

须弥雪兔子 xu mi xue tu zi

Herbs 9–30 cm tall, perennial, monocarpic. Caudex unbranched. Stem solitary, ca. 6.5 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to oblong, 3.5–11.5 × 0.8–2.5 cm, both surfaces dark reddish green to blackish purple and arachnoid, margin dentate, apex acute. Upper stem leaves linear, both surfaces densely white lanate, margin entire, apex acute. Capitula numerous, densely clustered on flat stem apex in a synflorescence ca. 4 cm in diam., hidden at anthesis in a lanate indumentum, sessile. Involucre cylindric, 5–6 mm in diam. Phyllaries in 3 or 4 rows, membranous; outer phyllaries spatulate to narrowly obovate, 8–8.5 × ca. 2.5 mm, densely pilose and glandular, apex apiculate; inner phyllaries narrowly ovate to linear, 8–8.5 × ca. 1.5 mm, sparsely pilose, apex acute to apiculate. Receptacle densely papillose; papillae ca. 0.5 mm. Corolla bright purple to reddish purple, 1–1.3 cm, glabrous, tube 5.5–6.5 mm, limb 4.5–6.5 mm, lobes 1.5–2 mm. Achene purplish black, cylindric, 4–7 mm, densely papillose. Pappus dirty white; outer bristles 2.5–4.5 mm; inner bristles 1.1–1.3 cm. Fl. and fr. Aug–Sep. $2n = 36$*.

Alpine scree slopes; ca. [3900–]4900[–5500] m. S Xizang (Nyalam) [?Bhutan, India (Sikkim), Nepal].

No specimens of *Saussurea nishiokae* were seen by the present authors. This treatment is based on the original description and on the revision by Fujikawa (Makinoa, n.s., 8: 53–55. 2010).

28. Saussurea conaensis (S. W. Liu) Fujikawa & H. Ohba, Makinoa, n.s., 8: 73. 2010.

错那雪兔子 cuo na xue tu zi

Saussurea gossipiphora D. Don var. *conaensis* S. W. Liu, Acta Biol. Plateau Sin. 3: 71. 1984.

Herbs 12–20[–30] cm tall, perennial, monocarpic. Caudex unbranched. Stem solitary, ca. 1 cm in diam., erect, simple. Lower and middle stem leaves petiolate; leaf blade narrowly obovate or narrowly oblong, 5–10[–17] × [0.5–]1–2[–3] cm, both surfaces green and sparsely arachnoid but glabrescent, margin sinuate-dentate, apex obtuse to acute. Upper stem leaves linear, 2–5 × 0.5–1.5 cm, both surfaces purplish black and densely white lanate, margin entire, apex acute to acuminate. Capitulum solitary, on flat stem apex, sessile, hidden at anthesis by lanate indumentum. Involucre broadly campanulate, [1–]2–3[–6?] cm in diam. Phyllaries not seen. Receptacle without bristles or papillae. Corolla bright purple to purple, 7–12.5 mm, tube 2--5 mm, limb 5–7.5 mm. Achene cylindric, 3–5 mm, smooth, glabrous. Pappus dirty white; outer bristles ca. 5 mm; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

Alpine scree slopes; 4000–4700 m. S Xizang (Cona) [Bhutan].

29. Saussurea topkegolensis H. Ohba & S. Akiyama, Univ. Mus. Univ. Tokyo Nat. Cult. 4: 68. 1992.

藏南雪兔子 zang nan xue tu zi

Herbs 4–20 cm tall, perennial, monocarpic. Caudex unbranched. Stem solitary, 8–10 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly ovate-oblong to linear, 4.5–16 × 0.5–1.5 cm, both surfaces green and sparsely pilose or glabrous, margin sparsely dentate to pinnately lobed, apex acute. Upper stem leaves sessile, linear, both surfaces purplish black and densely white lanate, margin sparsely denticulate, apex acute. Capitula numerous, loosely clustered on obovoid stem apex in a synflorescence 3–4.5 cm in diam., hidden at anthesis in a lanate indumentum, very shortly pedunculate. Involucre campanulate, ca. 1 cm in diam. Phyllaries in 3 or 4 rows, margin membranous, apex acute; outer phyllaries narrowly ovate, ca. 13 × 3 mm, apically blackish purple, densely pilose and glandular; inner phyllaries narrowly ovate to linear, ca. 11 × 2.5 mm, apically densely pilose. Receptacle bristles ca. 1.5 mm. Corolla bright purple to reddish purple, 7–8.5 mm, tube 2.5–3.5 mm, limb 4.5–5 mm, lobes 1.3–2 mm. Achene ca. 2.5 mm, wrinkled, apically sparsely papillose. Pappus dirty white; outer bristles ca. 4 mm; inner bristles ca. 8 mm. Fl. and fr. Aug–Sep. $2n = 32$.

Alpine meadows, sandy or stony places, scree slopes; 4500–5200 m. S Xizang [Bhutan, NW India, Nepal].

No specimens of *Saussurea topkegolensis* were seen by the present authors. This treatment is based on the original description and on the revision by Fujikawa (Makinoa, n.s., 8: 66–67. 2010).

30. Saussurea bhutkesh Fujikawa & H. Ohba, Edinburgh J. Bot. 59: 283. 2002.

定日雪兔子 ding ri xue tu zi

Herbs 10–30 cm tall, perennial, polycarpic, caespitose. Caudex branched. Stem solitary, 3–15 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade spatulate, narrowly elliptic, or oblong, 2–25 × 0.5–2.8 cm, both surfaces green and densely golden yellow and white tomentose, margin dentate, apex acute. Upper stem leaves sessile, gradually shorter upward on stem. Capitula densely clustered on flat stem apex in a synflorescence 1.3–5.5 cm in diam., hidden at anthesis in a lanate indumentum, sessile. Involucre tubular, 0.5–1.5 cm in diam. Phyllaries in 1 row, narrowly elliptic to linear,

5–9.5 × 0.5–1.5 mm, apically pilose and glandular, margin membranous, apex acute. Receptacle sparsely papillose; papillae ca. 0.3 mm. Corolla pale purple to bright purple, 0.8–1.2 cm, tube 1.5–4 mm, limb 5.5–8.5 mm, lobes 1.5–2.5 mm. Achene cylindric to fusiform, 2.4–3.8 mm, smooth, densely papillose. Pappus dirty white; outer bristles 1–4 mm; inner bristles 8–11 mm. Fl. and fr. Aug–Sep. $2n = 36$.

Alpine rock crevices, scree slopes; ca. [4400–]5300 m. S Xizang (Tingri) [E Nepal].

The only record of *Saussurea bhutkesh* from China is a picture from Langma La in Tingri Xian (Fujikawa & Springate, Newslett. Himalayan Bot. 39: 38. 2007). This treatment is based on the original description and on the revision by Fujikawa (Makinoa, n.s., 8: 53–55. 2010).

2. Saussurea subg. **Amphilaena** (Stscheglejew) Lipschitz, Trudy Moskovsk. Obshch. Isp. Prir., Biol. Ser. 3: 182. 1960.

雪莲亚属 xue lian ya shu

Saussurea sect. *Amphilaena* Stscheglejew, Bull. Soc. Imp. Naturalistes Moscou 21(3): 244. 1848.

Herbs, perennial or rarely biennial, polycarpic or rarely monocarpic, cauliferous, rarely substemless or stemless. Stems erect or ascending, simple or apically branched, leafy. Leaves elliptic, oblong, ovate, obovate, or linear, undivided, margin entire, denticulate, or sinuate-dentate. Uppermost stem leaves and bracts boat-shaped and keeled or flat, membranous or papery, enclosing, half-enclosing, or subtending and surrounding synflorescence or capitulum, colored pale yellow, yellowish green tinged purple, purple, or red. Capitula 1 to many, terminal on stem, solitary or in a lax or condensed corymbiform or hemispheric synflorescence. Phyllaries without an appendage. Receptacle usually with many subulate bristles, rarely papillose or naked. Corolla glabrous. Anther tails lacerate or sometimes simple. Achene smooth or ribbed, sometimes wrinkled, glabrous, usually without an apical crown. Pappus dirty white, yellowish, straw-colored, or light brown, always in 2 rows; outer bristles scabrid.

Twenty-eight species: Bhutan, China, N India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, N Myanmar, Nepal, Pakistan, Russia (Siberia); 25 species (18 endemic) in China.

1a. Uppermost leaves and bracts pale yellow, membranous, usually more than 3 cm wide.
2a. Capitula (1 or)2–5, in a laxly paniculiform synflorescence or rarely solitary, nodding, with a long (to 7 cm) peduncle; uppermost stem leaves and bracts not aggregated but distant from each other ..... 41. *S. wettsteiniana*
2b. Capitula numerous (5–30), in a condensed corymbiform or hemispheric synflorescence, erect, sessile or with a short (to 3 cm) peduncle; uppermost stem leaves aggregated below synflorescence.
3a. Uppermost stem leaves connivent and enclosing synflorescence; synflorescence laxly corymbiform; stem 0.4–1.4 cm in diam. ..... 44. *S. obvallata*
3b. Uppermost stem leaves stellately spreading; synflorescence strongly condensed corymbiform hemispheric; stem 1.5–3 cm in diam.
4a. Stem base covered with band-shaped remains of leaf sheaths; outer phyllaries linear-subulate, 1.1–1.8 cm, densely sericeous ..... 42. *S. orgaadayi*
4b. Stem base densely covered with fibrous remains of leaf sheaths; outer phyllaries narrowly triangular-ovate, 0.8–1.1 cm, glabrescent ..... 43. *S. involucrata*
1b. Uppermost leaves and bracts yellowish or greenish tinged with purple, yellowish rose, or purple, membranous or papery, usually less than 3 cm wide.
5a. Capitula (1 or)2–9(–13), in a corymbiform synflorescence or rarely solitary.
6a. Leaves abaxially grayish white and sericeous-tomentose, adaxially green ..... 34. *S. phaeantha*
6b. Leaves concolorous, green, glabrescent.
7a. Phyllaries obtuse or rounded at apex.
8a. Uppermost stem leaves large, 1–2.5 cm wide, half-enclosing synflorescence; capitula usually 3–6 ..... 54. *S. iodostegia*
8b. Uppermost stem leaves small, 0.2–1 cm wide, not enclosing synflorescence; capitula 1–3 ..... 53. *S. nigrescens*
7b. Phyllaries acute or acuminate at apex.
9a. Colored uppermost stem leaves not aggregated below synflorescence, distant from each other, not covering capitula.
10a. Involucre obconic, 1–2 cm in diam.; phyllaries glabrescent; leaves green, abaxially ± densely glandular ..... 50. *S. erubescens*
10b. Involucre broadly obconic, 2–2.5 cm in diam.; phyllaries densely villous; leaves blackening when dry, subglabrous, without glands ..... 51. *S. taipaiensis*
9b. Colored uppermost stem leaves aggregated below synflorescence, surrounding and covering at least basal part of capitula.
11a. Leaves smooth, sparsely villous and without glands ..... 55. *S. veitchiana*
11b. Leaves scabrid, glabrescent and usually with sessile or stalked glands.
12a. Leaf margin subentire to minutely denticulate ..... 52. *S. gymnocephala*
12b. Leaf margin sinuate-dentate.

13a. Capitula in a clustered synflorescence, sessile or subsessile; plants usually less than 20 cm tall; leaves usually less than 7 cm ..... 45. *S. tangutica*
13b. Capitula in a corymbiform synflorescence, pedunculate; plants usually more than 20 cm tall; leaves usually more than 10 cm.
14a. Plants tufted and forming large clumps; stems many; achene distinctly ribbed, apex with a dentate crown ..... 48. *S. luae*
14b. Plants not tufted; stems solitary or few; achene smooth or indistinctly ribbed, apex without a dentate crown.
15a. Uppermost stem leaves yellowish tinged with purple, margin irregularly dentate; involucre obconic to broadly campanulate ..... 47. *S. schultzii*
15b. Uppermost stem leaves intensely red to purple, margin subentire; involucre globose ..... 49. *S. globosa*

5b. Capitulum 1(or 2).
16a. Colored uppermost stem leaves not aggregated below capitulum, distant from each other, not covering capitulum.
17a. Phyllaries obtuse at apex ..... 53. *S. nigrescens*
17b. Phyllaries acute or acuminate at apex.
18a. Leaves abaxially grayish white and densely tomentose, adaxially green ..... 33. *S. pubifolia*
18b. Leaves green and ± concolorous.
19a. Leaf blade glabrescent, sometimes glandular, margin sinuate-dentate.
20a. Involucre obconic, 1.5–2 cm in diam.; phyllaries glabrescent; leaves green, abaxially ± densely glandular ..... 50. *S. erubescens*
20b. Involucre broadly obconic, 2–2.5 cm in diam.; phyllaries densely villous; leaves blackening when dry, subglabrous and without glands ..... 51. *S. taipaiensis*
19b. Leaf blade pubescent or sericeous, without glands, margin subentire or denticulate.
21a. Involucre 3–3.5 cm in diam.; outer phyllaries 1.5–2.3 cm; upper stem leaves to 2.5 cm wide; leaf blade sericeous, base attenuate and gradually tapering into winged petiole, apex acute to acuminate ..... 39. *S. longifolia*
21b. Involucre 1–2.5 cm in diam.; outer phyllaries 1–1.5 cm; upper stem leaves to ca. 1.5 cm wide; leaf blade pilose or glabrescent, base asymmetric and rounded, cordate, or cuneate, abruptly narrowed into petiole, apex obtuse to subacute ..... 40. *S. polycolea*
16b. Colored uppermost stem leaves aggregated below capitulum, surrounding and covering at least basal half of involucre.
22a. Leaves linear, 1–5 mm wide.
23a. Leaves grayish green, concolorous, both surfaces ± densely villous; caudex with hard tunic of pale brown persistent remains of petioles ..... 31. *S. pilinophylla*
23b. Leaves adaxially dark green and glabrous; caudex with blackish brown withered remains of petioles ..... 32. *S. hookeri*
22b. Leaves narrowly elliptic, narrowly ovate, or linear, more than 6 mm wide.
24a. Leaves on both surfaces grayish green and lanate-tomentose ..... 35. *S. velutina*
24b. Leaves adaxially green and not lanate-tomentose.
25a. Leaves adaxially green, abaxially grayish white.
26a. Leaf margin sinuate-dentate; uppermost stem leaves few, purplish red, enclosing capitulum ..... 33. *S. pubifolia*
26b. Leaf margin entire; uppermost stem leaves many, pale yellow, stellately spreading and subtending capitulum ..... 36. *S. baoxingensis*
25b. Leaves green, ± concolorous.
27a. Leaves abaxially with sessile glands, margin subentire to minutely denticulate ..... 52. *S. gymnocephala*
27b. Leaves with stalked glandular hairs or without glands, margin sinuate-dentate.
28a. Leaves smooth, pilose, or sericeous ..... 37. *S. muliensis*
28b. Leaves scabrid, glabrescent.
29a. Leaves usually more than 2 cm wide, apex usually obtuse ..... 38. *S. uniflora*
29b. Leaves usually less than 2 cm wide, apex acute.
30a. Involucre broadly campanulate; phyllaries densely villous, subequal, 1–1.6 cm; corolla 1–1.5 cm ..... 45. *S. tangutica*
30b. Involucre obconic; phyllaries pilose, glabrescent, unequal, 0.6–2.2 cm; corolla 1.5–1.8 cm ..... 46. *S. bracteata*

31. Saussurea pilinophylla Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 513. 1922.

膜鞘风毛菊 mo qiao feng mao ju

Saussurea tunicata Handel-Mazzetti.

Herbs (2–)7–23 cm tall, perennial, caespitose, forming large clumps. Caudex stout, many branched near ground level, densely covered by hard tunic of pale brown persistent remains of petioles. Stems numerous, 2–4 mm in diam., erect, simple. Rosette and lower stem leaves shortly petiolate; leaf blade narrowly ovate-elliptic to linear, (1.5–)4–7 × 0.2–0.6 cm, both surfaces grayish green and ± densely villous to sericeous, margin revolute and subentire or mucronulate, apex acute. Middle and upper stem leaves sessile, both surfaces grayish green to purplish red. Uppermost stem leaves ± aggregated, narrowly ovate, ovate-elliptic, or ovate-triangular, 1.3–3 × 0.6–1 cm, membranous, covering basal part of capitulum, both surfaces purplish red or pale purple, apex acuminate. Capitulum solitary. Involucre obconic to campanulate, 1.5–2.5 cm in diam. Phyllaries in 4–6 rows, dark purple to blackish, densely sericeous, apex acuminate to caudate; outer phyllaries narrowly ovate-elliptic, 5–8 × 2–4 mm; middle phyllaries narrowly ovate-elliptic, 8–10 × 1.5–2 mm; inner phyllaries linear, 12–14 × 1–2 mm. Corolla purplish red, 1.1–1.6 cm, tube 4.5–7.5 mm, limb 5.5–6.5 mm, lobes 3.5–4.5 mm. Achene cylindric, 3.5–4 mm, glabrous. Pappus straw-colored; outer bristles 2–3 mm; inner bristles 0.9–1.1 cm. Fl. and fr. Jul–Aug.

• Alpine scree slopes and grasslands; 4000–5300 m. Qinghai, NW Sichuan, Xizang.

Examination of rediscovered type material of *Saussurea pilinophylla* at WRSL and WU has shown that these plants from NW Sichuan are identical with those of *S. tunicata* from Xizang and Qinghai. They only differ in taller growing stems. There is a pronounced tendency toward smaller, almost stemless plants in higher and drier regions of the Qinghai-Xizang Plateau.

32. Saussurea hookeri C. B. Clarke, Compos. Ind. 230. 1876.

椭圆风毛菊 tuo yuan feng mao ju

Herbs 4–30 cm tall, perennial. Caudex simple or few branched, covered with blackish brown withered remains of leaf bases. Stems usually solitary, 1.5–3.5(–5) mm in diam., erect, simple. Rosette and lower stem leaves narrowly linear, 4–18 × 0.1–0.6 cm, abaxially paler green and pilose on midvein, adaxially dark green and glabrous, base attenuate, margin revolute and entire or denticulate, apex obtuse. Middle and upper stem leaves sessile, linear-subulate to narrowly ovate, 2–10 × 0.3–1 cm, both surfaces sericeous, apex acuminate. Uppermost stem leaves triangular-ovate, ovate, or elliptic, 1.3–2 × 0.4–1.1 cm, both surfaces blackish purple and densely sericeous, apex acute. Capitulum solitary. Involucre campanulate, 2–3 cm in diam. Phyllaries in 4 or 5 rows, black, sericeous; outer phyllaries narrowly triangular-ovate, 7–13 × 3–4 mm, apex obtuse; middle and inner phyllaries 11–14 × 1–2 mm, apex obtuse to acute. Receptacle bristles (0.6–)4–7 mm. Corolla purple, 0.9–1.5 cm, tube 4.5–8 mm, limb 5.5–7 mm, lobes 3–5 mm. Achene straw-colored with black spots, cylindric, 3.5–5.5 mm, ribbed, apex with a short crown. Pappus dirty white; outer bristles 1–6 mm; inner bristles 0.9–1.2 cm. Fl. and fr. Aug–Sep.

Alpine grasslands; 4300–5300 m. Qinghai, W Sichuan, Xizang [Bhutan, NE and NW India, Kashmir, Nepal].

33. Saussurea pubifolia S. W. Liu, Acta Biol. Plateau Sin. 3: 70. 1984.

毛背雪莲 mao bei xue lian

Herbs 15–45 cm tall, perennial. Caudex stout, few branched, densely covered with persistent remains of petioles. Stems usually solitary, 2–5 mm in diam., erect, simple. Rosette, basal, and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 8–25 × 0.4–1.5 cm, abaxially grayish white, densely lanate, and sometimes gland-dotted, adaxially green and sparsely pilose, base attenuate, margin revolute and sinuate-dentate, apex acute. Middle and upper stem leaves sessile, narrowly ovate to elliptic, 5–9 × 1–1.5 cm, base semiamplexicaul. Uppermost stem leaves ovate and boat-shaped, 2.5–5.5 × 1–2.6 cm, enclosing or subtending capitulum, both surfaces purplish red, base rounded, margin dentate, apex acute. Capitulum solitary. Involucre broadly campanulate, 2–2.5(–3) cm in diam. Phyllaries in ca. 4 rows, blackish brown, densely villous, apex acuminate; outer phyllaries narrowly triangular-ovate, 7.5–8.5 × ca. 2.5 mm; middle phyllaries narrowly ovate, 9–12 × 2–2.5 mm; inner phyllaries linear, 15–16 × 0.8–1.7 mm. Corolla purple, 1.2–1.6 cm, tube 7–8 mm, limb 7–8 mm, lobes 4.8–5.4 mm. Achene black, obconic, 4.4–5.8 mm. Pappus straw-colored; outer bristles 1.2–2.4 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Sep.

• Alpine scree slopes, grasslands; 4500–5200 m. SC Xizang.

1a. Uppermost stem leaves large, membranous, surrounding capitulum; leaves abaxially with golden glands ..... 33a. var. *pubifolia*

1b. Uppermost stem leaves small, herbaceous, not surrounding capitulum; leaves abaxially without golden glands ..... 33b. var. *lhasaensis*

33a. Saussurea pubifolia var. **pubifolia**

毛背雪莲(原变种) mao bei xue lian (yuan bian zhong)

Leaves with golden glands. Uppermost stem leaves large, membranous, surrounding capitulum.

• Alpine scree slopes; 4500–5100 m. SC Xizang.

33b. Saussurea pubifolia var. **lhasaensis** S. W. Liu, Acta Biol. Plateau Sin. 3: 71. 1984.

小苞雪莲 xiao bao xue lian

Leaves without golden glands. Uppermost stem leaves small, herbaceous, not surrounding capitulum.

• Alpine grasslands; 4600–5200 m. SC Xizang (Lhasa).

34. Saussurea phaeantha Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 489. 1882.

褐花雪莲 he hua xue lian

Saussurea tsarongensis J. Anthony.

Herbs 4–40 cm tall, perennial, caespitose. Caudex simple or few branched. Stems solitary or 2–4, 3–6 mm in diam., erect, simple. Rosette and basal stem leaves petiolate; leaf blade narrowly elliptic to linear, 3–15 × 0.5–1.6 cm, abaxially pale green and densely sericeous-villous, adaxially dark green and pilose but glabrescent, margin undulate or sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile, 2–7.5 × 0.3–1.2 cm, base semiamplexicaul. Uppermost stem leaves narrowly elliptic or triangular-ovate, 1–2.5 × 0.2–0.6 cm, membranous, half-enclosing synflorescence, both surfaces purple, margin entire or with a few teeth. Capitula 3–10(–15), in a congested corymbiform synflorescence 2.5–5 cm in diam., shortly pedunculate or sessile. Involucre cylindric, 0.7–1.5 cm in diam. Phyllaries in 3 or 4 rows, blackish purple, densely villous; outer phyllaries triangular-ovate, (5–)7.5–12 × 2–4.5 mm, apex acute; middle and inner phyllaries narrowly ovate, 8–11 × 0.9–2.8 mm, apex obtuse. Receptacle bristles 3–4 mm. Corolla dark brownish purple, 0.8–1.2 cm, tube 3.3–5 mm, limb 4.6–6 mm, lobes 2.4–3 mm. Achene straw-colored, cylindric to obconic, 3.3–4.8 mm, obtusely 5-ribbed. Pappus dirty white to pale brown; outer bristles 0.4–2.8 mm; inner bristles 8–10 mm. Fl. and fr. Jun–Sep.

• Alpine meadows, grasslands, mountain steppes; (2300–)3000–4800 m. Gansu, Qinghai, W Sichuan, SE Xizang (Zayü), NW Yunnan (Dêqên).

35. Saussurea velutina W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 221. 1920.

毡毛雪莲 zhan mao xue lian

Herbs 17–40 cm tall, perennial, caespitose. Caudex stout, many branched, covered with persistent remains of petioles. Stems many, 5–8 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 5.5–17 × 0.7–2 cm, both surfaces grayish green and densely lanate-tomentose, margin shallowly sinuate-denticulate to subentire, apex acute. Middle and upper stem leaves sessile, narrowly ovate to narrowly elliptic, 6.5–12.5 × 1–2 cm. Uppermost stem leaves ovate or narrowly ovate and boat-shaped, (1–)3–6 × (0.8–)1.5–3 cm, membranous, enclosing involucre, both surfaces purplish red and sparsely villous, margin denticulate or entire. Capitulum solitary. Involucre broadly campanulate, 3–4 cm in diam. Phyllaries in 4 or 5 rows, black or blackish purple, yellowish white villous, apex acuminate and often reflexed; outer phyllaries narrowly triangular-ovate, 11–14 × 3–5 mm; middle phyllaries narrowly triangular-ovate, 14–15 × 2–3 mm; inner phyllaries narrowly ovate to linear, 15–19 × 1–2.5 mm. Receptacle bristles 1.5–5.8 mm. Corolla purple, 1.2–1.5 cm, tube 6.5–8 mm, limb 6–7.5 mm, lobes 3.2–4.8 mm. Achene obovoid to cylindric, 3–5.5 mm. Pappus dirty white; outer bristles 2–6 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Sep.

• Alpine scree slopes, mats, and pastures; (3300–)4100–5500 m. SW Sichuan, SE Xizang, NW Yunnan.

36. Saussurea baoxingensis Y. S. Chen, Nordic J. Bot. 28: 761. 2010.

宝兴雪莲 bao xing xue lian

Herbs 20–40 cm tall, perennial. Caudex stout, woody, much branched. Stem solitary, 4–5 mm in diam. near base, erect, simple. Lower stem leaves sessile, linear, 6–25 × 0.6–0.9 cm, abaxially light green and densely lanate, adaxially green and sparsely villous, margin entire, apex acute. Upper stem leaves narrowly triangular-ovate, 5–12 × 1.2–1.5 cm. Uppermost stem leaves 12–14, sessile, ovate, 4.3–5 × 1.2–2.5 cm, membranous, aggregated and stellately spreading below capitulum, both surfaces yellowish white, abaxially sparsely villous, adaxially glabrous, margin entire and ciliate, apex acute. Capitulum solitary. Involucre broadly campanulate, ca. 2 cm in diam. Receptacle bristles 3–4 mm. Phyllaries in ca. 4 rows, yellowish to purplish black but with a dark brown margin, apically densely villous, margin minutely denticulate, apex acute; outer phyllaries narrowly ovate-elliptic, 11–13 × 2–2.5 mm; middle phyllaries narrowly ovate-elliptic, 10–12 × 1.5–2 mm; inner phyllaries narrowly elliptic, 9–10 × 1–1.1 mm. Corolla purple, 9–10 mm, tube 3–4 mm, limb 4.5–6 mm, lobes 1.3–1.5 mm. Achenes only seen when immature. Pappus dirty yellowish white; outer bristles 2.5–3 mm; inner bristles 7–8 mm. Fl. and fr. Aug–Sep.

• Open rock crevices; ca. 4000 m. Sichuan (Baoxing).

Saussurea baoxingensis is a very distinct taxon only known from the type collection and has not been observed in the field since 1936.

37. Saussurea muliensis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 656. 1937.

木里雪莲 mu li xue lian

Herbs 20–30 cm tall, perennial. Caudex stout, few branched, covered with blackish remains of petioles. Stems usually solitary, 3–5 mm in diam., erect, simple. Rosette and lower stem leaves sessile or shortly petiolate; leaf blade narrowly elliptic to obovate, 10–16 × 1–2.4 cm, both surfaces green and sparsely pilose to densely villous, base attenuate, margin denticulate to subentire, apex acute. Middle and upper stem leaves sessile, narrowly ovate to ovate, 6.5–10 × 2–3.4 cm, both surfaces green to purple, base semiamplexicaul. Uppermost stem leaves ovate and boat-shaped, 4–6.5 × 2–4.8 cm, half-enclosing involucre, both surfaces purplish red. Capitulum solitary. Involucre broadly campanulate, 2.5–4 cm in diam. Phyllaries in 3–5 rows, blackish brown, villous, apex acute; outer phyllaries triangular-ovate, 8–10 × 3–3.5 mm; middle phyllaries narrowly elliptic to ovate, 11–14 × 3–3.5 mm; inner phyllaries linear, 1.6–2 × 0.2–0.3 cm. Corolla purple, 1.4–1.7 cm, tube 6–9 mm, limb 7.5–8 mm, lobes 4.6–5.7 mm. Achene (immature) cylindric, ca. 5 mm. Pappus dirty white; outer bristles 3–6.5 mm; inner bristles 1.7–1.8 cm. Fl. and fr. Aug–Sep.

• Grasslands on mountain slopes; 4300–4400 m. SW Sichuan (Muli).

38. Saussurea uniflora (Candolle) Wallich ex Schultz Bipontinus, Linnaea 19: 330. 1846.

单花雪莲 dan hua xue lian

Aplotaxis uniflora Candolle, Prodr. 6: 539. 1838; *Saussurea conica* C. B. Clarke; *S. uniflora* var. *conica* (C. B. Clarke) Lipschitz; *S. uniflora* var. *sinensis* J. Anthony.

Herbs 14–70 cm tall, perennial. Caudex stout, simple or few branched. Stems usually solitary, 3–7 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade oblong, elliptic, narrowly elliptic, or obovate, (3–)12–32 × (1–)2–6.5 cm, both surfaces green and glabrescent, margin sinuate-dentate, apex obtuse to acute. Middle and upper stem leaves sessile, elliptic to elliptic-ovate, 7–19 × 2–4.5(–7.5) cm, both surfaces green tinged with purple, base cuneate or auriculate-amplexicaul, apex acute to obtuse. Uppermost stem leaves sessile, elliptic, boat-shaped, 1.5–4.5 × 0.6–1.8 cm, membranous, half-enclosing capitula, both surfaces purplish red, abaxially villous and sometimes glandular hairy, adaxially glabrescent, margin entire, apex acute to acuminate. Capitulum solitary [or several in a corymbiform synflorescence]. Involucre obconic, 2.5–4 cm in diam. Phyllaries in ca. 4 rows, apically villous, apex acuminate; outer phyllaries ovate-triangular, 10–15 × 2.5–5 mm; middle and inner phyllaries narrowly ovate to linear, 1.6–2 × 0.1–0.3 cm. Receptacle bristles 5–7.5 mm. Corolla bluish purple, 1.2–1.8 cm, tube 6–9 mm, limb 6.5–8 mm, lobes 3.6–5.7 mm. Achene blackish brown, cylindric, 4.5–6 mm, indistinctly ribbed. Pappus yellowish white; outer bristles 3–8.5 mm; inner bristles 1–1.3 cm. Fl. and fr. Jul–Sep. $2n = 32$.

Forests, thickets, alpine meadows; 3600–4800 m. S Xizang, NW Yunnan [Bhutan, NE India, Nepal].

Saussurea uniflora is a very variable species. Plants with several capitula have been described as *S. conica* from N India, but there is no reason to keep them separate from *S. uniflora* at any taxonomic rank. However, the name *S. conica* has been misapplied in a number of Chinese floras for a different taxon, the recently described *S. luae* (see discussion under that species).

39. Saussurea longifolia Franchet, J. Bot. (Morot) 2: 354. 1888.

长叶雪莲 chang ye xue lian

Herbs 25–40 cm tall, perennial. Caudex simple or few branched. Stem solitary, 4–6 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 10–35 × 1–5 cm, both surfaces green, abaxially densely sericeous, adaxially sparsely villous, margin subentire to denticulate, apex acute. Middle and upper stem leaves sessile, narrowly elliptic to ovate or obovate to linear and boat-shaped, 5–16 × 1.5–4 cm, both surfaces green to dark purple, base semiamplexicaul, margin entire, apex acute to acuminate. Capitulum solitary. Involucre obconic to broadly campanulate, 3–3.5(–4.5) cm in diam. Phyllaries in 3 or 4 rows, blackish brown or purple, sericeous, apex acuminate; outer phyllaries narrowly triangular-ovate, 1.5–2.3 × 0.3–0.5 cm; middle phyllaries linear-subulate, 2.2–2.3 × 0.3–0.4 cm; inner phyllaries linear, 2.1–2.3 × 0.2–0.3 cm. Receptacle bristles 4–9 mm. Corolla dark purple, 1.8–2.1 cm, tube 1.1–1.2 cm, limb 7–9 mm, lobes 4.8–5.6 mm. Achene straw-colored with some black spots, cylindric to obovoid, 5–5.5 mm. Pappus yellowish brown; outer bristles 1.5–5 mm; inner bristles 0.8–1.4 cm. Fl. and fr. Jul–Sep.

• Grasslands, thickets, alpine meadows; 3000–4700 m. ?Qinghai (Nangqên), SW Sichuan (Muli), SE Xizang, NW Yunnan.

We cannot confirm the record of *Saussurea longifolia* from Qinghai reported by S. W. Liu (Fl. Qinghai. 3: 450. 1996).

40. Saussurea polycolea Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 654. 1937.

多鞘雪莲 duo qiao xue lian

Saussurea nidularis Handel-Mazzetti.

Herbs (3–)6–45 cm tall, perennial. Caudex simple or few branched. Stems solitary or several, 1–4 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly ovate, elliptic, or obovate, 2–20 × 0.5–3 cm, both surfaces green and pubescent, base usually asymmetric and cuneate, rounded, or cordate, margin subentire to shallowly sinuate-denticulate, apex obtuse to acute and mucronate. Middle and upper stem leaves sessile, ovate or obovate and boat-shaped, 3–13 × 0.8–3.2 cm, both surfaces green to purple, base amplexicaul, margin entire, apex acuminate. Uppermost stem leaves boat-shaped, 1.5–6.5 × 0.3–1.6 cm, both surfaces purplish red. Capitulum solitary. Involucre obconic to campanulate, 1–2.5 cm in diam. Phyllaries in 4 or 5 rows, blackish brown or purple, sericeous-villous, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, 10–15 × 2–5 mm; middle phyllaries narrowly elliptic, 12–16 × 2–3 mm; inner phyllaries linear, 12–18 × 1–2 mm. Receptacle bristles 2.5–6(–9) mm. Corolla purple, 1.5–1.7 cm, tube 7–9 mm, limb 6–9 mm, lobes 4.5–5.8 mm. Achene straw-colored to blackish, obovoid, 3.8–4.6 mm, indistinctly 5-ribbed. Pappus pale brown; outer bristles 1–5.5 mm; inner bristles (0.8–)1–1.2 cm. Fl. and fr. Jul–Oct.

• Grasslands on mountain slopes, scree slopes, thickets, rocky pastures; 3200–4700 m. W Sichuan, E Xizang, NW Yunnan.

Saussurea nidularis, only known from the type collection, was described from juvenile specimens with capitula in bud stage. It does not differ from *S. polycolea* in any developed character; its substemless growth form is most probably due to its early developmental stage.

Saussurea polycolea var. *acutisquama* is a synonym of *S. erubescens*. The name of the variety was often misapplied for a recently recognized good species, *S. acutisquama* of *S.* subg. *Saussurea*.

41. Saussurea wettsteiniana Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 144. 1920.

垂头雪莲 chui tou xue lian

Herbs 30–90 cm tall, perennial. Caudex stout, simple or few branched. Stems 1–3, 3–5 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to linear, 15–55 × 1.5–6 cm, both surfaces light green, pilose, and glandular hairy, margin undulate and usually denticulate, apex acute. Middle and upper stem leaves sessile, narrowly elliptic, 7.5–25 × 1.5–4.5 cm. Uppermost stem leaves sessile, ovate and boat-shaped, 3–15 × (1–)2.5–14 cm, membranous, half-enclosing synflorescence, both surfaces yellowish, base cordate, rounded, or cuneate and auriculate-amplexicaul, margin entire or denticulate, apex acuminate. Capitula (1 or)2–5, in a laxly paniculiform synflorescence or rarely solitary, nodding at anthesis and fruiting time, long pedunculate. Involucre campanulate, 2–3.5 cm in diam. Phyllaries in 3 or 4 rows, blackish purple, villous, apex acuminate; outer phyllaries narrowly triangular-ovate, 14–16 × 3–6 mm; middle and inner phyllaries narrowly ovate to linear, 1.6–2.2 × 0.2–0.5 cm. Receptacle bristles 5.5–9 mm. Corolla dark purple, 1.3–1.9 cm,

tube 6–9.5 mm, limb 6–9.5 mm, lobes 2.5–5.5 mm. Achene straw-colored with blackish spots, obovoid, 5.4–6.7 mm, indistinctly ribbed. Pappus light yellowish brown; outer bristles 1–5.4 mm; inner bristles 1.1–1.4 cm. Fl. and fr. Jul–Sep.

• Forest margins, grasslands, meadows near mountain rivers; 3200–4300 m. W Sichuan, NW Yunnan.

Records of *Saussurea wettsteiniana* from Xizang are due to misidentifications (see discussion under *S. luae*).

42. Saussurea orgaadayi Khanminchun & Krasnoborov, Izv. Sibirsk. Otd. Akad. Nauk S.S.S.R. 13(2): 15. 1984.

阿尔泰雪莲 a er tai xue lian

Herbs 40–65 cm tall, perennial or biennial. Stem solitary, 2.5–3 cm in diam., erect, simple, hollow, densely leafy, covered at base with band-shaped remains of petioles. Rosette and lower stem leaves petiolate; leaf blade elliptic to narrowly elliptic-obovate, 6–16 × 3–4 cm, both surfaces green, scabrous, glandular hairy, and sparsely pilose, margin sinuate-dentate to serrate, apex acute. Middle and upper stem leaves sessile, narrowly ovate, elliptic, or obovate, 8–17 × 2–5.5 cm, base auriculate. Uppermost stem leaves ovate to narrowly triangular-ovate, 4–12 × 1.5–6.5 cm, membranous, stellately surrounding synflorescence, both surfaces yellowish, margin dentate. Capitula 20–30, in a hemispheric synflorescence 12–15 cm in diam., sessile or shortly pedunculate. Involucre campanulate, 2–3 cm in diam. Phyllaries in 3–5 rows, linear-subulate, brown with dark margin, sericeous-villous, apex acuminate; outer phyllaries 11–18(–23) × 1–2.5 mm; middle and inner phyllaries 14–18 × 1.4–1.8 mm. Receptacle naked or shortly papillose. Corolla purple, 1.7–1.9 cm, tube 8.5–9.5 mm, limb 8.5–9 mm, lobes 4.2–4.6 mm. Achene straw-colored with blackish spots, cylindric, 5–6.7 mm, obtusely 5-ribbed. Pappus straw-colored; outer bristles 1–4 mm; inner bristles 1.1–1.4 cm. Fl. Jul–Aug, fr. Aug–Oct. $2n$ = 32.

N Xinjiang (Altay Shan) [Mongolia, Russia (Siberia)].

The whole plant of *Saussurea orgaadayi* is used medicinally.

See also the discussion under *Saussurea involucrata*.

43. Saussurea involucrata (Karelin & Kirilov) Schultz Bipontinus, Linnaea 19: 331. 1846.

雪莲花 xue lian hua

Aplotaxis involucrata Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 389. 1842; *Saussurea involucrata* var. *axillicalathina* J. S. Li; *S. ischnoides* J. S. Li; *S. karelinii* Stscheglejew; *S. lioui* Y. Ling; *S. polylada* J. S. Li.

Herbs 15–50 cm tall, perennial. Caudex stout, unbranched, densely covered with fibrous remains of petioles. Stem solitary, 1.5–3 cm in diam., erect, simple. Rosette and stem leaves petiolate; leaf blade narrowly ovate, elliptic, or obovate, 8–13 × 2–4 cm, both surfaces green and glandular hairy, base decurrent, margin denticulate to serrulate, apex acute to obtuse. Uppermost stem leaves sessile, ovate to elliptic, 5.5–12 × 3.5–6.5 cm, membranous, stellately surrounding synflorescence, both surfaces pale yellow. Capitula 10–20, in a hemispheric synflorescence 8–15 cm in diam., sessile or shortly pedunculate. Involucre hemispheric to broadly campanulate, 1–2.5 cm in diam. Phyllaries in 3 or 4 rows, dark or light brown with dark margin, sparsely pubescent, apex acute; outer phyllaries narrowly ovate-elliptic, 8–11 × 2.5–5 mm; middle and inner phyllaries narrowly elliptic to linear, 10–18 × 1.5–2 mm. Receptacle papillose; papillae 0.5–1 mm. Corolla purple, 1.3–1.8 cm, tube 7–9 mm, limb 6–9 mm, lobes 3–5 mm. Achene straw-colored with blackish spots, cylindric, 4.8–6.7 mm, 5- or 6-ribbed. Pappus dirty white; outer bristles 0.5–3 mm; inner bristles 0.8–1.5 cm. Fl. Jul–Aug, fr. Aug–Oct. $2n$ = 32*.

Mountain slopes, mountain valleys, by water, meadows, in rock fissures; 2400–4100 m. C, N, and W Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia].

The whole plant of *Saussurea involucrata* is used medicinally, and the species is endangered in China due to over-collecting.

Most previous records from the Chinese Altay probably belong to *Saussurea orgaadayi*, but the occurrence of *S. involucrata* cannot be excluded there.

44. Saussurea obvallata (Candolle) Schultz Bipontinus, Linnaea 19: 331. 1846.

苞叶雪莲 bao ye xue lian

Aplotaxis obvallata Candolle, Prodr. 6: 541. 1838; *Saussurea obvallata* var. *orientalis* Diels.

Herbs 15–80 cm tall, perennial. Caudex stout, usually unbranched. Stem solitary, 4–14 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade ovate, elliptic-oblong, or obovate, 7–32 × 1–6.5 cm, both surfaces pilose and glandular hairy but glabrescent, base attenuate, margin subentire to sinuate-dentate, apex obtuse to acute. Middle and upper stem leaves sessile, narrowly elliptic to ovate, 5–16 × 1.5–8 cm, base semiamplexicaul. Uppermost stem leaves elliptic or ovate, boat-shaped, 5–15 × 1.5–9 cm, membranous, enclosing synflorescence and forming a lanternlike head of 4–14 cm in diam., both surfaces pale yellow. Capitula 2–16, in a corymbiform synflorescence 3.5–9 cm in diam., pedunculate or subsessile. Involucre globose to campanulate, 1–3 cm in diam. Phyllaries in 3–5 rows, straw-colored with dark margin and apex, pilose to glabrescent, apex acute to acuminate; outer phyllaries triangular-ovate, 5–15 × 2–6 mm; middle phyllaries narrowly ovate, 7–15 × 1–4 mm; inner phyllaries linear, 8–14 × 1–2 mm. Receptacle bristles 1–5 mm. Corolla purple, 0.9–1.3 cm, tube 4–7 mm, limb 4.5–6 mm, lobes 1.8–3.3 mm. Achene straw-colored with dark spots, cylindric, 2–5 mm, 4–7-ribbed. Pappus dirty white-yellowish; outer bristles 2–5 mm; inner bristles 7.5–11 mm. Fl. and fr. Jul–Sep. $2n$ = 32*.

Grasslands, rocky places on mountain slopes, by streams, scree slopes; 3200–5200 m. E Qinghai, W Sichuan, SE Xizang, NW Yunnan [Bhutan, NE and NW India, Kashmir, N Myanmar, Nepal].

The whole plant of *Saussurea obvallata* is used medicinally.

The combination *Saussurea obvallata* by Schultz Bipontinus preceded the same name by Edgeworth (Trans. Linn. Soc. London 20: 76. Aug 1846) by one month.

45. Saussurea tangutica Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 489. 1882.

唐古特雪莲 tang gu te xue lian

Saussurea tangutica var. *bayankaraensis* W. Y. Wang.

Herbs 6–20(–30) cm tall, perennial, caespitose. Caudex simple or branched. Stems solitary or several, 2.5–4 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic, 3–9 × 0.7–2.3 cm, both surfaces green, abaxially pilose, adaxially scabrous but glabrescent, margin sinuate-dentate, apex acute and mucronate. Middle stem leaves sessile, 3.3–5 × 0.6–1.2 cm. Uppermost stem leaves ovate and boat-shaped, 3–4.5 × 1.5–2.5 cm, membranous, enclosing synflorescence and forming a lanternlike head of 3.5–7 cm in diam., both surfaces yellowish rose to purple, margin denticulate, apex acuminate. Capitula 1–5, solitary or in a condensed corymbiform synflorescence 3–7 cm in diam., subsessile. Involucre campanulate, 1–3 cm in diam. Phyllaries in ca. 4 rows, blackish purple, densely villous, apex acuminate; outer phyllaries elliptic, (5–)10–13 × 2–5 mm; middle phyllaries narrowly elliptic, 11–15 × 2–3 mm; inner phyllaries linear, 13–16 × 1–2 mm. Receptacle bristles 0.5–2 mm. Corolla purple, (1–)1.4–1.5 cm, tube (5–)6.5–8 mm, limb (5–)7–7.5 mm, lobes (2.8–)4.2–4.8 mm. Achene straw-colored, sometimes tinged purple and with blackish spots, cylindric, 4.5–5.5 mm. Pappus dirty white; outer bristles 2–4 mm; inner bristles 0.9–1.1 cm. Fl. and fr. Jul–Sep.

• Alpine scree slopes, alpine meadows; 3600–5300 m. Gansu, Qinghai, NW Sichuan, Xizang.

46. Saussurea bracteata Decaisne in Jacquemont, Voy. Inde 4(Bot.): 94. 1843.

膜苞雪莲 mo bao xue lian

Saussurea nana (Pampanini) Pampanini; *S. schultzii* J. D. Hooker var. *nana* Pampanini.

Herbs 3–8(–20) cm tall, perennial, sometimes stemless. Caudex simple or few branched. Stems usually solitary, 2–3 mm in diam., erect, simple. Rosette and lower stem leaves shortly petiolate; leaf blade narrowly elliptic, 2–10 × 0.2–1 cm, abaxially glabrescent, adaxially glandular hairy, margin sinuate-dentate, apex acute. Middle and upper stem leaves sessile, narrowly ovate-elliptic, 3–5 × 0.5–1.8 cm. Uppermost stem leaves elliptic or ovate, 1.5–3.5 × 0.8–1.7 cm, membranous, half-enclosing capitulum, both surfaces yellowish green tinged purple to purplish red, margin dentate, apex acuminate. Capitulum solitary. Involucre narrowly campanulate to obconic, (1–)1.5–2.5(–3.5) cm in diam. Phyllaries in ca. 4 rows, densely villous to sparsely pilose, apex acute; outer phyllaries triangular-ovate, 6–9(–14) × 3–4 mm; middle phyllaries narrowly ovate to linear, 13–18 × 2–3 mm; inner phyllaries linear, 1.5–2.2 × 0.1–0.2 cm. Receptacle bristles 1.5–2.5 mm. Corolla purplish red, 1.5–1.8 cm, tube 6.5–8.5 mm, limb 7.5–9.5 mm, lobes 4.4–6 mm. Achene straw-colored, cylindric to obovoid, 5–6 mm, 4- or 5-ribbed. Pappus dirty white; outer bristles 2–3.6(–5) mm; inner bristles 1.1–1.5 cm. Fl. Jul–Sep, fr. Sep–Oct.

Alpine meadows and scree slopes; 4500–5400 m. S Xinjiang, W Xizang [NW India, Kashmir].

47. Saussurea schultzii J. D. Hooker, Fl. Brit. India 3: 366. 1881.

克什米尔雪莲 ke shi mi er xue lian

Herbs 16–42 cm tall, perennial. Caudex usually unbranched. Stem solitary, 3–7 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 7.5–23 × 1.2–3 cm, both surfaces green, scabrous, and densely glandular hairy, margin sinuate-dentate, apex acute. Middle and upper stem leaves sessile, 5.5–15 × 1–2.5 cm, base semiamplexicaul. Uppermost stem leaves sessile, elliptic or obovate and boat-shaped, 1.5–8 × 1–3.7 cm, membranous, half-enclosing synflorescence, both surfaces yellowish rose, margin dentate, apex acuminate. Capitula 3–8, in a condensed corymbiform synflorescence 3–10 cm in diam., pedunculate. Involucre obconic to campanulate, 1–2.5(–3) cm in diam. Phyllaries in 3–5 rows, straw-colored with dark margin and distal part, villous, apex acute to acuminate; outer phyllaries narrowly triangular, 9–12 × 1.5–3 mm; middle phyllaries narrowly elliptic to linear, 12–15 × 1–2.5 mm; inner phyllaries linear, 15–18 × 1–2 mm. Receptacle bristles (1–)3–4.5 mm. Corolla purple, 1.6–1.9 cm, tube 9–10 mm, limb 7.5–9 mm, lobes 4.2–5.2 mm. Achene brown, cylindric to obovoid, 3.5–5 mm, obtusely 5–7-ribbed. Pappus dirty white; outer bristles 2.8–5 mm; inner bristles 1.2–1.4 cm. Fl. Jul–Aug, fr. Aug–Sep. $2n = 32$ (as *Saussurea bracteata*).

Glacier moraines, rocky slopes, scree slopes; ca. 5200 m. SW Xinjiang (Yecheng) [NW India, Kashmir, Pakistan].

The only record of *Saussurea schultzii* in China is from the N declivity of the Karakorum range, where it was collected only twice in the first half of the 20th century.

48. Saussurea luae Raab-Straube, Willdenowia 39: 103. 2009.

宝璐雪莲 bao lu xue lian

Herbs 30–70 cm tall, perennial, caespitose, forming large clumps. Caudex stout, much branched. Stems many, 4–6 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic, 10–35 × 0.6–3.2 cm, both surfaces green, abaxially gland-dotted, adaxially sparsely pilose to glabrescent, margin sinuate-dentate, apex acute. Middle and upper leaves sessile, narrowly elliptic to narrowly ovate, 7.5–14 × 1.4–2.8 cm. Uppermost stem leaves sessile, ovate, boat-shaped, 1.7–8 × 0.7–3.2 cm, half-enclosing synflorescence, both surfaces pale greenish yellow ± tinged purple, margin dentate, apex acuminate. Capitula (1 or)2–8, in a corymbiform synflorescence or rarely solitary, pedunculate. Involucre campanulate, 1.5–2.5 cm in diam. Phyllaries in 5 or 6 rows, blackish or purplish brown, villous, glabrescent, apex acute; outer phyllaries triangular-ovate, 7–8 × 2–3.5 mm; middle phyllaries narrowly ovate, 8–13 × 1.5–2.5 mm; inner phyllaries narrowly elliptic to linear, 13–15 × 1–2 mm. Receptacle bristles 3.5–7.5 mm. Corolla purple, 1.1–1.7 cm, tube 5.5–9 mm, limb 5–8 mm, lobes 3.2–4.4 mm. Achene blackish brown, cylindric to obconic, 4–5.7 mm, 5–7-ribbed, apex with a denticulate crown. Pappus rose-purple; outer bristles 1.5–3.5 mm; inner bristles 1.4–1.6 cm. Fl. Aug–Sep, fr. Sep–Oct. $2n = 32$*.

• Open gravelly and rocky slopes, stabilized boulder scree slopes, ravine beds; 4000–5000 m. NW Sichuan, E Xizang.

This taxon has been confused with *Saussurea conica* (here treated as a synonym of *S. uniflora*) and with *S. wettsteiniana*. All literature records of *S. conica* and *S. wettsteiniana* from Xizang (Y. L. Chen, Fl. Xizang. 4: 869. 1985; C. Shih & S. Y. Jin, FRPS 78(2): 29–30. 1999) belong in fact to *S. luae*.

49. Saussurea globosa F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 96. 1935.

球花雪莲 qiu hua xue lian

Herbs 10–70 cm tall, perennial. Caudex simple or few branched. Stems usually solitary, 2–7 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly ovate, elliptic, or linear, 12–28 × 1–4.2 cm, both surfaces green, abaxially glandular hairy, adaxially glabrescent, margin dentate, apex acute. Middle and upper stem leaves sessile, 5–16 × 1.8–3.2 cm, both surfaces green to purple. Uppermost stem leaves ovate and boat-shaped, 4–6 × 1–2 cm, membranous, half-enclosing synflorescence, both surfaces red to purple, margin entire or serrulate, apex acuminate. Capitula (1 or)2–9(–13), in a corymbiform synflorescence or rarely solitary, pedunculate. Involucre globose, 1.5–2 cm in diam. Phyllaries in 3 or 4 rows, blackish purple or yellowish with dark margin, villous to glabrescent, apex acuminate; outer phyllaries triangular-ovate, 7.5–10 × 3–4.5 mm; middle phyllaries narrowly triangular-ovate, 9–11 × 2–3 mm; inner phyllaries linear, 12–14 × 1.5–2 mm. Receptacle bristles 3–5(–7.5) mm. Corolla purple, 1.3–1.5 cm, tube 7–8.5 mm, limb 6–7 mm, lobes 3.6–4.5 mm. Achene straw-colored to black, cylindric to obovoid, 3–5.5 mm, indistinctly 5-ribbed. Pappus yellowish; outer bristles 1–7.5 mm; inner bristles 9–10 mm. Fl. and fr. Jul–Oct. $2n = 32$*.

• Alpine grasslands, thickets, meadows; 3000–4800 m. W Sichuan, NW Yunnan.

50. Saussurea erubescens Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 342. 1960.

红柄雪莲 hong bing xue lian

Saussurea globosa F. H. Chen var. *monocephala* Lipschitz; *S. nigrescens* Maximowicz var. *acutisquama* Y. Ling; *S. polycolea* Handel-Mazzetti var. *acutisquama* (Y. Ling) Lipschitz; *S. uniflora* (Candolle) Wallich ex Schultz Bipontinus var. *pumila* Maximowicz.

Herbs 10–30 cm tall, perennial. Caudex simple or few branched. Stems solitary or 2, 1–3 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 1.5–10 × 0.7–2(–3.5) cm, both surfaces green, abaxially densely glandular hairy, adaxially glandular hairy but glabrescent, margin sinuate-denticulate, apex acute to acuminate. Middle and upper stem leaves sessile, 2.5–4 × 0.4–0.9 cm, both surfaces green to purple, margin sinuate-denticulate or entire. Uppermost stem leaves sessile, elliptic and boat-shaped, 1.5–3.5 × 0.3–1 cm, both surfaces purple, margin entire, apex acuminate. Capitula (1 or)2 or 3(–5), in a corymbiform synflorescence or rarely solitary, pedunculate. Involucre obconic, 1.5–2(–3) cm in diam. Phyllaries in 4 or 5 rows, blackish purple, pilose, apex acute; outer phyllaries triangular-ovate, 8–10.5 × 2.5–5.5 mm; middle phyllaries narrowly triangular, 10–12 × 1.5–2.5 mm; inner phyllaries linear, 11–12 × 0.5–1.5 mm. Receptacle bristles 3–5.5 mm. Corolla purple, 1.1–1.7 cm, tube 5.5–7 mm, limb 6–9 mm, lobes 3.2–5 mm. Achene straw-colored with blackish spots, obovoid to cylindric, 3–4 mm, indistinctly ribbed. Pappus dirty white; outer bristles 1–4.5 mm; inner bristles 8.5–10 mm. Fl. Jul–Aug, fr. Aug–Oct.

• Grassy areas in marshes, by rivers, mountain valleys, meadows; 2400–4900 m. Gansu, Qinghai, NW Sichuan, Xizang.

The type of *Saussurea nigrescens* var. *acutisquama* clearly belongs to this taxon. Unfortunately, the combination of this epithet with *S. polycolea* by Lipschitz (who had no opportunity to check the type) was widely misapplied for an entirely different taxon, *S. acutisquama*, which was recently recognized as a good species.

51. Saussurea taipaiensis Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 151. 1935.

太白山雪莲 tai bai shan xue lian

Herbs 10–22 cm tall, perennial, caespitose. Caudex stout, branched. Stems solitary or few, 2–4 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to oblong, 4–10(–20) × 1–2 cm, both surfaces green, blackening when dry, and subglabrous, base attenuate, margin sinuate-dentate to denticulate, apex acute. Middle and upper stem leaves sessile, narrowly ovate to linear and boat-shaped, 1.5–5 × 0.3–1 cm, both surfaces dark purple, abaxially sparsely pilose near base, base semiamplexicaul, margin entire, apex acute to acuminate. Uppermost stem leaves merging into phyllaries, abaxially villous. Capitulum 1(or 2), subsessile. Involucre broadly obconic, 2–2.5 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, densely villous, apex acute to acuminate; outer phyllaries triangular-ovate, 6–7 × 2.5–3.5 mm; middle phyllaries narrowly ovate to elliptic, 8–10 × 1–2 mm; inner phyllaries linear, 10–12 × 1–1.5 mm. Receptacle bristles 2–4 mm. Corolla purple, 1.2–1.3 cm, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene cylindric, 3–4 mm, smooth. Pappus straw-colored; outer bristles 1–3 mm; inner bristles 0.9–1.1 cm. Fl. Aug, fr. Sep–Oct.

• Alpine grasslands and meadows; 3200–3900 m. S Shaanxi (Taibai Shan).

52. Saussurea gymnocephala (Y. Ling) Raab-Straube, Willdenowia 41: 89. 2011.

裸头雪莲 luo tou xue lian

Saussurea obvallata (Candolle) Schultz Bipontinus var. *gymnocephala* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 92. 1949.

Herbs 9–35(–55) cm tall, perennial. Caudex stout, simple or few branched, apically with black fibrous remains of petioles. Stem solitary, 2–4 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic to elliptic, 4–18(–27) × 0.9–2.5(–3.8) cm, both surfaces gland-dotted, abaxially glaucous green and glabrescent, adaxially green and scabrous, base cuneate, margin subentire to minutely denticulate, apex acute to acuminate. Middle stem leaves sessile, narrowly elliptic, 4–10 × 0.8–1.5 cm. Upper stem leaves narrowly elliptic and boat-shaped, 2–6 × 0.5–1.5 cm, half-enclosing synflorescence, both surfaces purple, margin entire. Capitula 1–4,

solitary or in a congested corymbiform synflorescence, shortly pedunculate. Involucre campanulate to obconic, 1.5–2.5 cm in diam. Phyllaries in 4 or 5 rows, straw-colored to purplish but with a dark margin, sparsely pilose, glabrescent, apex acuminate; outer phyllaries triangular-ovate, 8–10 × 3–4 mm; middle phyllaries narrowly ovate-elliptic, 10–14 × 1.5–2.5 mm; inner phyllaries linear, 14–17 × 1–1.5 mm. Receptacle bristles 4–6 mm. Corolla purple, 1.3–1.7 cm, tube 5–9 mm, limb 6–8 mm, lobes 3–5 mm. Achene brown, cylindric, 3–3.5 mm. Pappus straw-colored; outer bristles 2–5 mm; inner bristles 1.1–1.3 cm. Fl. and fr. Jul–Sep.

• Marshlands, wet meadows; 3400–4300 m. Qinghai, W Sichuan, E Xizang.

This species has frequently been confused with *Saussurea erubescens*, due to an unfortunate, questionable synonymization by the monographer of the genus, Lipschitz. It is morphologically quite different from both *S. obvallata* and *S. erubescens*.

53. Saussurea nigrescens Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 491. 1882.

钝苞雪莲 dun bao xue lian

Herbs 8–50 cm tall, perennial. Stems solitary or few, 1–2 mm in diam., erect, simple. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 3–15 × 0.8–2.3 cm, both surfaces green and sparsely villous but glabrescent, margin denticulate, apex acute. Middle and upper stem leaves sessile, narrowly elliptic to linear, 2.8–7.7 × 0.6–1.1 cm, base semiamplexicaul. Uppermost stem leaves sessile, narrowly ovate to linear and boat-shaped, 1.4–3 × 0.2–0.8 cm, not enclosing synflorescence, both surfaces purplish, margin entire, apex acuminate. Capitula 1–3(–6), solitary or in a corymbiform synflorescence, pedunculate. Involucre campanulate to obconic, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, straw-colored to purple and with a dark margin, sparsely pilose, glabrescent, apex obtuse; outer phyllaries triangular-ovate, 5–6 × 2.5–4 mm; middle phyllaries narrowly ovate, 6.5–12 × 2–3 mm; inner phyllaries linear, 12–16 × 1–2 mm. Receptacle bristles 5–6 mm. Corolla purple, 1.3–1.8 cm, tube 7–9 mm, limb 5.5–9 mm, lobes 3–4 mm. Achene cylindric, ca. 3 mm. Pappus dirty white; outer bristles 1–3 mm; inner bristles 1.2–1.3 cm. Fl. and fr. Jul–Oct. $2n = 32$*.

• Grasslands; 1900–4000 m. Gansu, W Henan, Qinghai, Shaanxi.

54. Saussurea iodostegia Hance, J. Bot. 16: 109. 1878.

紫苞雪莲 zi bao xue lian

Saussurea iodostegia var. *ferruginipes* J. R. Drummond ex Handel-Mazzetti; *S. iodostegia* var. *glandulifera* X. Y. Wu.

Herbs (5–)10–80 cm tall, perennial. Caudex simple or few branched. Stems solitary or 2–4, 1.5–7 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly ovate-elliptic to linear, 8–45 × 0.6–5 cm, both surfaces green, sometimes spotted, abaxially glabrescent, adaxially sparsely villous, margin sinuate-dentate, apex acute. Middle and upper stem leaves sessile, ovate and boat-shaped, 3–8 × 0.6–3 cm, both surfaces green to purple, base semiamplexicaul, margin dentate to subentire, apex acuminate. Uppermost stem leaves ovate to elliptic and boat-shaped, 2.5–6.5 × 0.5–2.3 cm, membranous, half-enclosing synflorescence, both surfaces purple, margin subentire. Capitula (1 or)2–10, in a corymbiform synflorescence or rarely solitary, pedunculate. Involucre cylindric to obconic, 0.9–1.7 cm in diam. Phyllaries in 3 or 4 rows, villous, apex obtuse; outer phyllaries elliptic to suborbicular, 4.5–7.5 × 3–4.5 mm; middle phyllaries narrowly elliptic, 6–12 × 2–3 mm; inner phyllaries linear, 12–15 × 1.5–2.5 mm. Receptacle bristles 2.5–6(–10) mm. Corolla purple, 1.3–1.4 cm, tube 6–7 mm, limb 6.5–7.5 mm, lobes 4.2–5 mm. Achene dark brown, obovoid, 4.5–5.5 mm. Pappus pale brown; outer bristles 1–4 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep.

• Grasslands, meadows, forests on mountain slopes; 1300–3500 m. Gansu, Hebei, Henan, Nei Mongol, Ningxia, Shaanxi, Shanxi.

The proximal part of multicellular flagellate hairs on leaves and peduncles is often remaining when the distal, long, hairlike part of the trichome is shed. These remaining basal parts are sometimes colored and are easily mistaken for glandular hairs. The two varieties of *Saussurea iodostegia*, which have been distinguished based on this misleading character, both from the same locality, are not recognized here.

55. Saussurea veitchiana J. R. Drummond & Hutchinson, Bull. Misc. Inform. Kew 1911: 190. 1911.

华中雪莲 hua zhong xue lian

Herbs 20–70 cm tall, perennial. Caudex simple or branched. Stem solitary, 3–6 mm in diam., erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic, ovate, or obovate, 12–36 × 1–3 cm, both surfaces green and appressed pilose, margin undulate to shallowly sinuate-dentate, apex acute to acuminate. Middle stem leaves sessile, narrowly ovate, 8–16 × 1–3 cm, both surfaces green, tinged rose-purple, base semiamplexicaul. Bracts ovate, boat-shaped, 3.5–9 × 0.8–2.5 cm, membranous, half-enclosing synflorescence, both surfaces purple, margin entire or dentate in basal part, apex acuminate. Capitula 2–10, in a corymbiform synflorescence, pedunculate. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in 3–5 rows, straw-colored to purplish brown, sparsely villous, apex acute; outer phyllaries triangular-ovate, 5.5–8.5 × 2.5–4.5 mm; middle phyllaries narrowly ovate, 9–15 × 2–3 mm; inner phyllaries linear, 14–18 × 1.5–2.5 mm. Receptacle bristles 6–9 mm. Corolla dark purplish red, 1.2–1.4 cm, tube 5.5–7 mm, limb 6.5–7.5 mm, lobes 4.2–5.4 mm. Achene light brown with black spots, cylindric to obovoid, 4.4–5.2 mm, obtusely 5-ribbed. Pappus pale brown; outer bristles 0.5–5 mm; inner bristles 8–11 mm. Fl. and fr. Jul–Sep.

• Montane grasslands, meadows, thickets, forest margins; 1600–3000 m. E Chongqing, W Hubei, SE Shaanxi.

3. Saussurea subg. **Theodorea** Cassini, Bull. Sci. Soc. Philom. Paris 1818: 168. 1818.

附片风毛菊亚属 fu pian feng mao ju ya shu

Theodorea (Cassini) Cassini.

Herbs, biennial or perennial. Stems usually tall, many branched, leafy. Capitula usually numerous to very numerous, in a corym-

biform or paniculiform synflorescence. Phyllaries imbricate, margin sometimes dentate, all or only middle and inner phyllaries with colored and membranous or green and herbaceous apical appendage; appendage sometimes inconspicuous or apex spiniform-acuminate. Receptacle with subulate or filiform bristles. Corolla limb deeply cleft (more than 2/3–4/5), usually gland-dotted. Achene smooth or ribbed, sometimes wrinkled, glabrous or gland-dotted, without a conspicuous apical crown. Pappus white, straw-colored, or pale brown, always in 2 rows; outer bristles scabrid or rarely plumose.

Twenty species: China, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; Europe; 17 species (seven endemic) in China.

1a. Phyllaries without a conspicuous appendage, apex cartilaginous, spiniform, and usually reflexed.
2a. Capitula numerous; plants biennial or perennial, without woody caudex ..... 66. *S. malitiosa*
2b. Capitulum solitary; plants perennial, with a stout woody caudex ..... 67. *S. jurineoides*
1b. Phyllaries with a ± widened, membranous, or callose-serrulate appendage, apex not spiniform but sometimes needlelike or ± long acuminate.
3a. Phyllaries or at least inner ones with a small herbaceous callose-serrulate apical appendage.
4a. Leaf blade undivided, margin entire ..... 72. *S. chinnampoensis*
4b. Leaf blade pinnatisect, pinnately lobed, or margin sinuate-lobate.
5a. Leaf blade adaxially green, sparsely pubescent, abaxially pale grayish green, sparsely arachnoid; inner phyllaries apically not barbellate ..... 70. *S. nematolepis*
5b. Leaf blade green, concolorous, sparsely strigose; inner phyllaries apically densely barbellate ..... 71. *S. ladyginii*
3b. Phyllaries or at least inner ones with a purple membranous apically widened but sometimes inconspicuous appendage.
6a. Outer phyllaries with an apical cartilaginous mucro.
7a. Plants biennial ..... 68. *S. pseudomalitiosa*
7b. Plants perennial.
8a. Stems wingless or wing inconspicuous ..... 62. *S. runcinata*
8b. Stems conspicuously winged.
9a. Basal leaves bipinnately parted; apex of outer phyllaries reflexed ..... 63. *S. laciniata*
9b. Basal leaves pinnately parted to undivided; apex of outer phyllaries not or barely reflexed.
10a. Basal leaves lyrate-pinnately lobed to undivided and with sinuate-dentate or subentire margin ..... 64. *S. grubovii*
10b. Basal leaves pinnately lobed or pinnately parted ..... 65. *S. alata*
6b. Outer phyllaries without an apical cartilaginous mucro.
11a. Outer phyllaries with a long needlelike recurved apex ..... 60. *S. robusta*
11b. Outer phyllaries without a needlelike apex.
12a. Involucre cylindric, narrowly obconic, or narrowly campanulate; outer phyllaries without a membranous appendage.
13a. Stem usually wingless ..... 56. *S. amara*
13b. Stem winged.
14a. Middle and upper stem leaves ovate, base amplexicaul, margin entire and undivided ..... 57. *S. chingiana*
14b. Middle and upper stem leaves narrowly elliptic to linear, base not amplexicaul, margin pinnately lobed or dentate ..... 61. *S. prostrata*
12b. Involucre globose, ovoid, or campanulate; all phyllaries usually with a membranous appendage.
15a. Involucre globose, 10–15 mm in diam.; phyllary appendages showy, 2–3 mm wide, usually overlapping ..... 59. *S. pulchella*
15b. Involucre campanulate, 4–10 mm in diam.; phyllary appendages not showy, 1–2 mm wide, not overlapping.
16a. Stem usually wingless; involucre cylindric to narrowly campanulate; outer phyllaries sometimes without an appendage ..... 58. *S. japonica*
16b. Stem narrowly winged; outer phyllaries with an appendage.
17a. Involucre tubular to narrowly campanulate, 4–6 mm in diam.; capitula numerous in a large corymbiform synflorescence ..... 58. *S. japonica*
17b. Involucre campanulate, 8–10 mm in diam.; capitula solitary or few at branch ends ..... 69. *S. pinnatidentata*

56. Saussurea amara (Linnaeus) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 200. 1810.

草地风毛菊 cao di feng mao ju

Herbs 9–70 cm tall, perennial. Stem solitary, 3–7 mm in diam., erect, branched, usually wingless. Lower stem leaves petiolate; leaf blade narrowly elliptic, oblong, or narrowly ovate, 4–20 × 0.7–6 cm, both surfaces green, sparsely pubescent or

glabrous, and gland-dotted, base cuneate-attenuate, margin entire or obtusely sinuate-dentate, apex acute to obtuse. Middle and upper stem leaves shortly petiolate or sessile, elliptic to narrowly ovate, gradually smaller upward on stem, base cuneate and rarely auriculate. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre narrowly campanulate to narrowly obconic, 0.8–1.2 cm in diam. Phyllaries in 4–6 rows, sparsely pubescent, sometimes gland-dotted; outer phyllaries ovate to narrowly ovate, 3–5 × 1–1.5 mm, apex blackish and acuminate or tricuspidate; middle and inner phyllaries narrowly elliptic to linear, 5–14 × 1–1.5 mm, appendage purple, orbicular, 0.5–1.5 mm wide, and membranous or rarely appendage lacking. Receptacle bristles 8–10 mm. Corolla pale purple, rarely white, 1.3–1.8 cm, gland-dotted, tube 8–10 mm, limb 5–7 mm, lobes 3–5 mm. Achene brown, cylindric, 3–3.5 mm, 4-ribbed. Pappus dirty white; outer bristles 1–5 mm; inner bristles 1.2–1.7 cm. Fl. and fr. Jul–Oct. $2n = 26$.

Wastelands, by trails, forest steppes, steppes, saline and alkaline soils, dikes of streams, dunes, river and lake shores, sandy soils; 500–3200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; E Europe].

The type of *Saussurea tenuicaulis* has the upper stem leaves with a widened auriculate base, a character not found in typical specimens of *S. amara*. Such plants may deserve separate taxonomic status.

1a. Middle and inner phyllaries with a purple appendage; corolla pale purple ..... 56a. var. *amara*
1b. All phyllaries acuminate at apex and without an appendage; corolla white ..... 56b. var. *exappendiculata*

56a. Saussurea amara var. **amara**

草地风毛菊(原变种) cao di feng mao ju (yuan bian zhong)

Serratula amara Linnaeus, Sp. Pl. 2: 819. 1753; *Saussurea amara* var. *glomerata* (Poiret) Trautvetter; *S. amara* f. *microcephala* Franchet; *S. glomerata* Poiret; *S. tenuicaulis* Y. Ling.

Middle and inner phyllaries with a purple membranous appendage. Corolla pale purple.

Wastelands, by trails, forest steppes, steppes, saline and alkaline soils, dikes of streams, dunes, river and lake shores; 500–3200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; E Europe].

56b. Saussurea amara var. **exappendiculata** H. C. Fu in Ma, Fl. Intramongol., ed. 2, 4: 848. 1993.

尖苞草地风毛菊 jian bao cao di feng mao ju

All phyllaries without an apical appendage, apex acuminate. Corolla white.

• Sandy soils. Nei Mongol (Dalad Qi, Ih Ju Meng).

57. Saussurea chingiana Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 647. 1937.

抱茎风毛菊 bao jing feng mao ju

Herbs 45–100 cm tall, ?perennial. Stem solitary, 5–10 mm in diam., erect, apically much branched, narrowly winged. Lower stem leaves petiolate; leaf blade narrowly elliptic to narrowly ovate, 5–20 × 1–4 cm, runcinate-pinnatifid or undivided, both surfaces green, sparsely strigose or glabrescent, and gland-dotted, base decurrent; lateral lobes (if present) narrowly triangular to linear, margin entire, apex acuminate. Middle and upper stem leaves ovate to linear, 1–6 × 0.2–2.5 cm, undivided, base auriculate and amplexicaul, margin entire, apex acuminate. Capitula numerous, clustered at end of branches, in a corymbiform synflorescence, subsessile or pedunculate. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 5 or 6 rows, straw-colored to green, distinctly striate, sparsely arachnoid or glabrous; outer phyllaries narrowly ovate-triangular, 2–3 × 1–1.5 mm, apex acuminate; middle and inner phyllaries narrowly ovate-elliptic to linear, 3–10 × 1–1.7 mm, appendage purple, orbicular, widened, and membranous. Receptacle bristles whitish, to 8 mm. Corolla reddish purple, 1.3–1.4 cm, tube 4–6 mm, limb 7–8 mm, lobes 3–3.5 mm. Achene obovoid, ca. 3 mm, glabrous. Pappus dirty white; outer bristles ca. 3 mm; inner bristles ca. 1.4 cm. Fl. and fr. Jul–Aug.

• Forests, gravelly open soil near rivers, by trails and ditches; ca. 2400 m. Gansu.

Saussurea chingiana is only known from the incomplete type, which lacks basal and underground parts. The plants from Qinghai (S. W. Liu, Fl. Qinghai. 3: 461. 1996) do not belong here but are winged forms of *S. japonica* (see *S. japonica* var. *pteroclada*).

58. Saussurea japonica (Thunberg) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 203. 1810.

风毛菊 feng mao ju

Herbs (0.2–)0.5–2 m tall, biennial. Stem solitary, 3–10 mm in diam., erect, much branched. Lower stem leaves petiolate; leaf blade elliptic to narrowly ovate-elliptic, 7–30 × 3.5–9 cm, pinnately lobed, both surfaces green, scabrous, and gland-dotted; lateral lobes 5–8 pairs, obliquely triangular to linear-oblong, margin usually entire, apex obtuse; terminal lobe narrowly ovate-elliptic to linear. Middle and upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem, pinnately lobed or undivided. Capitula very numerous, in a corymbiform or paniculiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–8(–10) mm in diam. Phyllaries in 5 or 6 rows, green with a dark purple midvein, arachnoid to glabrescent, gland-dotted, apical appendage purple, orbicular, 1–2 mm wide, and membranous; outer phyllaries ovate to narrowly triangular-ovate, 2–3 × 1–1.5 mm, apex acute or with a small appendage; middle and inner phyllaries narrowly elliptic to linear, 4–10 × 0.8–1.5 mm, apex with a larger appendage. Receptacle bristles 5–6 mm. Corolla purple, 1–1.4 cm, gland-dotted, tube 6–8 mm, limb 4–6 mm, lobes 4–5 mm. Achene straw-colored with dark spots, cylindric to obconic, 3–4 mm. Pappus dirty white; outer bristles ca. 2 mm; inner bristles 7–9 mm. Fl. and fr. Jun–Nov. $2n = 26, 28$.

Mountain slopes, forests, thickets, loess slopes, roadsides, wastelands, fallow fields; 200–2900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Mongolia].

Saussurea japonica has often been confused with *S. amara* (e.g., S. W. Liu, Fl. Yunnan. 13: 538. 2004), mainly because many herbarium specimens lack underground and basal parts. *Saussurea amara* is a perennial species with undivided basal leaves of steppe and often saline and alkaline soils in N and W parts of the country, whereas *S. japonica* is a very widespread tall biennial plant with pinnatifid to pinnatisect basal leaves in a variety of habitats but usually not on saline soils. *Saussurea japonica* seems to be absent from Xinjiang and Xizang. Plants in the SE part of the country tend to have smaller capitula (matching *S. microcephala*) and may deserve separate taxonomic status.

1a. Stem not winged; leaf blade base not or very shortly decurrent ..... 58a. var. *japonica*
1b. Stem with conspicuous entire or dentate wings; leaf blade base decurrent ..... 58b. var. *pteroclada*

58a. Saussurea japonica var. **japonica**

风毛菊(原变种) feng mao ju (yuan bian zhong)

Serratula japonica Thunberg in Murray, Syst. Veg., ed. 14, 723. 1784; *Saussurea amara* (Linnaeus) Candolle var. *microcephala* (Franchet) Lipschitz (1979), not *S. amara* f. *microcephala* Franchet (1883); *S. glomerata* Poiret var. *chinensis* F. H. Chen; *S. intermedia* Turczaninow; *S. japonica* var. *intermedia* (Turczaninow) Lipschitz; *S. japonica* f. *leucocephala* (Nakai & Kitagawa) Nakai & Kitagawa; *S. japonica* var. *longicephala* Hayata; *S. japonica* var. *maritima* Kitagawa; *S. linearis* Champion ex Bentham; *S. microcephala* Franchet; *S. microcephala* var. *aptera* Nakai & Kitagawa; *S. microcephala* f. *leucocephala* Nakai & Kitagawa; *S. taquetii* H. Léveillé & Vaniot.

Stem not winged. Leaf blade base not or very shortly decurrent.

Mountain slopes, forests, thickets, loess slopes, roadsides, wastelands, fallow fields; 200–2800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Mongolia].

58b. Saussurea japonica var. **pteroclada** (Nakai & Kitagawa) Raab-Straube, **comb. nov.**

翼茎风毛菊 yi jing feng mao ju

Basionym: *Saussurea microcephala* var. *pteroclada* Nakai & Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 1: 63. 1934; *S. glomerata* f. *alata* F. H. Chen; *S. japonica* f. *alata* (F. H. Chen) Kitagawa; *S. japonica* var. *alata* (F. H. Chen) Nakai & Kitagawa (1936), not (Regel) Komarov (1907).

Stem conspicuously winged; wings entire or dentate. Leaf blade base decurrent.

• Mountain slopes, forests, thickets, loess slopes, roadsides, wastelands, fallow fields; 200–2900 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Ningxia, Qinghai, Shandong, Sichuan.

Saussurea japonica var. *pteroclada* with winged stems is treated under the name *S. japonica* var. *alata* (Regel) Komarov in some provincial floras (H. C. Fu & D. S. Wen in Ma, Fl. Intramongol., ed. 2, 4: 720. 1993; W. Wang & C. Y. Li, Fl. Pl. Herb. Chin. Bor.-Orient. 9: 331. 2004; D. Z. Ma et al., eds., Fl. Ningxia. 2: 368. 2007). However, that name is based on *S. pulchella* var. *alata* Regel, a taxon which clearly belongs to *S. pulchella* and can only be used for the winged variety of that species (see also the discussion under *S. pulchella*). A name for the winged forms of *S. japonica* at the varietal level is not yet available and is therefore validated here. The variety probably has a wider distribution in China than indicated above.

Saussurea chingiana in the sense of S. W. Liu (Fl. Qinghai. 3: 461. 1996) is a misapplied name for this taxon.

59. Saussurea pulchella (Fischer) Fischer in Colla, Herb. Pedem. 3: 234. 1834.

美花风毛菊 mei hua feng mao ju

Heterotrichum pulchellum Fischer, Mém. Soc. Imp. Naturalistes Moscou 3: 71. 1812; *Saussurea japonica* (Thunberg) Candolle var. *alata* (Regel) Komarov; *S. japonica* var. *subtomentosa* Komarov; *S. pulchella* var. *alata* Regel; *S. pulchella* f. *subintegra* (Regel) Kitagawa; *S. pulchella* var. *subintegra* Regel; *S. pulchella* f. *subtomentosa* (Komarov) Kitagawa.

Herbs 25–120 cm tall, biennial. Stem solitary, 3–6 mm in diam., erect, apically branched. Basal, lower, and middle stem leaves petiolate; leaf blade oblong to elliptic, 10–25 × 4–14 cm, pinnately lobed to pinnatisect, both surfaces green, scabrous, strigose, and gland-dotted, sometimes abaxially grayish white tomentose; segments 4–8 pairs, narrowly ovate-elliptic to linear, margin entire or dentate, apex acuminate. Upper stem leaves sessile, narrowly ovate-elliptic to linear, 4–12 × 0.1–2 cm, pinnately lobed to pinnatisect or undivided. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre globose, 0.8–1.5 cm in diam. Phyllaries in 6 or 7 rows, subglabrous and gland-dotted, all with an apical appendage; appendage purple, orbicular, 2–3 mm wide, membranous; outer phyllaries narrowly triangular-ovate to linear, 2–3 × 0.5–1.5 mm; middle and inner phyllaries narrowly ovate-elliptic to linear, 4–11(–15) × 1–3 mm. Receptacle bristles 4–6 mm. Corolla pale purple, 1.1–1.3 cm, gland-dotted, tube 5–8 mm, limb 4–6.5 mm, lobes 4–5 mm. Achene ivory-colored with dark spots, obconic, 3–5 mm, obtusely 5-angled. Pappus dirty white; outer bristles 0.5–2.5 mm; inner bristles 7–8(–13) mm. Fl. and fr. Aug–Oct. $2n = 26, 28$.

Forest steppes, thickets, meadows; 300–2200 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi [Japan, Korea, Mongolia, Russia (Far East, E Siberia)].

Winged forms of *Saussurea pulchella* (*S. pulchella* var. *alata*) have not been distinguished in China.

60. Saussurea robusta Ledebour, Icon. Pl. 1: 16. 1829.

强壮风毛菊 qiang zhuang feng mao ju

Herbs 30–80 cm tall, biennial or perennial. Stem solitary, 5–6 mm in diam., erect, branched, narrowly winged. Basal and lower stem leaves sessile, oblong, 6–20 × 1–6 cm, both surfaces green, scabrous, and gland-dotted, base semiamplexicaul and decurrent, margin entire or sparsely dentate, apex acuminate. Middle and upper stem leaves sessile, narrowly ovate-elliptic to linear, 5–8 × 0.5–1.5 cm, margin entire, apex acuminate. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre campanulate, (0.6–)1–2(–3) cm in diam. Phyllaries in ca. 5 rows; outer phyllaries narrowly tri-

angular-subulate, 8–11 × 1–2 mm, basally arachnoid lanate, apically glabrous, apex needlelike and reflexed; middle and inner phyllaries subulate to linear, 10–14 × 1–2 mm, densely arachnoid lanate and gland-dotted, appendage narrowly triangular to ovate, 0.5–1 mm wide, and membranous. Receptacle bristles filiform, 7–9 mm, hyaline. Corolla purple, 1.6–1.9 cm, gland-dotted, tube 0.9–1.2 cm, limb 6–7 mm, lobes 3.5–4.5 mm. Achene blackish brown, cylindric to obconic, 3–3.5 mm. Pappus dirty white; outer bristles 1–4 mm; inner bristles 1–1.4 cm. Fl. and fr. Jul–Sep.

Grassy shores, salt marshes, wastelands, saline soils; 700–2000 m. NW Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

61. Saussurea prostrata C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 518. 1886.

展序风毛菊 zhan̆ xu feng mao ju

Herbs 10–60 cm tall, biennial or perennial. Stems solitary or several, procumbent, ascending, or erect, simple or branched in upper half, distinctly winged. Stem leaves narrowly elliptic to linear, 1.5–2.5 × 0.3–0.7 cm, both surfaces green, scabrid, and pilose, base long decurrent, margin pinnately lobed or dentate, apex acute. Capitula 1–8, solitary or clustered in a corymbiform synflorescence, sessile or shortly pedunculate. Involucre campanulate, (0.5–)1–1.5 cm in diam. Phyllaries in 4 or 5 rows, greenish with dark midvein, villous to glabrescent; outer phyllaries narrowly elliptic, 2–4 × 1–2 mm, erect or slightly recurved, apex acuminate; middle phyllaries narrowly elliptic, 4–8 × 1–2 mm, appendage dark, widened, and cuspidate; inner phyllaries linear, 8–11 × 1–1.5 mm, appendage purple, suborbicular, widened, membranous, and denticulate. Receptacle bristles 7–8 mm. Corolla purple, 1.7–1.8(–2) cm, tube ca. 1 cm, lobes ca. 5 mm. Achene dark brown, cylindric, ca. 3.5 mm, ribbed, glabrous. Pappus white; outer bristles to 5 mm; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Aug.

Salt meadows, saline and alkaline sandy soils; 500–2500 m. Xinjiang [Kazakhstan, Kyrgyzstan].

62. Saussurea runcinata Candolle, Ann. Mus. Natl. Hist. Nat. 16: 202. 1810.

倒羽叶风毛菊 dao yu ye feng mao ju

Herbs (5–)15–60 cm tall, perennial. Stems solitary or few, erect, apically branched, covered with fibrous lacerate remains of petioles at base, wingless or narrowly winged; wings entire or dentate. Basal and lower stem leaves petiolate; petiole 1–5 cm; leaf blade narrowly obovate, narrowly ovate-elliptic, or linear, 4–20 × 0.5–7 cm, lyrate, pinnately parted, pinnatisect, or undivided, both surfaces green and glabrous. Middle and upper stem leaves sessile, narrowly elliptic to linear, undivided, margin entire or basally dentate. Capitula few to numerous, in a corymbiform or paniculiform synflorescence, shortly pedunculate. Involucre tubular to campanulate, 4–10 mm in diam. Phyllaries in 4–6 rows, glabrous or sparsely pubescent; outer phyllaries ovate to narrowly ovate, ca. 3.5 × 1.5 mm, appendage widened, herbaceous, and with a cartilaginous mucro; middle and inner phyllaries narrowly elliptic to linear, 7–10 × 1–1.8 mm, appendage red, widened, membranous, and denticulate. Corolla purplish red, 1–1.5 cm, gland-dotted, tube 7–8 mm, limb 6–8 mm, lobes 3–4 mm. Achene blackish brown, cylindric, 2–3 mm. Pappus pale yellowish brown; outer bristles 2–3 mm; inner bristles 7–9 mm. Fl. and fr. Jul–Sep.

River and lake shores, rock fissures near moist places, saline lowlands, saline and alkaline soils, salt and alkaline marshes; 700–1300 m. Hebei, Heilongjiang, Jilin, Nei Mongol, Ningxia, Shaanxi, Shanxi [Mongolia, Russia (Siberia)].

1a. Basal and lower stem leaves lyrate to pinnatisect; involucre campanulate to tubular-campanulate, 5–10 mm in diam. ..... 62a. var. *runcinata*

1b. Basal and lower stem leaves undivided; involucre narrowly tubular, 4–5 mm in diam. ..... 62b. var. *integrifolia*

62a. Saussurea runcinata var. **runcinata**

倒羽叶风毛菊(原变种) dao yu ye feng mao ju (yuan bian zhong)

Saussurea alata Candolle var. *runcinata* (Candolle) Herder; *S. crepidifolia* Turczaninow.

Basal and lower stem leaves lyrate, pinnately parted, or pinnatisect; lateral lobes 1–7 pairs, narrowly triangular, elliptic, falcate, or linear, recurved to patent, margin usually entire or sometimes dentate, apex acute to obtuse and with a cartilaginous mucro; terminal lobe narrowly ovate, narrowly triangular, or linear, margin entire or dentate, apex acute to obtuse. Involucre campanulate to tubular-campanulate, 5–10 mm in diam.

River and lake shores, rock fissures near moist places, saline lowlands, saline and alkaline soils; 700–1300 m. Hebei, Heilongjiang, Jilin, Nei Mongol, Ningxia, Shaanxi, Shanxi [Mongolia, Russia (Siberia)].

62b. Saussurea runcinata var. **integrifolia** H. C. Fu & D. S. Wen in Ma, Fl. Intramongol. 6: 329. 1982.

全叶石咸地风毛菊 quan ye shi xian di feng mao ju

All leaves undivided, margin entire. Involucre narrowly tubular, 4–5 mm in diam.

● Salt and alkaline marshes. Nei Mongol.

63. Saussurea laciniata Ledebour, Icon. Pl. 1: 16. 1829.

裂叶风毛菊 lie ye feng mao ju

Saussurea alata Candolle var. *laciniata* (Ledebour) Herder; *S. laciniata* var. *pygmaea* Lipschitz.

Herbs 15–50 cm tall, perennial. Stems solitary or few, erect, simple or branched from base, narrowly winged; wings dentate. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 3–12 × 1.5–2.5 cm, bipinnately parted, both surfaces green, sparsely pubescent, and gland-dotted; primary lobes 5–10 pairs; secondary lobes obliquely triangular, narrowly triangular-ovate, or toothlike, margin dentate; teeth and apex cartilaginous mucronate. Middle and upper stem leaves sessile, narrowly elliptic to linear, pinnately divided, pinnately lobed, or undivided. Capitula numerous, in a corymbiform synflorescence, subsessile to shortly pedunculate. Involucre campanulate, 0.8–1.5 cm in diam. Phyllaries in 4 or 5 rows; outer

phyllaries narrowly ovate, 4–5 × 1.5–2 mm, appendage green, herbaceous, ± reflexed, and mucronate; middle phyllaries narrowly ovate-elliptic, 6–8 × 1.5–2 mm, appendage green, herbaceous, widened, margin dentate, and apex mucronate; inner phyllaries narrowly elliptic to linear, 9–11 × 1.5–2 mm, appendage purplish, membranous, villous and gland-dotted, and margin erose-denticulate. Corolla reddish purple, 1–1.4 cm, tube 6–7 mm, limb 4–6 mm, lobes 3–4 mm. Achene dark brown, cylindric to obconic, (2–)3–4 mm. Pappus yellowish white; outer bristles 1–5 mm, scabrid to plumose; inner bristles 9–10 mm. Fl. and fr. Jul–Aug. $2n = 28$.

Desert steppes, saline and alkaline soils; 1300–2200 m. Gansu, Nei Mongol, Ningxia, Shaanxi, Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

64. Saussurea grubovii Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 366. 1961.

蒙新风毛菊 meng xin feng mao ju

Saussurea paradoxa Lipschitz.

Herbs 30–80 cm tall, perennial. Stems solitary or few, erect, simple or branched in upper part, narrowly winged. Basal and lower stem leaves petiolate; leaf blade ovate, elliptic, obovate, or oblong, 5–20 × 2.5–5 cm, thick, fleshy, lyrate, pinnately lobed, or undivided, both surfaces green, scabrous, and appressed pubescent, base cuneate, margin sinuate-dentate or entire, apex acute. Middle and upper stem leaves shortly petiolate or sessile, narrowly ovate, obovate, elliptic, or linear, 2.5–5 × 0.5–2 cm, margin entire. Capitula clustered 2–6 at end of stem and branches, in a corymbiform synflorescence, shortly pedunculate. Involucre campanulate, 5–10 mm in diam. Phyllaries in 5 or 6 rows; outer phyllaries narrowly ovate, 2–4 × 1–2 mm, apex acuminate with a cartilaginous mucro; middle and inner phyllaries narrowly elliptic to linear, 3–8 × 1–2 mm, appendage pink, widened, and membranous. Receptacle densely bristly. Corolla pink, 1.2–2 cm, tube 6–12 mm, limb 6–8 mm, lobes ca. 5 mm. Achene light brown, cylindric, ca. 3.5 mm, ribbed. Pappus white; outer bristles 0.5–3 mm; inner bristles [0.8–]1.2–1.4 cm. Fl. and fr. Jul–Sep.

Salt meadows, alkaline soils; 400–1900 m. N Xinjiang [Kazakhstan, Mongolia].

No specimens of *Saussurea grubovii* from China were seen by the present authors. The description here is based on images of the type specimens and on the treatments by Lipschitz (Fl. URSS 27: 506. 1962) and G. M. Shen (Fl. Xinjiang. 5: 272. 1999).

65. Saussurea alata Candolle, Ann. Mus. Natl. Hist. Nat. 16: 202. 1810.

具翅风毛菊 ju chi feng mao ju

Saussurea runcinata Candolle var. *dentata* Ledebour.

Herbs, perennial, 20–70 cm tall. Stem solitary, erect, apically branched, winged; wings entire or dentate. Basal leaves petiolate; leaf blade narrowly elliptic, 10–20 × 1–6 cm, lyrate, pinnately lobed, pinnatisect, or rarely undivided, both surfaces green, strigose, and gland-dotted; lateral lobes triangular to narrowly ovate-elliptic, margin sinuate-dentate or entire, apex with cartilaginous mucro. Lower and middle stem leaves petiolate or sessile, gradually smaller upward on stem. Upper stem leaves sessile, narrowly elliptic to linear, margin entire. Capitula numerous, in a corymbiform or paniculiform synflorescence, sessile or pedunculate. Involucre cylindric to ovoid, 8–10 mm in diam. Phyllaries in ca. 5 rows; outer phyllaries narrowly ovate-elliptic, ca. 4 × 1.5 mm, apex acute to obtuse; middle phyllaries narrowly elliptic, 5–6 × ca. 2 mm, apex obtuse to rounded; inner phyllaries narrowly elliptic to linear, ca. 8 × 2 mm, appendage purple, widened, membranous, and denticulate. Receptacle bristles 4–5 mm. Corolla purplish red, 1.1–1.6 cm, tube ca. 6 mm, limb ca. 8 mm, lobes ca. 3 mm. Achene dark brown, obconic to cylindric, 3–4 mm. Pappus straw-colored; outer bristles 2–5 mm; inner bristles 8–10 mm. Fl. and fr. Jul–Sep.

Salt marshes, fallow and cultivated fields, sandy soils; 500–1200 m. Nei Mongol, Xinjiang [Mongolia, Russia (Siberia)].

66. Saussurea malitiosa Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 493. 1882.

尖头风毛菊 jian tou feng mao ju

Herbs 10–40 cm tall, biennial or perennial. Stem solitary, 3–10 mm in diam., erect, simple or branched, usually wingless. Basal leaves petiolate; leaf blade narrowly obovate, oblong, or narrowly elliptic, 2–12 × 0.5–2.5 cm, pinnately lobed or pinnatisect, both surfaces green, strigose, gland-dotted, and scabrous; lateral lobes linear, narrowly ovate-elliptic, or narrowly triangular, recurved, margin entire or dentate, apex acute to acuminate and with cartilaginous mucro. Middle and upper stem leaves sessile, base semiamplexicaul. Capitula usually 3–15, clustered in a terminal corymbiform synflorescence or sometimes solitary on lower branch ends, sessile or pedunculate. Involucre campanulate, 1–2 cm in diam. Phyllaries in 5–7 rows, densely villous, apex long acuminate to spiniform and with a cartilaginous tip; outer phyllaries ovate to narrowly ovate-elliptic, 8–12 × 3–4 mm, apical part usually reflexed; middle phyllaries narrowly ovate-elliptic, 10–20 × 2–3 mm, apical part reflexed to patent; inner phyllaries linear, 2–2.5 × 0.1–0.2 cm, appressed. Receptacle bristles 0.8–1.4 cm. Corolla pink, 2–2.5 cm, gland-dotted, tube 1–1.2 cm, limb 1.3–1.4 cm, lobes 5–6 mm. Achene obconic, ca. 2 mm, wrinkled, gland-dotted. Pappus white; outer bristles 1–2 mm; inner bristles 1.8–2 cm. Fl. and fr. Jun–Sep.

• Sandy and gravelly mountain slopes; 3000–4300 m. W Gansu, Qinghai.

67. Saussurea jurineoides H. C. Fu in Ma, Fl. Intramongol., ed. 2, 4: 847. 1993.

阿右风毛菊 a you feng mao ju

Herbs 10–20 cm tall, perennial. Caudex stout, densely covered with dark brown remains of petioles. Stems solitary or few, erect, simple. Lower stem leaves petiolate; petiole 2–3 cm; leaf blade elliptic to narrowly ovate-elliptic, 5–8 × 1.5–2 cm, pinnately lobed or pinnatisect, both surfaces green, pilose, and gland-dotted; lateral lobes 4–8, narrowly ovate to linear, margin entire or sparsely dentate, apex acuminate and mucronate; terminal lobe linear to narrowly ovate-elliptic, margin entire, apex acuminate. Middle and upper stem leaves narrowly ovate-elliptic to linear, gradually smaller upward on stem, pinnately lobed

or margin dentate. Capitulum solitary. Involucre broadly campanulate, 1.5–2 cm in diam. Phyllaries in ca. 5 rows, yellowish green, densely villous and gland-dotted, apex spiniform, reflexed, and with a cartilaginous tip; outer phyllaries ovate to narrowly ovate; middle phyllaries narrowly ovate; inner phyllaries narrowly ovate to linear. Receptacle bristly. Corolla purple, ca. 1.8 cm, tube ca. 1 cm, limb ca. 8 mm, lobes ca. 3 mm. Achene brown, cylindric, 3–4 mm, sparsely puberulent and glandular. Pappus white; inner bristles ca. 1.7 cm. Fl. and fr. Jul–Aug.

• Stony mountain slopes; 2400–2500 m. Nei Mongol (Alxa Meng).

No specimens of *Saussurea jurineoides* were seen by the present authors, and the description here is based on the original publication. It is very close to *Saussurea malitiosa*, differing from that species only in the stout caudex and the solitary capitulum with somewhat smaller florets.

68. Saussurea pseudomalitiosa Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 76. 1954.

类尖头风毛菊 lei jian tou feng mao ju

Herbs (7–)25–50 cm tall, biennial. Stems solitary or few, 3–7 mm in diam., erect, simple or branched from base, narrowly winged; wings dentate. Basal and lower stem leaves petiolate; leaf blade narrowly ovate-elliptic to linear, 6–11 × 1–4 cm, runcinate-pinnately lobed or pinnatisect, both surfaces green and sparsely pubescent; lateral lobes triangular to linear, margin entire or dentate, teeth and apex with cartilaginous mucro. Middle and upper stem leaves sessile, base ± decurrent. Capitula very numerous, 3–6 ± clustered at end of branches in a corymbiform or paniculiform synflorescence, subsessile to pedunculate. Involucre campanulate, 0.8–1.5 cm in diam. Phyllaries in 4 or 5 rows, villous and gland-dotted, apically dark purple, apex long acuminate; outer phyllaries narrowly ovate-elliptic, 8–10 × ca. 1 mm, apex acuminate and sometimes recurved; middle phyllaries narrowly elliptic, 10–11 × 1–2 mm, apex acuminate; inner phyllaries linear, 10–12 × 1–2 mm, apical appendage dark purple and somewhat widened. Receptacle bristles 1–2 mm. Corolla purplish red, 1.1–1.5 cm, gland-dotted, tube 5–7 mm, limb 6–7 mm, lobes 3–4 mm. Achene obconic, ca. 3 mm, wrinkled, gland-dotted. Pappus straw-colored; outer bristles 1–2 mm; inner bristles 1–1.1 cm. Fl. and fr. Aug.

• *Juniperus* and *Picea* forests, open mountain slopes; 3300–4200 m. Qinghai.

69. Saussurea pinnatidentata Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 524. 1972.

羽裂风毛菊 yu lie feng mao ju

Saussurea runcinata Candolle var. *pinnatidentata* (Lipschitz) A. C. Fu & D. C. Wen.

Herbs 20–25(–80) cm tall, biennial. Stem solitary, erect, branched apically or from base, narrowly winged; wings dentate. Basal and lower stem leaves petiolate; leaf blade narrowly ovate-elliptic to narrowly obovate, 5–11 × 0.5–2 cm, pinnately divided, pinnately lobed, or dentate, scabrous, strigose, or glabrous; lateral lobes 1–6 pairs, linear-oblong, margin entire, apex acuminate and with a cartilaginous mucro; terminal lobe narrowly triangular, apex acute to acuminate. Upper stem leaves sessile, narrowly ovate-elliptic to linear, undivided, margin entire or basally few dentate. Capitula numerous, solitary or few at end of branches in a corymbiform or paniculiform synflorescence, long pedunculate. Involucre campanulate, (5–)8–10 mm in diam. Phyllaries in 4 or 5 rows, sparsely arachnoid, glabrescent; outer phyllaries ovate, ca. 4 × 2 mm, apical appendage herbaceous with a callose-serrulate margin; middle and inner phyllaries narrowly elliptic to linear, 7–10 × 0.8–2 mm, apical appendage purplish red, membranous, and with denticulate margin. Corolla purple, ca. 1.1 cm. Achene only seen as immature. Pappus pale brown; outer bristles short; inner bristles ca. 1 cm. Fl. and fr. Aug–Oct.

• Grasslands on mountain slopes, fields, saline and alkaline soils; 2200–3200 m. Gansu, Nei Mongol, Qinghai.

70. Saussurea nematolepis Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 67. 1949.

钻状风毛菊 zuan zhuang feng mao ju

Herbs 30–90 cm tall, perennial. Stem erect, apically branched, winged; wings ± dentate. Lower stem leaves unknown. Upper stem leaves sessile, oblong, narrowly elliptic, or linear-oblong, 3–13 × 0.7–2 cm, pinnately lobed or undivided, abaxially pale green to grayish green and sparsely arachnoid, adaxially dark green and sparsely pubescent; lateral lobes 1 or 2 pairs, broadly triangular, base decurrent or auriculate-semiamplexicaul, margin entire or sinuolate. Capitula numerous, in a lax paniculiform synflorescence, pedunculate. Involucre campanulate to globose, (0.7–)1–1.5 cm in diam. Phyllaries in 5–7 rows, arachnoid; outer phyllaries narrowly triangular-ovate, 4–5 × ca. 1 mm, apically dark purple, apex subulate and reflexed; middle phyllaries narrowly ovate-elliptic, 5–10 × 1–2 mm, apex acuminate to shortly subulate and erect or reflexed; inner phyllaries linear, 10–13 × ca. 1 mm, appendage herbaceous and villous. Receptacle bristles ca. 5 mm. Corolla pale purple or white, 0.8–1.2 cm, tube 5–6 mm, limb 5–6 mm. Achene brown, obconic, ca. 3.5 mm, angulate, wrinkled. Pappus dirty white; outer bristles ca. 4 mm; inner bristles ca. 8 mm. Fl. and fr. Aug–Oct.

• By trails on mountain slopes; 1500–3800 m. Gansu, Qinghai, NW Sichuan.

71. Saussurea ladyginii Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 77. 1954.

拉氏风毛菊 la shi feng mao ju

Herbs 30–40 cm tall, biennial. Stems solitary or several, erect, usually branched, narrowly winged; wings dentate. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 10–15 × 2–3.5 cm, runcinate-pinnately lobed or pinnatisect, both surfaces green, scabrid, sparsely strigose, and gland-dotted, midvein prominent and straw-colored; lateral segments 6–10 pairs, margin entire or few dentate, apex acute. Middle and upper stem leaves sessile, gradually smaller upward on stem, base decurrent. Capitula numerous, clustered at end of branches in a corymbiform synflorescence, shortly pedunculate. Involucre campanulate, 1–1.2 cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries ovate, 3–5 × 1–1.5 mm, apex subulate;

middle and inner phyllaries narrowly ovate to narrowly elliptic, 6–9 × 1.8–2 mm, appendage greenish, herbaceous, gland-dotted, and densely villous. Receptacle bristles ca. 4 mm. Corolla purplish red, 9–10 mm, gland-dotted, tube 3–4 mm, limb ca. 6 mm. Achene dark brown, obconic, 3.5–4 mm. Pappus pale brown; outer bristles 2–3 mm; inner bristles 7–8 mm. Fl. and fr. Aug.

• About 3500 m. Qinghai.

Saussurea ladyginii is only known from the type. It is morphologically very close to *S. pseudomalitiosa* but differs from that species in the shape and color of the phyllaries.

72. Saussurea chinnampoensis H. Léveillé & Vaniot, Bull. Acad. Int. Géogr. Bot. 20: 145. 1909.

京风毛菊 jing feng mao ju

Saussurea chinnampoensis var. *gracilis* H. C. Fu & D. S. Wen; *S. peipingensis* F. H. Chen.

Herbs 10–60(–100) cm tall, biennial. Stem solitary, erect, branched from base. Basal leaves shortly petiolate; leaf blade linear, narrowly ovate, narrowly elliptic, or narrowly obovate, 4–13 × 0.4–1 cm, thick, scabrous, gland-dotted, base attenuate-cuneate, margin revolute, subentire, mucronulate, apex acute to obtuse. Lower and middle stem leaves sessile, gradually smaller upward on stem, base semiamplexicaul. Capitula solitary or few on ends of branches in a corymbiform or paniculiform synflorescence, pedunculate. Involucre broadly campanulate to hemispheric, 1–2 cm in diam. Phyllaries in 4–6 rows, narrowly ovate-elliptic to linear, green, gland-dotted; outer phyllaries 4–8 × 1.5–2 mm, apex cartilaginous mucronate; middle phyllaries 8–10 × 1.5–2 mm, appendage green, herbaceous, margin and apically cartilaginous mucronate; inner phyllaries 10–13 × 1–1.5 mm, appendage green to purple, herbaceous, brownish tomentose, acuminate, and recurved. Receptacle bristles white, filiform, 6–9 mm. Corolla pale purple, 1.2–1.6 cm, gland-dotted, tube 8–11 mm, limb 5–6 mm, lobes 4–4.5 mm. Achene cylindric, ca. 3 mm, ribbed. Pappus pale yellowish brown; outer bristles 3–5 mm; inner bristles 7–10 mm. Fl. and fr. Jul–Oct.

Salt marshes, moist meadows; near sea level to 1200 m. Hebei, Liaoning, Nei Mongol, N Shaanxi [Korea].

4. Saussurea subg. Saussurea

风毛菊亚属 feng mao ju ya shu

Perennial herbs or rarely subshrubs, cauliferous or stemless. Leaves undivided or pinnately divided. Uppermost stem leaves herbaceous, green, not densely lanate. Capitula usually in a corymbiform or paniculiform synflorescence or sometimes solitary. Phyllaries usually without an appendage but sometimes with a green herbaceous appendage, apex obtuse, acute, acuminate, or caudate and usually appressed or sometimes reflexed. Receptacle usually densely bristly, rarely paleate, papillose, or naked. Corolla usually glabrous, rarely gland-dotted. Anther tails ± lacerate, lanate, or entire. Achene cylindric, oblong, or fusiform, obtusely 4- or 5-angled, smooth or wrinkled, usually glabrous, rarely gland-dotted or sericeous, usually without a conspicuous apical crown. Pappus dirty white, straw-colored, or yellowish brown, usually in 2 rows; outer bristles scabrid or rarely plumose, rarely lacking.

About 333 species: Asia, C, E, and N Europe, W North America; 217 species (152 endemic) in China.

1a. Subshrubs, repeatedly virgately branched from base ..... 1. *S.* sect. *Jurineiformes*
1b. Perennial herbs or rarely subshrubs, never virgately branched.
2a. Phyllaries straw-colored, with a black or brown membranous margin; receptacle with paleae as long as or longer than inner phyllaries; pappus bristles in 1 row ..... 2. *S.* sect. *Jacea*
2b. Phyllaries straw-colored, greenish, yellow, brown, purple, or black, without a black or brown membranous margin; receptacle with bristles shorter than inner phyllaries or naked; pappus bristles usually in 2 rows.
3a. Plants stemless or substemless and sometimes forming dense cushions; leaves undivided, usually less than 2 cm wide, if wider then margin dentate or serrate; capitula usually solitary, rarely few or numerous ..... 3. *S.* sect. *Gymnocline*
3b. Plants usually with well-developed stem, if stemless then leaves either pinnately lobed to pinnately divided or leaf blade more than 2 cm wide and with an entire margin; capitula in a corymbiform, paniculiform, or racemiform synflorescence or solitary.
4a. Roots and caudex fibrously split; capitula usually numerous, in a corymbiform or paniculiform synflorescence; involucre cylindric, tubular, or narrowly campanulate, usually less than 1 cm in diam. ..... 4. *S.* sect. *Laguranthera*
4b. Roots and caudex not fibrously split; capitula solitary to numerous; involucre usually campanulate, more than 1 cm in diam.
5a. Anther tails cottony or lanate, rarely lacerate; capitula mostly solitary and usually more than 1.5 cm in diam.
6a. Leaf blade undivided, narrowly linear and grasslike, or narrowly oblong, narrowly ovate-elliptic to narrowly obovate-elliptic ..... 5. *S.* sect. *Lagurostemon*
6b. Leaf blade usually pinnately lobed to pinnately divided, if rarely undivided then not narrowly linear and grasslike but elliptic, obovate, or oblong ..... 6. *S.* sect. *Strictae*
5b. Anther tails ciliate or lacerate, not cottony or lanate; capitula usually numerous and less than 1.5 cm in diam.

7a. Plants scapiform or subscapiform; basal leaves rosulate; stem leaves much reduced ..... 7. *S.* sect. *Rosulascentes*

7b. Plants not scapiform; basal leaves not rosulate (often withered at anthesis); stem leaves usually well developed ..... 8. *S.* sect. *Saussurea*

1. Saussurea sect. **Jurineiformes** (Lipschitz) Lipschitz in Schischkin & Bobrov, Fl. URSS 27: 512. 1962.

木质风毛菊组 mu zhi feng mao ju zu

Saussurea ser. *Jurineiformes* Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 43: 452. 1958.

Subshrubs, virgate, much branched. Leaves few, narrowly elliptic to linear, small. Capitula numerous, in an ample paniculiform synflorescence. Phyllaries sometimes pilose, apex acuminate, cartilaginous, and stiff. Receptacle with dense subulate long bristles. Achene with a short crown, glandular. Pappus in 2 rows, white; outer bristles barbellate or plumose, sometimes lacking.

Three species: Afghanistan, China, N Pakistan, Tajikistan, Uzbekistan; one species in China.

73. Saussurea chondrilloides C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 169. 1889.

木质风毛菊 mu zhi feng mao ju

Jurinea chondrilloides (C. Winkler) O. Fedtschenko; *Saussurea aphylla* K. H. Rechinger; *S. rupestris* Hemsley & Lace.

Subshrubs 60–80 cm tall. Stem green, erect, strongly and repeatedly branched. Leaves elliptic to linear, 1–7.5 × 0.2–0.5(–1) cm, both surfaces green or glaucous, sparsely pubescent, and gland-dotted, margin entire or with few teeth, apex acute. Uppermost stem leaves linear, ca. 10 × 2–3 mm. Capitula numerous, solitary on branch ends in a lax paniculiform synflorescence. Involucre campanulate to obconic, (3–)6–10 mm in diam. Phyllaries in 5–7 rows, arachnoid tomentose and gland-dotted, apex acuminate; outer phyllaries triangular-ovate, 2–3 × 1–1.5 mm; middle phyllaries narrowly elliptic, 3–10 × 1.5–2 mm; inner phyllaries linear, 10–12 × 1–1.5 mm. Receptacle bristles silvery, subulate, 6–8 mm. Corolla pale reddish purple, 1.1–1.6 cm, glandular, tube 5–8 mm, limb 6–8 mm, lobes 2.5–3 mm. Achene brown, cylindric, 2.5–6 mm, gland-dotted, ribbed, apex with a dentate and lacerate crown. Pappus white or dirty white; outer bristles 1–4[–6] mm, barbellate to plumose, sometimes lacking; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep.

Stony slopes; 1800–2800 m. W Xinjiang [Afghanistan, N Pakistan, Tajikistan, Uzbekistan].

No specimens of *Saussurea chondrilloides* from China were seen by the present authors. The description here is based on the treatment by G. M. Shen (Fl. Xinjiang. 5: 275. 1999), on material from Afghanistan, and on an image of the type specimen in LE.

2. Saussurea sect. **Jacea** Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 441. 1954.

栗缘风毛菊组 li yuan feng mao ju zu

Herbs, perennial. Stem solitary, branched, densely leafy. Capitula numerous or few, solitary at stem and branch ends, supported by uppermost stem leaves. Phyllaries straw-colored, leathery, with brown or black membranous margin. Receptacle paleate; paleae 1–2 cm, approximately as long as inner phyllaries. Anther tails short, undivided. Achene ribbed, glabrous. Pappus bristles in 1 row, plumose, persistent.

Three species: Afghanistan, Bhutan, China, NE and NW India, Kashmir, N Myanmar, Nepal, N Pakistan, Tajikistan; one species in China.

The species of *Saussurea* sect. *Jacea*, including its only Chinese representative, almost certainly do not belong in *Saussurea*. In a cladogram from a recent molecular analysis (Y. J. Wang et al., Biol. J. Linn. Soc. 97: 893–903. 2009), *S. fastuosa* (= *S. forrestii*) was positioned far from the *Saussurea* clade. The affinities of *S. fastuosa* could not be further elucidated, however, and it is treated here under *Saussurea*.

74. Saussurea fastuosa (Decaisne) Schultz Bipontinus, Linnaea 19: 331. 1846.

奇形风毛菊 qi xing feng mao ju

Aplotaxis fastuosa Decaisne in Jacquemont, Voy. Inde 4(Bot.): 97. 1843; *A. denticulata* Candolle; *A. denticulata* var. *glabrata* Candolle; *A. denticulata* var. *hypoleuca* Candolle; *Saussurea denticulata* (Candolle) Wallich ex C. B. Clarke (1876), not Ledebour (1829); *S. forrestii* Diels; *S. glabrata* (Candolle) C. Shih; *S. wallichii* Schultz Bipontinus.

Herbs 0.6–1.5 m tall, perennial. Stem solitary, erect, simple or apically branched. Basal and lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole ca. 5 mm; leaf blade narrowly ovate-elliptic, 6–15 × 2–4.5 cm, abaxially grayish white and densely tomentose or sometimes glabrescent, adaxially green and glabrous, base rounded to broadly cuneate, margin serrulate, apex acute to acuminate. Upper stem leaves gradually smaller upward on stem. Capitula solitary at end of stem or branches, in a lax corymbiform synflorescence, large, on a ± widened peduncle. Involucre campanulate, 1.5–2.5 cm in diam. Phyllaries in 4 or 5 rows, straw-colored, margin membranous, dark brown, and erose-lacerate, apex rounded; outer phyllaries ovate, 4–8 × 4–5 mm; middle phyllaries elliptic to narrowly elliptic, 7–13 × 2–4 mm; inner phyllaries narrowly elliptic to linear, 13–15 × 1.5–2 mm. Receptacle with paleae but without alveolate bristles; paleae 1.2–1.7 cm. Corolla purple, 1.3–1.4 cm, glabrous, tube 6–8 mm, limb 5–7 mm, lobes 2.5–3

mm. Achene pale brown, obconic, 4–5 mm, ribbed, glabrous. Pappus bristles straw-colored, 7–12 mm. Fl. and fr. Aug–Oct.

Forests, forest or thicket margins, grasslands, moist meadows; 2400–4000 m. SW Sichuan, S Xizang, NW Yunnan [Bhutan, NE and NW India, N Myanmar, Nepal].

This taxon is very variable with respect to the indumentum of the abaxial leaf surface, which ranges from grayish white and densely tomentose to green and glabrous, and to the shape of the peduncles, which are ± inflated below the capitulum. *Saussurea forrestii*, which has less dense indumentum and barely inflated peduncles, was described from material from Yunnan and accepted by S. W. Liu (Fl. Yunnan. 13: 550. 2004); and *S. glabrata* with glabrous leaves was recognized by C. Shih (FRPS 78(2): 84. 1999). However, as no discontinuous characters could be found that would justify separation of these taxa at species level, a broad species concept is adopted here. While the rank of variety might be appropriate, we refrain from validating a name at this rank, as long as the generic affiliation of this species is not yet clear.

3. Saussurea sect. **Gymnocline** Franchet, J. Bot. (Morot) 2: 311. 1888.

无茎风毛菊组 wu jing feng mao ju zu

Herbs, stemless or substemless but sometimes with branched woody caudex and densely caespitose or forming dense cushions. Leaf blade margin entire, serrate, dentate, or sinuate. Capitula usually solitary in center of leaf rosette, large or medium-sized, sometimes several in a clustered synflorescence, sessile or shortly pedunculate. Receptacle with subulate, sometimes very short bristles or naked. Corolla glabrous or sometimes gland-dotted. Anther tails lacerate or lanate. Achene glabrous or glandular, without an apical crown but sometimes with a crenulate rim. Pappus usually in 2 rows; outer bristles scabrid or plumose, rarely very few or lacking.

Twenty species: Bhutan, China, NE and NW India, Japan, Kashmir, Nepal, Tajikistan; 17 species (13 endemic) in China.

Saussurea sect. *Acaules* C. B. Clarke (Compos. Ind. 220. 1876) was lectotypified by Kitamura (Acta Phytotax. Geobot. 24: 22. 1969) with *S. stoliczkae* (= *S. andryaloides*), a species now included in *S.* sect. *Strictae*. Lipschitz (Rod *Saussurea*, 106. 1979) explicitly excluded this lectotype from his *S.* sect. *Acaules* and thereby created an illegitimate later homonym (*Vienna Code*, Art. 48.1). The lectotype of *S.* sect. *Depressae* C. B. Clarke (loc. cit.: 221; chosen by Lipschitz, loc. cit.: 96–97) is *S. andersonii*, now also included in *S.* sect. *Strictae*. *Saussurea* sect. *Depressae* has often been regarded as highly artificial (Lipschitz, loc. cit.: 97). Moreover, its key character is not even very useful for grouping of species. Naked receptacles can be observed in most other sections as well and may only be used for keying out certain groups within a section. For this reason, *S.* sect. *Depressae* is merged here with *S.* sect. *Acaules*. The correct name for this section is *S.* sect. *Gymnocline*, typified by *S. ciliaris*.

1a. Receptacle naked, without bristles; outer phyllaries apically green and reflexed; leaf margin entire; capitulum solitary.
2a. Leaf blade narrowly linear, 1–2 mm wide ..... 77. *S. poochlamys*
2b. Leaf blade narrowly obovate-elliptic to linear, 3–15 mm wide.
3a. Leaf blade adaxially green when dry, glabrous, rigid, and leathery; inner phyllaries acute at apex ..... 78. *S. ciliaris*
3b. Leaf blade adaxially black when dry, puberulent or glabrous, soft, and herbaceous; inner phyllaries obtuse at apex ..... 79. *S. coriolepis*
1b. Receptacle with sometimes very shortly subulate bristles; outer phyllaries apically not green or reflexed; leaf margin entire, dentate, or pinnately lobed; capitula solitary or several.
4a. Leaves long petiolate; petiole 1.5–10 cm; leaf blade elliptic, ovate, or obovate, large (more than 1.5 cm wide), margin coarsely dentate or serrate.
5a. Outer pappus bristles reflexed and appressed on achene; capitulum 1(or 2–4); leaf base cuneate, margin sharply dentate or serrulate ..... 75. *S. katochaete*
5b. Outer pappus bristles neither reflexed nor appressed on achene; capitula 4–18 in a corymbiform synflorescence; leaf base cordate, margin shallowly sinuate-dentate ..... 76. *S. bella*
4b. Leaves shortly petiolate or sessile; petiole 0.1–2 cm; leaf blade spatulate, narrowly ovate, narrowly elliptic, or linear, small (less than 1.5 cm wide), margin entire, denticulate, sinuate-dentate, or pinnately lobed.
6a. Outer pappus bristles plumose but sometimes very few or lacking; leaf blade spatulate, adaxially villous or tomentose.
7a. Leaf blade adaxially green, sparsely villous, abaxially glaucous but glabrescent ..... 82. *S. montana*
7b. Leaf blade adaxially grayish green, sparsely tomentose, abaxially grayish white densely tomentose.
8a. Phyllaries sparsely white or yellowish villous, apex usually acuminate; leaf margin entire ..... 80. *S. spatulifolia*
8b. Phyllaries dark brown or black villous, apex usually obtuse; leaf margin sinuate-dentate with short purple mucros ..... 81. *S. melanotricha*
6b. Outer pappus bristles scabrid; leaf blade narrowly elliptic, linear, sometimes narrowly obovate, adaxially glabrous or sparsely pubescent.
9a. Plants forming dense cushions.
10a. Leaf blade pinnately lobed, apex rounded to subobtuse ..... 90. *S. pulviniformis*
10b. Leaf blade undivided, apex acuminate or spinulose.

11a. Leaf blade 2–7 cm, abaxially white and tomentose; capitulum 2–3 cm in diam. ..... 88. *S. columnaris*
11b. Leaf blade 0.5–1.2 cm, abaxially green and glabrous; capitulum 0.5–0.7 cm in diam. ..... 89. *S. subulata*
9b. Plants not forming dense cushions but sometimes densely caespitose.
12a. Leaf blade green on both surfaces, glabrous or with glandular hairs.
13a. Leaf blade glabrous, margin subentire ..... 86. *S. pumila*
13b. Leaf blade densely glandular hairy, margin conspicuously sinuate-dentate ..... 87. *S. apus*
12b. Leaf blade abaxially white and densely tomentose, adaxially green or brown.
14a. Leaf blade margin dentate, crenate, or pinnate; plants densely caespitose ..... 91. *S. wernerioides*
14b. Leaf blade margin entire or denticulate; plants not caespitose.
15a. Leaf blade ovate to elliptic, 1–3.5 × 0.5–1.5 cm; capitula 2–5 ..... 83. *S. ovatifolia*
15b. Leaf blade narrowly obovate to linear, 2.5–7 × 0.2–0.6 cm; capitulum solitary.
16a. Leaf blade spatulate to narrowly obovate, 3–6 mm wide, adaxially arachnoid and glandular ..... 84. *S. cochleariifolia*
16b. Leaf blade linear to narrowly ovate-elliptic, 2–5 mm wide, adaxially glabrous ..... 85. *S. minuta*

75. Saussurea katochaete Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 491. 1882.

重齿风毛菊 chong chi feng mao ju

Saussurea anochaete Handel-Mazzetti; *S. katochaete* var. *caulescens* Lipschitz; *S. katochaetoides* Handel-Mazzetti; *S. rohmooana* C. Marquand & Airy Shaw.

Herbs 3–10(–20) cm tall, perennial, stemless or shortly stemmed. Caudex stout, simple or few branched. Rosette leaves petiolate; petiole 1.5–6(–10) cm; leaf blade elliptic, obovate, or ovate, 2.5–11 × 1.5–4.5 cm, abaxially white or grayish white and densely tomentose, adaxially green and glabrous, base cuneate to rounded, margin sharply and narrowly serrate-dentate, apex acuminate, acute, or obtuse. Capitulum 1(or 2–4), in center of leaf rosette, sessile or pedunculate. Involucre broadly campanulate, 2.5–4 cm in diam. Phyllaries in 4 or 5 rows, brown to black, glabrous, apex acute to acuminate; outer phyllaries triangular-ovate, 9–15 × 4–6 mm; middle phyllaries ovate to narrowly ovate-elliptic, 12–15 × 4–6 mm; inner phyllaries narrowly elliptic to linear, 1.5–2 × 0.2–0.4 cm. Receptacle bristles yellowish, subulate, 1–3 mm. Corolla purple, 1.3–1.9 cm, tube 7–12 mm, limb 6–8 mm, lobes 4–5 mm. Achene dark brown, cylindric, 4–6 mm, obtusely 4- or 5-ribbed. Pappus pale brown; outer bristles 3–3.5 mm, usually reflexed and appressed to achene, scabrid; inner bristles 1.3–1.5 cm, erect. Fl. and fr. Jul–Oct.

Alpine meadows and pastures, scree slopes, thicket and forest margins; 2200–4800 m. Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan (Dêqên) [Bhutan, India (Sikkim)].

76. Saussurea bella Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 87. 1949.

漂亮风毛菊 piao liang feng mao ju

Saussurea haoi Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan.

Herbs 3–10 cm tall, perennial, stemless or shortly stemmed. Caudex long, stout, usually simple. Rosette leaves petiolate; petiole 2–7 cm; leaf blade ovate, elliptic, or suborbicular, 2–7 × 1–4.5 cm, abaxially white and densely arachnoid tomentose, adaxially green and arachnoid but glabrescent, base cordate, truncate, or cuneate, margin sinuate-dentate and sometimes proximally pinnately lobed, apex rounded or obtuse to acuminate. Capitula numerous, 4–18, in a clustered corymbiform synflorescence, pedunculate. Involucre campanulate, 1.2–3 cm in diam. Phyllaries in 4 or 5 rows, green and herbaceous in distal part, arachnoid; outer phyllaries narrowly ovate-elliptic to linear, 10–15 × 3–5 mm, apex with a reflexed spiniform mucro; inner phyllaries linear, 1.6–2 × ca. 0.2 cm, yellowish, apex herbaceous and acuminate. Receptacle bristles subulate, ca. 4 mm. Corolla purple, 1.7–2 cm, tube 0.9–1.1 cm, limb 9–10 mm, lobes 5–5.5 mm. Achene gray, 4–5 mm, 4-angled, glabrous. Pappus straw-colored; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1.6 cm. Fl. and fr. Aug–Sep.

• Alpine pastures, meadows, and scree slopes; 3200–4500 m. Qinghai, E Xizang.

77. Saussurea poochlamys Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 15. 1925.

革叶风毛菊 ge ye feng mao ju

Herbs 2–5 cm tall, perennial, stemless or substemless. Caudex simple or few branched. Rosette leaves sessile, linear, 2–12 × 0.1–0.2(–0.4) cm, leathery, both surfaces green, shiny, and glabrous, margin entire and revolute, apex obtuse. Innermost leaves gradually merging into phyllaries. Capitulum solitary in center of leaf rosette, sessile or on a peduncle to 4 cm. Involucre narrowly campanulate, 0.6–1.5 cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries with straw-colored, leathery proximal part and with a green, herbaceous distal part, glabrous, proximal part ovate, 8–10 × 3–5 mm, distal part linear, 1–4 × 0.1–0.2 cm, margin revolute, apex obtuse; middle phyllaries with gradually reduced herbaceous part, narrowly ovate-elliptic, 11–15 × 2–3 mm, glabrescent, apex acute to obtuse; inner phyllaries narrowly elliptic to linear, 15–17 × 1–2 mm, apically purplish, margin membranous, apex obtuse and mucronate or acuminate. Receptacle usually naked, rarely with 1–2 mm yellowish bristles. Corolla bluish purple, 1.6–2.2 cm, tube 0.8–1.5 cm, limb 5–7 mm, lobes 4.5–5 mm. Achene brown, cylindric, 3.5–4 mm, 5-ribbed, glabrous, tuberculate. Pappus dirty white; outer bristles 4–5 mm, plumose; inner bristles 1.2–1.3 cm. Fl. and fr. Aug–Oct.

• Thickets, alpine meadows and pastures; 3200–4300 m. SW and W Sichuan (Kangding, Muli), NW Yunnan (Lijiang, Zhongdian).

78. Saussurea ciliaris Franchet, J. Bot. (Morot) 2: 337. 1888.

尖叶风毛菊 jian ye feng mao ju

Saussurea ciliaris var. *major* Y. Ling.

Herbs 2.5–6 cm tall, perennial, stemless or shortly stemmed. Caudex short, simple or few branched. Rosette leaves sessile, narrowly obovate-elliptic to linear, 1.5–13 × 0.3–1.2 cm, rigid and leathery, glabrous, abaxially pale green, adaxially green and shiny, base cuneate-attenuate, margin entire, revolute, and ciliate, apex acute. Uppermost leaves gradually merging into phyllaries. Capitulum solitary, in center of leaf rosette, sessile. Involucre campanulate, 1–2.5 cm in diam. Phyllaries in 4 or 5 rows; outer phyllaries with brown leathery basal part and a green herbaceous reflexed apical part, glabrous, basal part ovate and 7–10 × 3–5 mm, apical part linear-oblong and 0.7–3 × 0.4–1 cm, margin revolute and ciliate, apex acute; middle phyllaries ovate-elliptic, 10–15 × 3–5 mm, with a gradually reduced herbaceous apical part, apex acute; inner phyllaries narrowly elliptic to linear, 12–18 × 2–3 mm, brown but apically purple, apex acuminate. Receptacle without bristles. Corolla bluish purple to blackish purple, 1.5–1.7(–2) cm, tube 8–9(–12) mm, limb 7–8 mm, lobes 4.5–5 mm. Achene brown, cylindric, ca. 4 mm, glabrous. Pappus pale brown; outer bristles 4–8 mm, plumose; inner bristles 1.2–1.3 cm. Fl. and fr. Aug–Sep.

• Alpine meadows and pastures, thickets, scree slopes; 2600–4400 m. W Sichuan, NW Yunnan (Eryuan, Lijiang, Zhongdian).

79. Saussurea coriolepis Handel-Mazzetti, Oesterr. Bot. Z. 89: 60. 1940.

硬苞风毛菊 ying bao feng mao ju

Herbs 2–3 cm tall, perennial, stemless. Caudex short, simple. Rosette leaves sessile, narrowly obovate-oblong to linear, 3.5–6 × 0.6–1.5 cm, herbaceous, abaxially pale green and glabrous, adaxially green, black when dry and sparsely pubescent or glabrescent, margin entire, revolute, and densely ciliate, apex obtuse. Uppermost leaves usually merging into phyllaries. Capitulum solitary, in center of leaf rosette, sessile. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 3 or 4 rows, purple, glabrous, margin ciliate, apex obtuse; outer phyllaries elliptic, 8–10 × ca. 4 mm, basal part purple and leathery, apical part green and leaflike; middle phyllaries elliptic to narrowly ovate, 10–14 × 3–4 mm, purple; inner phyllaries narrowly ovate-elliptic to linear, 13–16 × 2–3 mm, purple, apex obtuse. Receptacle without bristles. Corolla bluish purple, 1.3–1.7 cm, tube 9–10 mm, limb 4–8 mm, lobes 3–5 mm. Achene ca. 3 mm, ribbed, glabrous. Pappus straw-colored; outer bristles short, scabrid; inner bristles 1.1–1.5 cm. Fl. and fr. Aug.

• Mountain slopes; ca. 4000 m. Sichuan (Baoxing).

80. Saussurea spatulifolia Franchet, J. Bot. (Morot) 2: 338. 1888.

维西风毛菊 wei xi feng mao ju

Herbs 2–4 cm tall, perennial, stemless, sometimes laxly caespitose. Caudex simple or branched with several sterile and flowering leaf rosettes. Leaves petiolate; petiole purple, to 1 cm; leaf blade spatulate to oblong-spatulate, 0.5–3 × 0.5–1 cm, abaxially white and densely tomentose, adaxially grayish green and tomentose, base cuneate, margin entire, apex rounded and with a small mucro. Capitulum solitary, in center of leaf rosette. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in ca. 4 rows, pale brown to blackish purple, sparsely white or yellowish villous, apex acute to acuminate; outer phyllaries ovate, 8–10 × 4–5 mm; middle phyllaries narrowly ovate-elliptic, 10–12 × 3–4 mm; inner phyllaries narrowly elliptic to linear, 12–14 × 2–3 mm. Receptacle bristles brownish, subulate, 0.5–1.5 mm. Corolla purple, 1.3–1.6 cm, sparsely gland-dotted, tube 7–8 mm, limb 6–8 mm, lobes 5–6 mm. Achene dark brown, cylindric to obconic, 4–4.5 mm, transversely rugose, glabrous or with few sessile glands, apex with a crenulate rim. Pappus dirty white to pale brown; outer bristles very few or sometimes lacking, 2–3 mm, plumose; inner bristles 1.2–1.4 cm. Fl. and fr. Jul–Oct.

• Alpine meadows and pastures, scree slopes; 3000–4600 m. SW Sichuan, NW Yunnan.

81. Saussurea melanotricha Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 204. 1924.

黑苞风毛菊 hei bao feng mao ju

Saussurea xanthotricha Handel-Mazzetti.

Herbs 1.5–5 cm tall, perennial, stemless or substemless, laxly caespitose. Caudex usually branched with several sterile and flowering leaf rosettes. Leaves petiolate; petiole purple, to 1.5 cm; leaf blade elliptic to spatulate-elliptic, 1–3.5 × 0.4–1 cm, abaxially white, densely tomentose, and with a conspicuous midvein, adaxially grayish green and densely villous, base cuneate-attenuate, margin entire or obtusely sinuate-dentate with purple mucronulate teeth, apex rounded to obtuse with a short mucro. Capitulum solitary, in center of leaf rosette. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in ca. 4 rows, purplish brown and dark brown to blackish villous in distal part, apex acute to obtuse; outer phyllaries ovate, 9–11 × 4–6 mm; middle phyllaries narrowly ovate-elliptic, 12–13 × 3–4 mm; inner phyllaries narrowly elliptic-linear, 12–14 × 2–3 mm. Receptacle bristles few, triangular-subulate, to 1 mm. Corolla purple, 1.2–1.6 cm, sparsely gland-dotted, tube 5–8 mm, limb 6–8 mm, lobes 3.5–4 mm. Achene cylindric, 3–5 mm, gland-dotted. Pappus pale brown; outer bristles 3–5 mm, plumose; inner bristles 1.2–1.4 cm. Fl. and fr. Sep.

• Alpine scree slopes, open rocky mountain slopes; 3500–4700 m. SW Sichuan, NW Yunnan.

Saussurea melanotricha is very close to *S. spatulifolia* and probably not clearly separated at species level. The type specimen of *S. xanthotricha* from Sichuan holds an intermediate position between *S. spatulifolia* and *S. melanotricha*, combining the acuminate phyllaries with yellowish indumentum of the former with the sinuate-dentate leaf margins with purple mucros of the latter.

82. Saussurea montana J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 208. 1934.

山地风毛菊 shan di feng mao ju

Herbs 3–5 cm tall, perennial, stemless, caespitose. Caudex stout, usually branched at ground level, with several sterile and

flowering leaf rosettes. Leaves petiolate; petiole purple, to 5 mm; leaf blade narrowly obovate or narrowly elliptic, 1–3 × 0.4–1 cm, abaxially glaucous and sparsely villous but glabrescent, adaxially green and villous, base cuneate-attenuate, margin entire, apex obtuse to rounded and with a short mucro. Capitulum solitary, in center of leaf rosette, sessile. Involucre campanulate, 0.8–1.2 cm in diam. Phyllaries in ca. 4 rows, purple and yellowish to brownish villous in distal part, apex usually obtuse; outer phyllaries ovate, 6–7 × 3–4 mm; middle phyllaries narrowly ovate-elliptic, 7–11 × 2–3 mm, apex acute to obtuse; inner phyllaries narrowly elliptic to linear, 11–15 × 1.5–3 mm, apex acute. Receptacle bristles subulate, ca. 1.5 mm. Corolla purple, 1.6–1.7 cm, gland-dotted, tube 7–10 mm, limb 6–10 mm, lobes 5–6 mm. Achene cylindric, 4–5 mm, wrinkled, glabrous, apically with a crenulate rim. Pappus straw-colored; outer bristles few; 3–6 mm, plumose, often lacking; inner bristles 1–1.5 cm. Fl. and fr. Aug–Oct.

• Alpine pastures; 3600–4600 m. SW Sichuan (Muli), NW Yunnan (Lijiang).

Like *Saussurea melanotricha*, *S. montana* is also very close to *S. spatulifolia* and probably not clearly separated at species level. However, the indumentum is clearly very different, and no transient forms have been observed.

83. Saussurea ovatifolia Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 102. 1981.

青藏风毛菊 qing zang feng mao ju

Herbs 2–6 cm tall, perennial, stemless or shortly stemmed. Caudex elongate, 2–3 mm in diam., simple or few branched, covered with dark brown remains of petioles. Rosette leaves petiolate; petiole 3–10 mm; leaf blade ovate to elliptic, 1–3.5 × 0.5–1.5 cm, abaxially white and densely tomentose, adaxially grayish green and sparsely arachnoid, base rounded to cuneate, margin sparsely denticulate or entire, apex acute, acuminate, or obtuse. Capitula (1 or)2–5, in a hemispherically condensed corymbiform synflorescence or rarely solitary, subsessile. Involucre campanulate, 6–10 mm in diam. Phyllaries in 3–5 rows, brownish or greenish yellow, villous, apex acute to acuminate; outer phyllaries narrowly ovate, 4–6 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 5–8 × 1.5–2 mm; inner phyllaries linear, 8–10 × 1–1.5 mm. Receptacle bristles 1–2 mm. Corolla purplish red, 1.2–1.5 cm, tube 4–6 mm, limb 5–5.5 mm, lobes ca. 3 mm. Achene 3–4 mm, glabrous. Pappus basally pale brown, apically dirty white; outer bristles scabrid. Fl. and fr. Aug–Sep.

• Alpine meadows, riverbanks; 4200–5200 m. Qinghai, Xizang.

Saussurea ovatifolia may be very closely related to the geographically distant *S. elliptica*, known from the Karakorum range and attributed to *S.* sect. *Saussurea*. Records of *S. ovata* in the sense of S. W. Liu (Fl. Qinghai. 3: 469. 1996) are probably referable to *S. ovatifolia*.

84. Saussurea cochleariifolia Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 104. 1981.

匙叶风毛菊 shi ye feng mao ju

Herbs ca. 2 cm tall, perennial, stemless. Caudex stout, few branched. Rosette leaves petiolate; petiole 1–1.5 cm; leaf blade spatulate to narrowly obovate-oblong, 2.5–4 × 0.3–0.6 cm, abaxially grayish green and densely tomentose, adaxially green, glandular hairy, and sparsely arachnoid, base attenuate, margin entire, apex acute. Capitulum solitary, in center of leaf rosette, sessile. Involucre narrowly campanulate, 0.8–1.2 cm in diam. Phyllaries in 3 or 4 rows, margin and distally purplish black, sparsely arachnoid, apex acuminate; outer phyllaries narrowly triangular-ovate, 5–8 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 8–12 × 1–2 mm; inner phyllaries linear, 12–14 × ca. 1 mm. Receptacle not seen. Corolla purple, 1.5–1.6 cm, tube 7–8 mm, limb 7–8 mm, lobes ca. 5 mm. Achene ca. 1.5 mm, transversely rugose. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

• Moraines, alpine meadows; ca. 4000 m. S Xizang (Yadong) [?India (Sikkim)].

Saussurea cochleariifolia may occur in India (Sikkim) (see Grierson & Springate, Fl. Bhutan 2(3): 1441. 2001).

85. Saussurea minuta C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 243. 1894.

小风毛菊 xiao feng mao ju

Saussurea lancifolia Handel-Mazzetti.

Herbs 2.5–7 cm tall, perennial, stemless or shortly stemmed. Caudex 2–3 mm in diam., creeping, usually few branched, with several sterile and flowering leaf rosettes. Rosette leaves petiolate; leaf blade narrowly elliptic to linear, 3–7 × 0.2–0.5 cm, abaxially white and densely tomentose, adaxially green and glabrous, base attenuate, margin revolute and entire, apex acute. Stem leaves (if present) similar to rosette leaves but gradually shorter upward on stem; uppermost leaves sessile, subtending and overtopping capitulum. Capitulum solitary, in center of leaf rosette or terminal on a short stem. Involucre narrowly campanulate, 0.8–1.2 cm in diam. Phyllaries in 3 or 4 rows, purple; outer phyllaries triangular-ovate, 9–11 × 3–5 mm, glabrous, apex acute; middle phyllaries ovate, 12–14 × 3–4 mm, glabrous, apex acute; inner phyllaries narrowly ovate-linear, 14–16 × 2–3 mm, apically densely villous, apex obtuse. Receptacle bristles subulate-filiform, 7–8 mm. Corolla purple, 1.2–1.4 cm, tube 5–6 mm, limb 6–7 mm, lobes 3–4 mm. Achene only seen as immature. Pappus dirty white; outer bristles ca. 2 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep.

• Alpine scree slopes; 3500–4900 m. Gansu, Qinghai, W Sichuan.

86. Saussurea pumila C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 244. 1894.

矮小风毛菊 ai xiao feng mao ju

Herbs 2–4(–8) cm tall, perennial, stemless or shortly stemmed. Caudex 1–3 mm in diam., simple or few branched. Rosette leaves shortly petiolate; leaf blade narrowly ovate-elliptic, narrowly spatulate, or linear-elliptic, 0.8–3(–5) × 0.2–0.7(–1) cm, both surfaces green and glabrous, base cuneate-attenuate, margin subentire to minutely denticulate-serrulate, apex acute to obtuse and mucronate. Stem leaves (if present) similar to rosette leaves. Capitulum 1(–3), in center of leaf rosette or terminal on stem. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, blackish brown or straw-

colored with dark midvein and margin, sometimes tinged purple, glabrous or sparsely villous, apex acute to acuminate; outer phyllaries narrowly ovate-triangular, 7–11 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 8–13 × 2–3 mm; inner phyllaries narrowly elliptic-linear, 13–15 × ca. 2 mm. Receptacle bristles 3–5 mm. Corolla purple, 1–1.3 cm, tube 5–7 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene brown, cylindric, ca. 3 mm, glabrous. Pappus straw-colored; outer bristles 1–3 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep. $2n$ = 30* (as *Saussurea apus* but see discussion below).

• Alpine meadows, in turf; 3600–4700 m. Qinghai, Sichuan, Xizang.

Saussurea pumila has often been confused with *S. apus*. The two taxa are probably closely related. *Saussurea apus* differs from *S. pumila* by the usually larger size and always densely glandular, distinctly dentate leaves.

87. Saussurea apus Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 490. 1882.

无梗风毛菊 wu geng feng mao ju

Saussurea humilis Ostenfeld; *S. koslowii* C. Winkler.

Herbs 2–6(–10) cm tall, perennial, caespitose, shortly stemmed. Caudex branched, with many sterile and flowering leaf rosettes. Rosette leaves shortly petiolate; leaf blade narrowly elliptic to linear, 2–7 × 0.2–1.5 cm, both surfaces green and densely glandular hairy, abaxially with a prominent straw-colored midvein, base cuneate-attenuate, margin sharply sinuate-dentate, apex acuminate. Stem leaves (if present) similar to rosette leaves. Uppermost stem leaves sometimes tinged purple, subtending capitulum. Capitulum solitary, in center of leaf rosette or terminal on stem, sessile. Involucre campanulate, 1.2–2(–3) cm in diam. Phyllaries in 3–5 rows, blackish purple, villous but glabrescent, apex acute to acuminate; outer phyllaries narrowly ovate, 7–12 × 3–4 mm; middle phyllaries narrowly elliptic, 10–14 × 2–3 mm; inner phyllaries narrowly elliptic-linear, 13–15 × 1–2 mm. Receptacle bristles 1.5–3 mm. Corolla purple, 1.2–1.5 cm, tube 6–8 mm, limb 5–7 mm, lobes 3.5–4.5 mm. Achene cylindric, 2–3.5 mm, glabrous. Pappus dirty white; outer bristles 1–2(–3) mm, scabrid; inner bristles 0.9–1.1(–1.3) cm. Fl. and fr. Jul–Sep.

• Alpine steppes and pastures; 4000–5400 m. Gansu, Qinghai, Xizang.

Some populations of this taxon have purplish leaves subtending the capitulum, thereby showing similarity and possible relationship with *S. bracteata* from SW Xizang, a member of *S.* subg. *Amphilaena*.

88. Saussurea columnaris Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 652. 1937.

柱茎风毛菊 zhu jing feng mao ju

Herbs 4–10 cm tall, perennial, stemless or shortly stemmed. Caudex 1–1.5 cm in diam., usually much branched, with many sterile and flowering leaf rosettes forming large cushions, densely covered with persistent withered leaves. Rosette leaves sessile, linear, 2–7 × 0.1–0.2(–0.3) cm, abaxially grayish white and densely tomentose-sericeous, adaxially green to dark brown, shiny, and glabrous, base enlarged, sheathing, and white villous, margin entire and revolute, apex acute. Uppermost leaves merging into phyllaries. Capitulum solitary, in center of leaf rosette or terminal on stem, sessile. Involucre campanulate, 2–3 cm in diam. Phyllaries in ca. 5 rows, apex acuminate to caudate; outer phyllaries narrowly ovate-triangular, 10–16 × 3–4 mm, basal part blackish purple, apical part greenish or brown, shiny, glabrous, and reflexed; middle and inner phyllaries narrowly ovate-triangular to narrowly elliptic-linear, 11–15 × 2–4 mm, basal part pale yellow, apical part blackish purple, villous, and erect. Receptacle bristles 7–8 mm. Corolla purplish red, 1.3–1.5 cm, tube 7–8 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene dark brown, conic, ca. 3 mm, glabrous. Pappus in 2 rows; outer bristles white, 2–4 mm, scabrid; inner bristles pale brown, 9–10 mm. Fl. and fr. Aug–Oct.

Alpine meadows, rocky mountain slopes; 3000–4700 m. SW Sichuan, SE Xizang (Zayü), NW Yunnan [Bhutan].

The record of *Saussurea columnaris* in Bhutan (see Grierson & Springate, Fl. Bhutan 2(3): 1441. 2001) is now confirmed by more recent collections.

89. Saussurea subulata C. B. Clarke, Compos. Ind. 226. 1876.

钻叶风毛菊 zuan ye feng mao ju

Saussurea setifolia Klatt.

Herbs 1.5–10 cm tall, perennial, caespitose. Caudex much branched, with numerous sterile and flowering leaf rosettes forming dense cushions. Leaves sessile; leaf sheath purple, 1–1.2 cm, apically densely villous at margin; leaf blade subulate-linear, 5–12 × 0.5–1 mm, leathery, both surfaces green and glabrous, margin revolute and entire, apex with a white cartilaginous mucro to 1 mm. Uppermost leaves merging into phyllaries. Capitulum solitary, in center of leaf rosettes, very shortly pedunculate. Involucre campanulate, 5–7 mm in diam. Phyllaries in ca. 4 rows, glabrous, apex acuminate; outer phyllaries ovate, 10–14 × 3–5 mm, basal part brownish or purple, apical part green, leaflike, and subulate, apex with a white cartilaginous mucro; middle phyllaries narrowly ovate-elliptic, 6–9 × 2–3 mm, basal part pale yellow, apical part purple; inner phyllaries narrowly elliptic to linear, 6–9 × 1–2 mm. Receptacle bristles brown, to 1 mm. Corolla purplish red, 1–1.2 cm, tube 5–6 mm, limb 4–5 mm, lobes 2.5–3 mm. Achene cylindric, 1.5–3.5 mm, smooth, glabrous. Pappus brown; outer bristles 2–3 mm, scabrid; inner bristles 7–8(–12) mm. Fl. and fr. Jul–Sep.

Gravelly and moist places near rivers, alpine grasslands and meadows, saline or alkaline sandy soils; 4100–5300 m. Gansu, Qinghai, Xinjiang, Xizang [NW India, Kashmir].

The erroneous record of *Saussurea subulata* from Yunnan by H. Léveillé (Cat. Pl. Yun-Nan, 50. 1916) must be referable to *S. wernerioides*. Although S. W. Liu (Fl. Yunnan. 13: 543–544. 2004) listed *S. subulata* for this province as well, he mentioned that he did not see any specimens from there. Consequently, this species should be excluded from the flora of Yunnan.

90. Saussurea pulviniformis C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 377. 1891.

垫状风毛菊 dian zhuang feng mao ju

Herbs to 3.5 cm tall, perennial, caespitose. Caudex thick, much branched, with many sterile and flowering leaf rosettes forming dense cushions, with fibrously split bark, densely covered with remains of leaves. Rosette leaves petiolate; petiole sheathing at base; leaf blade narrowly elliptic to obovate in outline, 1.5–2.5 × 0.3–0.8 cm, pinnately lobed, both surfaces green and glabrous; lateral lobes 3–6, ovate-elliptic to suborbicular, margin entire or obtusely dentate, apex obtuse; terminal lobe orbicular or oblong-elliptic, larger than lateral ones, apex obtuse to rounded. Capitula solitary, sessile. Involucre campanulate, 5–8 mm in diam. Phyllaries in 5 or 6 rows, straw-colored, glabrous; outer phyllaries ovate, apex subobtuse; inner phyllaries narrowly ovate-elliptic, apex subobtuse or with a short cusp. Receptacle with short bristles. Corolla pale to deep red, 1.2–1.4 cm, tube 5–7 mm, limb 6–7 mm, lobes to 4 mm. Achene brown, obconic, to 5 mm, 4-angled, glabrous. Pappus dirty white to pale brown; outer bristles 1–5 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug.

• Alpine grasslands and stony slopes; 2100–3500 m. NW Xinjiang (Tian Shan).

91. Saussurea wernerioides Schultz Bipontinus ex J. D. Hooker, Fl. Brit. India 3: 367. 1881.

锥叶风毛菊 zhui ye feng mao ju

Herbs 1–3 cm tall, perennial, caespitose, stemless. Caudex stout, fibrous, much branched, with many sterile and flowering leaf rosettes. Rosette leaves petiolate; petiole to 4 mm; leaf blade narrowly obovate or elliptic, 8–15 × 1–4 mm, abaxially grayish white and densely tomentose, adaxially green and glabrous, base cuneate-attenuate, margin with 2 or 3 acute lobes or teeth, apex acuminate. Uppermost leaves merging into phyllaries. Capitula solitary, in center of leaf rosettes, sessile. Involucre campanulate, 0.8–1.5 cm in diam. Phyllaries in 3 or 4 rows, apex acuminate; outer phyllaries narrowly triangular-ovate, 7–15 × 2–5 mm, basal part brownish or purple, glabrous, apical part leaflike and tomentose; middle phyllaries narrowly ovate-elliptic, 6–10 × 1.5–3 mm, purplish brown, apically arachnoid; inner phyllaries linear, 8–10 × 1–1.5 mm, glabrous, apically purple. Receptacle bristles light brown, 1–3 mm. Corolla purplish red, 9–10(–16) mm, tube 4–5(–8) mm, limb 4.5–5(–8) mm, lobes 3–3.5 mm. Achene pale brown, cylindric, 2–3 mm, glabrous. Pappus pale brown; outer bristles 3–5 mm, scabrid; inner bristles 6–7(–10) mm. Fl. and fr. Aug–Oct. $2n = 32$.

Alpine pastures, meadows, and scree slopes; 4200–5400 m. W Sichuan, S Xizang, NW Yunnan (Dêqên) [Bhutan, India (Sikkim), Nepal].

4. Saussurea sect. **Laguranthera** (C. A. Meyer ex Endlicher) Lipschitz, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. S.S.R. 15: 17. 1959.

纤维风毛菊组 xian wei feng mao ju zu

Saussurea [unranked] *Laguranthera* C. A. Meyer ex Endlicher, Gen. Pl. 468. 1838; *Heterotrichum* M. Bieberstein.

Perennial herbs or subshrubs, sometimes densely caespitose, with well-developed stems. Rootstock or caudex distinctly fibrous or with woody bark split in fibers. Stems solitary or several, erect or sometimes procumbent or ascending, usually branched, leafy. Leaves fleshy or herbaceous, undivided to pinnatisect. Capitula usually numerous, rarely solitary or few, solitary or in a corymbiform or paniculiform synflorescence, narrowly campanulate, tubular, or cylindric, usually not more than 1 cm in diam. Phyllaries imbricate, appressed, margin entire, without an apical appendage, apex acute to obtuse and sometimes with a mucro or an erect or reflexed cusp. Receptacle usually with filiform or subulate bristles, rarely without bristles. Corolla glabrous or minutely gland-dotted. Anther tails lanate. Achene glabrous or rarely gland-dotted, with or without a short apical crown. Pappus always in 2 rows; outer bristles usually scabrid; inner bristles plumose.

Sixty-four species: C, E, and SW Asia, E Europe; 49 species (30 endemic) in China.

1a. Leaf blade thick, fleshy; plants usually on saline or alkaline soils.
2a. Flowering stems procumbent to ascending; receptacle usually naked ..... 92. *S. famintziniana*
2b. Flowering stems erect; receptacle with bristles.
3a. Leaf blade bipinnately divided or pinnatisect, secondary segments linear.
4a. Leaf blade glabrous or hispidulous; capitula 6–10 mm in diam.; outer phyllaries glabrous, apex acuminate ..... 93. *S. lacostei*
4b. Leaf blade strigose or arachnoid; capitula 4–5 mm in diam.; outer phyllaries pubescent, apex subobtuse ..... 94. *S. turgaiensis*
3b. Leaf blade pinnately divided, pinnately lobed, lyrate-pinnately lobed, or undivided with a sinuate-dentate margin.
5a. Plants grayish green; achene with a short crown.
6a. Capitula numerous, in a densely congested corymbiform hemispheric synflorescence; stem 4–20(–30) cm tall; leaves to 3 cm wide ..... 97. *S. daurica*
6b. Capitula solitary or few on branch ends; stem 15–50 cm tall; leaves 0.4–1.5 cm wide.
7a. Leaf blade ovate, rhombic, obovate, or elliptic ..... 95. *S. pseudosalsa*
7b. Leaf blade linear or narrowly elliptic ..... 96. *S. aerjingensis*
5b. Plants green; achene without a crown.
8a. Lower stem leaves pinnately cleft or pinnately divided; outer pappus bristles persistent ..... 99. *S. kaschgarica*
8b. Lower stem leaves lyrate-pinnately lobed or lyrate-pinnately divided; outer pappus bristles caducous.

9a. Terminal lobe of leaf blade large, triangular, sagittate, or hastate ..... 98. *S. salsa*
9b. Terminal lobe of leaf blade smaller, narrowly ovate to elliptic ..... 100. *S. maximowiczii*
1b. Leaf blade thin, not fleshy; plants not on saline or alkaline soils.
10a. Leaf sheath and base of petiole adaxially densely white lanate ..... 101. *S. pulvinata*
10b. Leaf sheath and base of petiole adaxially glabrous.
11a. Achene transversely rugose; capitula large, broadly obconic, 1–2 cm in diam.; corolla more than 1.8 cm ..... 102. *S. pulchra*
11b. Achene not transversely rugose; capitula smaller, cylindric to narrowly campanulate, usually less than 1 cm in diam.; corolla usually less than 1.5 cm.
12a. Phyllaries with apex acuminate and with a long conspicuous mucro.
13a. Leaf blade green and glabrous on both surfaces; capitula pendent ..... 105. *S. alberti*
13b. Leaf blade abaxially grayish green, arachnoid or tomentose; capitula erect.
14a. Leaf blade narrowly ovate or narrowly ovate-oblong, pinnately lobed, or undivided and margin sinuate-dentate ..... 106. *S. larionowii*
14b. Leaf blade linear, undivided, margin entire ..... 107. *S. mucronulata*
12b. Phyllaries with apex obtuse, acute, or shortly acuminate or with a short mucro.
15a. Perennial herbs, densely or laxly caespitose, or subshrubs; caudex or rootstock woody, branched; stems several to many.
16a. Leaf blade pinnately lobed, pinnatisect, or bipinnatisect.
17a. Leaf blade clearly bipinnatisect; segments 11–13 pairs ..... 119. *S. deserticola*
17b. Leaf blade pinnatisect or pinnately lobed; segments 2–5 pairs.
18a. Leaf blade segments subulate, linear, or narrowly triangular.
19a. Leaf blade of lower stem leaves sparsely gland-dotted on both surfaces otherwise glabrous; leaf blade segments 2 or 3 pairs, subulate; phyllaries in 7 or 8 rows ..... 117. *S. yabulaiensis*
19b. Leaf blade of lower stem leaves sparsely arachnoid and glandular on both surfaces; leaf blade segments 3–5 pairs, linear or narrowly triangular; phyllaries in 5 or 6 rows ..... 118. *S. mae*
18b. Leaf blade segments ovate, elliptic, or triangular-ovate.
20a. Involucre cylindric, 4–5 mm in diam. ..... 110. *S. kanzanensis*
20b. Involucre campanulate, 7–10 mm in diam.
21a. Leaf blade elliptic, pinnately lobed to pinnatisect ..... 109. *S. blanda*
21b. Leaf blade obovate, pinnately dentate to lyrate-pinnately lobed ..... 115. *S. salemannii*
16b. Leaf blade undivided, margin entire, sinuate-dentate, dentate, or denticulate.
22a. Capitula solitary or 2, at end of stem or branches ..... 116. *S. popovii*
22b. Capitula few, in a corymbiform synflorescence.
23a. Leaf blade grayish white and tomentose on both surfaces.
24a. Leaf margin entire ..... 112. *S. cana*
24b. Leaf margin sinuate-dentate ..... 114. *S. canescens*
23b. Leaf blade abaxially green and subglabrous or grayish white tomentose, adaxially green and subglabrous.
25a. Leaf blade linear or narrowly linear, 5 mm wide or less.
26a. Leaf blade narrowly linear, 1–4 mm wide, margin dentate ..... 113. *S. petrovii*
26b. Leaf blade linear, 2–5 mm wide, margin entire ..... 120. *S. salicifolia*
25b. Leaf blade narrowly elliptic, narrowly ovate, or oblong, more than 10 mm wide.
27a. Phyllaries not with a dark margin, apex acuminate and shortly mucronate; leaf blade abaxially pale or grayish green and glabrous or pubescent ..... 108. *S. coronata*
27b. Phyllaries with a narrow dark margin, apex obtuse to rounded; leaf blade abaxially grayish white and densely arachnoid tomentose ..... 121. *S. lomatolepis*
15b. Perennial herbs, not caespitose, without a woody caudex or rootstock, rhizomatous; stem solitary.
28a. Leaf blade green, concolorous or abaxially paler green, abaxially sparsely strigose or glabrous.
29a. Leaf blade pinnately dentate to pinnatisect.
30a. Leaf blade pinnately lobed or pinnately dentate ..... 135. *S. tianshuiensis*

30b. Leaf blade pinnatisect.
31a. Involucre tubular, 5–8 mm in diam. ..... 133. *S. acroura*
31b. Involucre campanulate to globose, 10–15 mm in diam. ..... 134. *S. megaphylla*
29b. Leaf blade undivided.
32a. Plants shortly stemmed, at most ca. 0.2 m tall ..... 103. *S. ovata*
32b. Plants with tall stems, 0.3–2 m tall.
33a. Plants 1–2 m tall; stem ca. 1 cm in diam. at base ..... 111. *S. elata*
33b. Plants to 1.4 m tall; stem less than 1 cm in diam. at base.
34a. Middle stem leaves triangular-ovate with a truncate base; phyllaries arachnoid lanate, apex reflexed and herbaceous ..... 127. *S. sutchuenensis*
34b. Middle stem leaves elliptic or narrowly elliptic; phyllaries glabrous, sparsely arachnoid, or only apically bearded and surface scarious, apex erect and not herbaceous.
35a. Leaves sessile; leaf blade narrowly ovate-elliptic to narrowly elliptic, 1–2 cm wide ..... 124. *S. zhuxiensis*
35b. Leaves petiolate; leaf blade elliptic, 3–7 cm wide.
36a. Capitula in a diffuse corymbiform-paniculiform synflorescence, long pedunculate ..... 128. *S. dolichopoda*
36b. Capitula clustered at end of branches, in congested corymbiform synflorescence, shortly pedunculate ..... 129. *S. saligna*
28b. Leaf blade abaxially grayish white or grayish green and densely tomentose, arachnoid, or pubescent, adaxially green.
37a. Leaf blade pinnately lobed, pinnatisect, or lyrate.
38a. Leaf blade lyrate-pinnatisect; plants less than 15 cm tall ..... 140. *S. bartholomewii*
38b. Leaf blade not lyrate-pinnatisect; plants more than 15 cm tall.
39a. Stem and petioles winged ..... 136. *S. pteridophylla*
39b. Stem and petioles unwinged.
40a. Stem usually with short sterile axillary shoots ..... 132. *S. elegans*
40b. Stem without short sterile axillary shoots.
41a. Leaf blade bipinnately divided ..... 139. *S. chrysanthemoides*
41b. Leaf blade pinnately lobed to pinnatisect.
42a. Middle stem leaves with 2 or 3 pairs of lobes, abaxially white and densely tomentose; involucre obconic, 6–8 mm in diam. ..... 137. *S. compta*
42b. Middle stem leaves with 4–14 pairs of lobes, abaxially grayish green and thinly arachnoid; involucre tubular, ca. 5 mm in diam. ..... 138. *S. variiloba*
37b. Leaf blade undivided and margin entire or dentate.
43a. Leaf blade ovate, ovate-elliptic, elliptic, or oblong, more than 3 cm wide.
44a. Leaves shortly petiolate (to 1 cm); leaf blade broadly ovate, margin sharply serrate; synflorescence supported by uppermost stem leaves ..... 104. *S. licentiana*
44b. Leaves long petiolate (2.5–5 cm); leaf blade ovate, elliptic, or narrowly ovate-elliptic, margin denticulate or sinuate-dentate; synflorescence not supported by uppermost stem leaves.
45a. Petiole unwinged; involucre narrowly cylindric, (3–)5–8 mm in diam.; phyllaries straw-colored, subglabrous, without a dark mucro ..... 130. *S. conyzoides*
45b. Petiole winged; involucre narrowly campanulate, 8–10 mm in diam.; phyllaries whitish, arachnoid, with a dark mucro ..... 131. *S. flexuosa*
43b. Leaf blade narrowly oblong, narrowly ovate-elliptic, narrowly elliptic, or linear, less than 3 cm wide.
46a. Leaf blade linear, less than 1 cm wide ..... 126. *S. integrifolia*

46b. Leaf blade narrowly ovate to narrowly elliptic, 1.5–3 cm wide.
47a. Stem winged; leaf base decurrent, margin usually entire ..... 125. *S. virgata*
47b. Stem unwinged; leaf base not decurrent, margin sinuate-dentate.
48a. Plants 60–100 cm tall; middle stem leaves petiolate; capitula very numerous, in an ample paniculiform-corymbiform synflorescence ..... 122. *S. polycephala*
48b. Plants 30–75 cm tall; middle stem leaves sessile; capitula 10–20, in a compact corymbiform synflorescence ..... 123. *S. chinensis*

92. Saussurea famintziniana Krasnov, Bot. Zap. 2(1): 71. 1887.

中新风毛菊 zhong xin feng mao ju

Saussurea colorata C. Winkler.

Herbs 2–12 cm tall, perennial, densely caespitose. Rootstock stout, with fibrously split bark. Caudex stout, much branched, densely covered with remains of petioles, with many sterile and flowering leaf rosettes. Stem solitary, prostrate or ascending, simple or apically branched. Rosette and lower stem leaves petiolate; petiole 0.5–2.5 cm; leaf blade narrowly ovate, 2–4(–10) × 0.3–0.5(–1.2) cm, slightly fleshy, pinnately lobed or subentire, scabrid, arachnoid or subglabrous, margin coarsely dentate. Upper stem leaves sessile, base weakly amplexicaul. Capitula 3–7, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–12 mm in diam. Phyllaries in 4 or 5 rows, arachnoid to glabrescent, apex obtuse; outer phyllaries ovate, 4–5 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 5–8 × 1.5–2.5 mm; inner phyllaries narrowly elliptic-linear, 8–11 × 1–1.5 mm. Receptacle with few bristles or naked. Corolla pale purple, 1.3–1.4 cm, gland-dotted, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene ca. 4 mm, smooth, glabrous, apex with a short crown. Pappus dirty white; outer bristles 3–6 mm, plumose; inner bristles 1–1.1 cm. Fl. and fr. Aug.

Saline sands, stony slopes, moraines, alpine steppes; ca. 3700[–4200] m. W Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

No specimens of *Saussurea famintziniana* from China were seen by the present authors. The description here is based on specimens from outside the Flora area and on the treatments by Lipschitz (Fl. URSS 27: 510. 1962) and G. M. Shen (Fl. Xinjiang. 5: 278. 1999).

93. Saussurea lacostei Danguy, J. Bot. (Morot) 21: 52. 1908.

高盐地风毛菊 gao yan di feng mao ju

Herbs 10–25 cm tall, perennial. Caudex stout, densely covered with remains of old leaves. Stems solitary or several, erect, branched from middle. Rosette leaves petiolate; petiole 2–4(–7.5) cm; leaf blade narrowly elliptic, 5–8 × 1–3 cm, bipinnately divided, both surfaces green and sparsely hispidulous; primary lobes 5–12 pairs, narrowly ovate to narrowly elliptic; secondary lobes 1–4 pairs, margin dentate, teeth and apex mucronate. Stem leaves similar to basal leaves, gradually smaller upward on stem. Capitula 1–6, on stem and branch ends, solitary or in a corymbiform synflorescence; peduncle 1–5 mm. Involucre obconic to narrowly campanulate, 6–10 mm in diam. Phyllaries in 4 or 5 rows, greenish or straw-colored, purplish in apical part, glabrous; outer phyllaries ovate, 4–5 × 2–3 mm, apex acuminate; middle phyllaries narrowly elliptic, 5–10 × 2–2.5 mm, apex acute; inner phyllaries narrowly elliptic to linear, 10–12 × 1.5–2 mm, apex acute. Receptacle bristles subulate, 6–8 mm. Corolla pale purple, 1.2–2.1(–2.4) cm, tube 5.5–10(–16) mm, limb 6.5–8 mm, lobes 2.5–4 mm. Achene brown, oblong, ca. 5 mm, glabrous. Pappus dirty white; outer bristles 1–3 mm; inner bristles 0.9–1.3 cm. Fl. and fr. Jul–Sep.

• Rocky dry mountain slopes, alpine saline soils; 2600–3000 m. W Xinjiang.

94. Saussurea turgaiensis B. Fedtschenko, Repert. Spec. Nov. Regni Veg. 8: 497. 1910.

太加风毛菊 tai jia feng mao ju

Herbs 20–50 cm tall, perennial, caespitose. Caudex stout, branched, with many sterile and flowering leaf rosettes. Stems several, erect, branched from middle or above. Rosette and lower stem leaves shortly petiolate; leaf blade linear-oblong, 3–10 × 0.5–1.5(–2) cm, pinnately divided or bipinnately divided, both surfaces green to grayish green, scabrid, and shortly strigose or arachnoid; lobes ovate to linear, apex acute. Middle and upper stem leaves gradually smaller upward on stem; uppermost leaves linear, undivided, margin dentate to almost entire. Capitula 2–8, on stem and branch ends, in a corymbiform synflorescence, shortly pedunculate. Involucre cylindric or narrowly campanulate, 4–5 mm in diam. Phyllaries in ca. 4 rows, often reddish, pubescent or glabrescent, apex subobtuse; outer phyllaries ovate, 3–5 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 5–8 × 1.5–2.5 mm; inner phyllaries linear-oblong, 8–10 × 1–2 mm. Receptacle with subulate bristles. Corolla reddish purple or pink, ca. 1.2 cm, tube ca. 7 mm, limb ca. 5 mm. Achene light brown, cylindric, ca. 2.5 mm, smooth. Pappus white or light brown; outer bristles to 5 mm; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep.

Saline meadows; 200–700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan].

95. Saussurea pseudosalsa Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 79. 1954.

假盐地风毛菊 jia yan di feng mao ju

Herbs or subshrubs, 10–60 cm tall, perennial. Rootstock apically branched. Stems solitary or several, erect or ascending, simple or much branched. Lower stem leaves petiolate; petiole to 1.5 cm; leaf blade oblong, elliptic, rhombic, or narrowly ovate, 0.4–3.5(–10) × 0.2–1.2(–4) cm, fleshy, both surfaces grayish green and scabrid, base cuneate, margin dentate, denticulate, or entire, apex acute. Middle and upper stem leaves sessile, narrowly obovate, elliptic, or linear-oblong, margin en-

tire. Capitula 1–5, on stem and branch ends, solitary or in a corymbiform synflorescence, shortly pedunculate. Involucre obconic, 6–8 mm in diam. Phyllaries in 5 or 6 rows, straw-colored, purple in apical part, villous, apex acuminate; outer phyllaries ovate-elliptic, 2–3 × 1.5–2 mm; middle phyllaries narrowly ovate-elliptic, 3–7 × 1.5–2 mm; inner phyllaries narrowly elliptic to linear, 7–8 × 1–1.5 mm. Receptacle bristles subulate, 7–8 mm. Corolla purplish red, 1.3–1.5 cm, tube 7–8 mm, limb 7–8 mm. Achene ca. 4 mm, apex with a short crown. Pappus straw-colored; outer bristles ca. 3 mm; inner bristles 9–10 mm. Fl. and fr. Jun–Aug.

Saline soils and gravelly shores near rivers and lakes; 2700–2800 m. NW Gansu, Nei Mongol, Qinghai, Xinjiang [Mongolia].

96. Saussurea aerjingensis K. M. Shen, Acta Phytotax. Sin. 36: 275. 1998.

阿尔金风毛菊 a er jin feng mao ju

Herbs 8–40 cm tall, perennial. Rootstock stout, apically branched, densely covered with remains of leaf sheaths. Stems solitary or 2 or 3, ca. 5 mm in diam., erect, simple or branched from base. Leaves petiolate; petiole to 2 cm; leaf blade narrowly elliptic to linear, 5–10 × 0.2–0.8 cm, thick, fleshy, both surfaces green and gland-dotted but otherwise glabrous or sparsely pubescent, base attenuate, margin entire or remotely denticulate, apex acute to acuminate. Capitula 1–4, at end of stem or branches and sometimes also axillary, solitary or in a congested corymbiform or racemiform synflorescence, subsessile. Involucre campanulate, 8–10 mm in diam. Phyllaries in ca. 4 rows, pilose, gland-dotted, apex acute; outer phyllaries ovate, 6–7 × 4–5 mm; middle phyllaries narrowly elliptic, 7–10 × 1.5–4 mm; inner phyllaries linear, 10–11 × 1–1.5 mm. Receptacle bristles to 2 mm. Corolla purple, 0.9–1.1 cm, gland-dotted, tube 4–6 mm, limb 4–5 mm. Achene obconic, ca. 3 mm, apex with a denticulate crown. Pappus brownish to reddish; outer bristles 2–3 mm; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

• Salt marshes; 1900–3000 m. SE Xinjiang (Ruoqiang).

No specimens of *Saussurea aerjingensis* were seen by the present authors. The description here is based on the original description and on the treatment by G. M. Shen (Fl. Xinjiang. 5: 294–296, 478–479. 1999).

97. Saussurea daurica Adams, Nouv. Mém. Soc. Imp. Naturalistes Moscou 3: 251. 1834.

达乌里风毛菊 da wu li feng mao ju

Saussurea crassifolia Candolle var. *papposa* (Turczaninow ex Candolle) Ledebour; *S. papposa* Turczaninow ex Candolle; *S. salsa* (Pallas) Sprengel var. *papposa* (Turczaninow ex Candolle) Ledebour.

Herbs 4–20(–30) cm tall, perennial. Taproot slender, 2–4 mm in diam. Stems solitary or several, ascending, erect, or sometimes procumbent, branched from base or apically. Basal leaves petiolate; petiole 0.5–3 cm; leaf blade narrowly ovate to narrowly elliptic, 2–10 × 0.5–3 cm, fleshy, both surfaces grayish green, gland-dotted, and scabridulous but glabrescent, base cuneate, margin entire, sinuate-dentate, runcinate-pinnately lobed, or pinnately parted, apex acute to subobtuse. Lower stem leaves similar to basal leaves but smaller, margin sinuate-dentate or entire. Upper stem leaves sessile, narrowly elliptic to broadly linear. Capitula usually numerous, in a globose condensed corymbiform synflorescence. Involucre cylindric, (3–)5–6 mm in diam. Phyllaries in 6 or 7 rows, purplish red in apical part, subglabrous, margin pubescent, apex acute to obtuse; outer phyllaries ovate to elliptic, 2–4 × 1–1.5 mm; middle phyllaries narrowly elliptic, 4–9 × 1–1.5 mm; inner phyllaries linear, 9–11 × ca. 1 mm. Corolla pink, 1.3–1.8 cm, tube 8–11 mm, limb 6–7 mm, lobes 3–3.5 mm. Achene cylindric, 2–3 mm, ribbed, glabrous, apex with a short crown. Pappus white; outer bristles 1–3 mm, scabrid; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Sep. $2n = 28$*.

Salt meadows and marshes, alkaline moist soils near rivers and lakes, riverbeds; 1000–3600 m. W Gansu, Heilongjiang, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia, Russia].

98. Saussurea salsa (Pallas) Sprengel, Syst. Veg. 3: 381. 1826.

盐地风毛菊 yan di feng mao ju

Serratula salsa Pallas, Reise Russ. Reich. 3: 607. 1776; *Heterotrichum salsum* (Pallas) M. Bieberstein; *S. crassifolia* Candolle.

Herbs 15–50 cm tall, perennial. Stems solitary or several, branched above middle. Basal and lower stem leaves petiolate; leaf blade ovate to broadly elliptic, 5–30 × 2–6(–12) cm, fleshy, lyrate-pinnately parted or pinnately lobed, both surfaces green, abaxially gland-dotted, adaxially sparsely strigose or glabrous; lateral lobes elliptic to triangular, margin entire or subentire; terminal lobe triangular, sagittate, or hastate, large, margin sinuate-dentate or entire. Middle and upper stem leaves sessile, oblong, linear-oblong, or narrowly ovate, margin entire or sparsely dentate. Capitula numerous, in a corymbiform synflorescence, pedunculate. Involucre narrowly cylindric, 4–5 mm in diam. Phyllaries in 5–7 rows, arachnoid, glabrescent, apex obtuse to subacute; outer phyllaries ovate, 2–3 × 2–2.5 mm; middle phyllaries narrowly ovate, 3–10 × 1.5–2 mm; inner phyllaries narrowly ovate-elliptic, 10–12 × 1–2 mm. Receptacle bristles subulate, 4–4.5 mm. Corolla pale purple, (1–)1.3–1.6 cm, tube 7–9 mm, limb 6–7 mm. Achene reddish brown, cylindric, 2.5–3 mm, glabrous. Pappus white; outer bristles ca. 3 mm; inner bristles (0.9–)1.3–1.5 cm. Fl. and fr. Jul–Sep. $2n = 28$.

Saline grasslands, alkaline steppes and meadows; 100–3300 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; SW Asia, E Europe].

The basionym, *Serratula salsa*, was validated by Pallas in the third volume of his *Reise*. In the text, he gave a reference to the short description of a *Serratula* (without specific epithet) from the second volume (Reise Russ. Reich. 2: 444. 1773); and in the unpaginated "Zweytes Register über die lateinischen Anhänge aller drey Theile" [second index of the Latin appendices of all three volumes] *S. salsa* was given as a name belonging to the description of a *"Planta salsa ambigui generis"* previously published in the first volume (Reise Russ. Reich. 1: 502. 1771).

99. Saussurea kaschgarica Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 54. 1869.

喀什风毛菊 ka shi feng mao ju

Herbs 14–25 cm tall, perennial. Caudex stout, apically branched, covered with dark brown remains of leaf sheaths. Stems several, ascending to erect, few branched. Basal and lower stem leaves petiolate; leaf blade narrowly obovate-elliptic, to 10 × 2.5 cm, pinnately lobed or pinnately divided, scabrid, hispid; lobe margins dentate, apex acute. Middle and upper stem leaves similar to lower leaves, gradually smaller upward on stem, shortly petiolate to subsessile; leaf blade small, not decurrent. Capitula in a densely corymbiform synflorescence. Involucre 6–10 mm in diam. Phyllaries in ca. 4 rows, apically purple and densely pubescent to glabrescent; outer phyllaries ovate, 3–4 mm, apex subobtuse; middle and inner phyllaries narrowly ovate-elliptic to linear, 4–12 mm, apex subacute. Receptacle with subulate bristles. Corolla pale purplish red, 1.4–1.6 cm, tube 6–8 mm, limb 7–8 mm. Achene pale brown, cylindric, 5–6 mm, glabrous. Pappus dirty white; outer bristles 3–5 mm, rigid, serrulate, persistent; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug.

Gravelly riverbanks in high mountain valleys, saline soils; ca. 3200 m. W Xinjiang (Wuqia) [Kyrgyzstan].

No specimens of *Saussurea kaschgarica* were seen by the present authors, and the description here is based on the treatments by Lipschitz (Fl. URSS 27: 509. 1962) and G. M. Shen (Fl. Xinjiang. 5: 280. 1999).

100. Saussurea maximowiczii Herder, Bull. Soc. Imp. Naturalistes Moscou 41(3): 14. 1868.

羽叶风毛菊 yu ye feng mao ju

Saussurea hakonensis Franchet & Savatier; *S. maximowiczii* f. *serrata* (Nakai) Kitamura; *S. maximowiczii* var. *serrata* Nakai; *S. maximowiczii* var. *triceps* (H. Léveillé & Vaniot) Kitamura; *S. triceps* H. Léveillé & Vaniot.

Herbs 40–100 cm tall, perennial. Rhizome stout, with many fibrous roots. Stem solitary, erect, apically branched, unwinged. Basal and lower stem leaves petiolate; petiole 5–13(–20) cm; leaf blade oblong to obovate in outline, (10–)20–50(–70) × (3–)7–10(–15) cm, thick, pinnately divided or pinnately lobed, both surfaces green, scabrid, and hispid; lateral lobes 4–8 pairs, narrowly obovate-elliptic to oblong, margin serrate, dentate, or entire, apex acuminate; terminal lobe narrowly ovate to elliptic. Middle stem leaves gradually smaller upward on stem. Upper stem leaves sessile, narrowly elliptic to linear, undivided. Capitula numerous, in a corymbiform-paniculiform synflorescence. Involucre cylindric to narrowly campanulate, 6–7 mm in diam. Phyllaries in 4 or 5 rows, sparsely arachnoid; outer phyllaries ovate, 3–4 × ca. 2 mm, apex acuminate; middle phyllaries oblong, 4–9 × 1.5–2 mm, apex subobtuse and mucronate; inner phyllaries narrowly elliptic, 9–11 × 1–1.5 mm, apex obtuse. Receptacle bristles to 7 mm. Corolla purple, 1.1–1.5 cm, tube 6–9 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene yellowish brown to black, obconic, 5–7 mm, obtusely ribbed, glabrous. Pappus white; outer bristles 2–5 mm; inner bristles ca. 1 cm. Fl. and fr. Aug–Oct. $2n = 26$.

Forest margins, thickets, meadows; near sea level to 1000 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia (Far East)].

101. Saussurea pulvinata Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 493. 1882.

甘青风毛菊 gan qing feng mao ju

Saussurea ruoqiangensis K. M. Shen.

Herbs 8–20 cm tall, perennial, densely caespitose. Caudex stout, much branched, with many leaf rosettes and flowering shoots, densely covered with remains of leaf sheaths, forming hard cushions. Stem solitary, 2–3 mm in diam., erect, simple. Rosette leaves petiolate; petiole to 2 cm, base and sheath adaxially densely white lanate; leaf blade narrowly elliptic to linear, 2–6 × 0.3–0.5 cm, both surfaces green, abaxially villous, adaxially sparsely villous but glabrescent, base cuneate-attenuate, margin revolute, entire, or crenulate, apex acute or obtuse. Stem leaves similar to rosette leaves, sessile, gradually smaller upward on stem. Capitula 5–12, in a densely congested corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 8–10 mm in diam. Phyllaries in 4 or 5 rows, straw-colored, apically densely villous, apex acuminate to acute; outer phyllaries narrowly triangular-ovate, 5–7 × 3–4 mm, apex acuminate; middle and inner phyllaries narrowly ovate-elliptic to linear, 7–10 × 1.5–3 mm, apex acute. Receptacle bristles ca. 1 mm. Corolla pale red, 0.9–1.3 cm, tube 4–7 mm, limb 4–6 mm, lobes 2.5–3 mm. Achene brown, 3–5 mm, transversely rugose. Outer pappus bristles white, 2–3 mm, barbellate; inner bristles grayish brown, 8–9 mm. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine scree slopes, rocky dry mountain slopes; 2900–4300 m. Gansu, Qinghai, SE Xinjiang (Ruoqiang).

102. Saussurea pulchra Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 19: 389. 1959.

美丽风毛菊 mei li feng mao ju

Hemisteptia pulchra (Lipschitz) Soják.

Herbs 8–27(–60) cm tall, perennial. Caudex stout, apically branched, densely covered with brown remains of old leaves. Stems 1–4, erect, simple or branched from middle. Rosette and lower stem leaves sessile, linear, 1.5–5 × 0.1–0.4 cm, abaxially grayish white and densely tomentose, adaxially glaucous green and glabrous, margin revolute and entire or with a few obtuse teeth, apex acute to obtuse. Middle and upper stem leaves linear, 5–10 mm. Capitula solitary or 2 or 3, on branch ends, in a corymbiform synflorescence, pedunculate. Involucre turbinate, 1–2 cm in diam. Phyllaries in 4–6 rows, purple, sparsely villous, apex acuminate and with a cartilaginous mucro; outer phyllaries ovate-elliptic, 4–6 × 1.5–2 mm; middle phyllaries narrowly ovate-elliptic to oblong, 6–15 × 1.5–2 mm; inner phyllaries linear-elliptic to linear, 15–19 × 1.8–2 mm. Receptacle bristles subulate, 5–6 mm. Corolla rose-purple, 1.8–2.5 cm, tube 1–1.2 cm, limb 1–1.2 cm, lobes 4–5 mm. Achene blackish green, cylindric, 5–5.5 mm, 4-angled, transversely rugose, gland-dotted, apex with a short crown. Pappus white; outer bristles ca. 3 mm, scabrid; inner bristles 1.5–1.6 cm. Fl. and fr. Aug–Oct.

• Sandy river valleys; 1900–3100 m. Gansu, Qinghai.

When Lipschitz published the name *Saussurea pulchra*, he intended it to be a replacement name for his earlier *"S. bella"* (Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 83. 1954), which he evidently thought was illegitimate as a later homonym of *S. bella* Y.

Ling (1949). However, because Lipschitz published *"Hemisteptia bella"* and *"S. bella"* simultaneously as alternative names, neither of them was validly published (*Vienna Code*, Art. 34.2). Lipschitz therefore inadvertently published *S. pulchra* as the name of a new species by reference to the Latin description of *"H. bella"* and *"S. bella."*

103. Saussurea ovata Bentham in G. Henderson & Hume, Lahore to Yarkand, 325. 1873.

卵叶风毛菊 luan ye feng mao ju

Saussurea pseudocolorata Danguy.

Herbs 1.5–15 cm tall, perennial. Caudex slender, 2–3 mm in diam., simple or few branched. Stem solitary, erect or ascending, simple. Basal and lower stem leaves petiolate; petiole 1–5 cm, winged; leaf blade ovate, elliptic, obovate, or suborbicular, 1.5–6 × 1.2–4 cm, both surfaces green, glabrescent or arachnoid villous, and glandular hairy at margin, margin sinuate-dentate, apex rounded to acuminate and mucronate. Upper stem leaves similar to lower ones, gradually smaller upward on stem; uppermost stem leaf narrowly elliptic to linear, subtending synflorescence. Capitula 3–15(–25), in a densely condensed globose or lax corymbiform synflorescence. Involucre campanulate, 8–9 mm in diam. Phyllaries in ca. 4 rows, purple and villous in apical part, apex subacute; outer phyllaries broadly triangular-ovate, 2–3 × ca. 2 mm; middle and inner phyllaries narrowly ovate-elliptic, 3–10 × ca. 2 mm. Receptacle without bristles. Corolla purplish red, 1.2–1.3 cm, glabrous, tube 6–7 mm, limb ca. 6 mm, lobes ca. 3 mm. Achene brown, 2–2.5 mm, ribbed, glabrous. Pappus white; outer bristles 4–5 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Aug.

Alpine meadows, gravelly mountain slopes, moist riverbeds, sand dunes; 2400–4300 m. SW Xinjiang [Tajikistan].

104. Saussurea licentiana Handel-Mazzetti, Oesterr. Bot. Z. 85: 222. 1936.

川陕风毛菊 chuan shan feng mao ju

Saussurea salicifolia (Linnaeus) Candolle var. *shensiensis* Y. Ling.

Herbs 40–80 cm tall, perennial. Rhizomes procumbent, with many black fibrous roots. Stem solitary, erect, simple or apically few branched. Basal and lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole to 1 cm; leaf blade ovate, obovate, narrowly ovate-elliptic, or elliptic, 4–13 × 2.5–8 cm, abaxially grayish white and densely tomentose, adaxially green and sparsely strigose, base cuneate, margin serrate, apex acuminate to caudate. Upper stem leaves similar to middle stem leaves but gradually smaller upward on stem, subtending synflorescence. Capitula few to numerous, in a paniculiform or corymbiform synflorescence, pedunculate. Involucre narrowly campanulate to cylindric, 4–5 mm in diam. Phyllaries in 4 or 5 rows, straw-colored or brown, glabrous; outer phyllaries broadly ovate, 1.5–3 × 1–1.5 mm, apex acute; middle phyllaries elliptic, 3–6 × 1–1.5 mm, apex obtuse; inner phyllaries elliptic to broadly linear, 6–8 × 1–1.5 mm, apex obtuse. Corolla purple, 7–8 mm, tube 4–5 mm, limb 2.5–3 mm, lobes 1.5–2 mm. Achene pale brown, ca. 4 mm, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles 6–8 mm. Fl. and fr. Aug–Sep.

• Grassy slopes, montane forests; 1900–3300 m. Gansu, Hubei, Shaanxi, Sichuan.

105. Saussurea alberti Regel & C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 298. 1880.

新疆风毛菊 xin jiang feng mao ju

Herbs, perennial. Stem apically branched, slightly winged. Basal leaves petiolate; leaf blade narrowly ovate-elliptic, to 7 × 2–3 cm, both surfaces green and glabrous, base cuneate, margin sinuate-dentate or runcinate and scabrous, apex acute. Stem leaves narrower than basal leaves, base decurrent to stem wing, margin subentire. Capitula numerous, at ends of flexuous or apically nodding branches, in an ample corymbiform synflorescence, pedunculate, with 19–20 florets. Involucre obconic, ca. 1 cm in diam. Phyllaries in 5 or 6 rows, arachnoid, glabrescent, apex acute and mucronate; outer phyllaries ovate; middle phyllaries narrowly ovate-oblong; inner phyllaries sublinear. Receptacle bristles to 8 mm. Corolla rose-pink, ca. 1.3 cm, tube 6–7 mm, limb 6–7 mm. Achene cylindric to oblong, ribbed, apex with a short crown. Pappus in 2 rows; outer bristles short, scabrid; inner bristles ca. 4 × as long as outer ones. Fl. and fr. Aug–Sep.

Scree slopes; 2700–2900 m. Xinjiang (Tian Shan) [Kyrgyzstan].

No specimens of *Saussurea alberti* from China were seen by the present authors. This description is based on an image of the cultivated type specimen (LE), on the original description, and on the account by Lipschitz (Fl. URSS 27: 426. 1962).

106. Saussurea larionowii C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 376. 1891.

天山风毛菊 tian shan feng mao ju

Saussurea takhtadganii Lipschitz.

Herbs 10–40(–60) cm tall, perennial. Caudex fibrous, branched, with several sterile and flowering leaf rosettes. Stems solitary or several, erect, simple or branched, slightly winged. Lower stem leaves petiolate; petiole 2–3(–5) cm; leaf blade narrowly ovate, ovate-oblong, or narrowly ovate-elliptic, 5–10 × (0.4–)1.5–4.5 cm, undivided, pinnately cleft, or pinnately lobed, abaxially grayish white and arachnoid tomentose, adaxially green, scabrous, and spinulose-strigose, margin sinuate or dentate. Middle and upper stem leaves sessile, gradually smaller upward on stem, base decurrent. Capitula in a densely congested corymbiform synflorescence, erect, shortly pedunculate, with 10–13 florets. Involucre narrowly cylindric, 4–9 mm in diam. Phyllaries in 4 or 5 rows, apically reddish, arachnoid, glabrescent, with a conspicuous midvein, apex acuminate and with a straight or weakly curved cusp; outer phyllaries ovate; inner phyllaries narrowly ovate-oblong. Receptacle bristles subulate, to 8 mm. Corolla rose-pink, 1.4–1.5 cm, sometimes sparsely glandular, tube 7–8 mm, limb 7–8 mm. Achene ca. 3 mm, glabrous, apex with a short crown. Pappus white or basally pale brown; outer bristles 2–4 mm; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Oct.

Forests, scree slopes, alpine and subalpine meadows; 1800–3800 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan].

Saussurea larionowii may be conspecific with the insufficiently known *S. alberti*, which has been described from a cultivated plant. Further studies in the field are needed to clarify the taxonomic status of these species.

107. Saussurea mucronulata Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 80. 1954.

小尖风毛菊 xiao jian feng mao ju

Herbs 8–30 cm tall, perennial, densely caespitose. Rootstock and caudex strongly fibrous, branched, with many sterile and flowering leaf rosettes. Stems solitary or several, erect or ascending, simple or apically few branched. Rosette and lower stem leaves narrowly elliptic-linear, 3–5 × 0.2–0.5 cm, both surfaces grayish white and with a prominent midvein, abaxially densely arachnoid tomentose, adaxially sparsely arachnoid tomentose, margin entire or denticulate and subrevolute, apex acute. Middle and upper stem leaves sessile, gradually smaller upward on stem, linear, 10–25 × 1–3 mm, base subamplexicaul, apex acuminate. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate to cylindric, 6–7 mm in diam. Phyllaries in 4 or 5 rows, blackish purple, apex acuminate, with a long ± reflexed cusp; outer phyllaries ovate, 3–5 × 1.5–2 mm; inner phyllaries linear-oblong, 5–8 × 1–1.5 mm. Receptacle with bristles. Corolla red, 1.3–1.5 cm, tube 5–6 mm, limb 8–10 mm. Achene brown, 2.5–3 mm, glabrous, apex with a short rim. Pappus dirty white to pale brown; outer bristles 2–3 mm, scabrid; inner bristles 1–1.2 cm. Fl. and fr. Aug.

• Scree slopes; 2100–3000 m. Xinjiang (Tian Shan).

108. Saussurea coronata Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 3: 107. 1845.

副冠风毛菊 fu guan feng mao ju

Saussurea dshungarica Iljin.

Herbs or subshrubs, 25–40 cm, perennial. Roots fibrously branched. Caudex much branched, with many flowering shoots. Stems erect or ascending, simple or apically branched, distinctly woody at base. Lower and middle stem leaves petiolate; leaf blade oblong to narrowly ovate-oblong, 5–10 × 1–2.5 cm, leathery, abaxially green or grayish, pubescent to almost glabrous, and gland-dotted, adaxially green, margin entire or crenate, apex acute to acuminate. Upper stem leaves gradually smaller upward on stem, narrowly ovate-elliptic, margin almost entire. Capitula [3–]7–10, in a ± condensed corymbiform synflorescence. Involucre narrowly campanulate, 7–10 mm in diam. Phyllaries in ca. 5 rows, green, apically purple, arachnoid or almost glabrous, gland-dotted, apex acuminate with a straight, not recurved cusp; outer phyllaries ovate, 2–3 × 1.5–2 mm; middle phyllaries 3–8 × 1–2 mm; inner phyllaries 8–10 × 1–1.5 mm. Receptacle bristles subulate, to 8 mm. Corolla purplish red, 1.2–1.6 cm, gland-dotted, tube 7–9 mm, limb 5–7 mm, lobes 2.5–3 mm. Achene cylindric, to 5 mm, with a short crown. Pappus white; outer bristles 1–5 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug.

Rocky mountain slopes; 1400–2100 m. NW Xinjiang (Huocheng) [Kazakhstan, Mongolia].

109. Saussurea blanda Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg 10: 354. 1842.

绿风毛菊 lü feng mao ju

Saussurea konuroba Saposhnikow.

Herbs or subshrubs, 10–30 cm tall, perennial, caespitose. Roots fibrous. Caudex much branched, with several leaf rosettes and flowering shoots. Stem erect or ascending, simple or apically branched, woody at base. Lower and middle stem leaves petiolate; petiole ca. 2 cm; leaf blade narrowly obovate to oblong, 3–7 × 2–2.5 cm, pinnately lobed to pinnatisect, both surfaces green and gland-dotted; lateral lobes 2–5 pairs, triangular-ovate, margin entire or dentate, apex acute to obtuse. Upper stem leaves sessile, gradually smaller upward on stem, pinnately lobed or pinnatisect. Capitula 1–5, solitary or in a corymbiform or paniculiform synflorescence, pedunculate. Involucre campanulate, 7–10 mm in diam. Phyllaries in ca. 5 rows, green or purple, glabrous or sparsely arachnoid, gland-dotted, apex acute; outer phyllaries ovate, 5–6 × 1.5–2.5 mm; middle phyllaries elliptic, 6–9 × ca. 2 mm; inner phyllaries linear-oblong, 9–10 × 1–1.5 mm. Receptacle bristles subulate, 5–6 mm. Corolla purple, 1.2–1.4 cm, gland-dotted, tube 5–6 mm, limb 7–8 mm, lobes ca. 3 mm. Achene ca. 4 mm, ribbed, glabrous, apex with a short crown. Pappus white; outer bristles 3–5 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug.

Rocky mountain slopes; ca. 1600 m. N Xinjiang (Toli) [Kazakhstan].

110. Saussurea kanzanensis Kitamura, Acta Phytotax. Geobot. 8: 75. 1939.

台湾风毛菊 tai wan feng mao ju

Herbs 6–14 cm tall, perennial. Stem solitary, ca. 1 mm in diam., slender, erect, simple, woody at base. Basal leaves withered at anthesis. Stem leaves petiolate; petiole 1–2.5 cm, narrowly winged, sometimes decurrent on stem; leaf blade narrowly elliptic to oblong, 2–4.5(–10) × 1–2(–4) cm, pinnately lobed to pinnatisect, both surfaces green and pubescent, base truncate to cuneate; lateral lobes 3–5 pairs, triangular to oblong, apex acute. Upper stem leaves smaller; uppermost stem leaves linear, subtending capitula. Capitula 1–3, solitary or in a corymbiform synflorescence, pedunculate. Involucre narrowly cylindric, 4–5 mm in diam. Phyllaries in ca. 4 rows, margin arachnoid, apex acuminate; outer phyllaries ovate; middle phyllaries oblong; inner phyllaries linear, ca. 8 mm. Receptacle bristles few, subulate, 5–6 mm. Corolla red, 9–10 mm, tube 4–5 mm, limb 4–5 mm. Achene brownish purple, cylindric, ca. 3.5 mm, glabrous. Pappus white, basally pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 7.5 mm. Fl. Aug–Sep, fr. Oct.

• Sunny rocky slopes, semishaded *Abies* forests; ca. 3500 m. Taiwan.

111. Saussurea elata Ledebour, Icon. Pl. 1: 20. 1829.

高风毛菊 gao feng mao ju

Herbs 1–2 m tall, perennial. Stem solitary, ca. 1 cm in diam., erect, branched from middle or apically, hollow. Basal

leaves usually withered at anthesis, petiolate. Middle stem leaves sessile or subsessile; leaf blade oblong-elliptic to narrowly ovate-elliptic, 6–15 × 1–4 cm, both surfaces green and strigose, abaxially glandular, margin entire or irregularly dentate, apex acute to acuminate. Upper stem leaves narrowly ovate-elliptic to linear. Capitula numerous, in a long and spreading corymbiform-paniculiform synflorescence. Involucre cylindric to narrowly campanulate, 5–7 mm in diam. Phyllaries greenish, colored in apical part, pubescent, apex subobtuse to obtuse; outer phyllaries ovate to ovate-oblong; inner phyllaries linear-oblong. Receptacle bristles ca. 3 mm. Corolla bluish purple, ca. 1.4 cm, tube ca. 7 mm, limb ca. 7 mm. Achene smooth, 7–8 mm. Pappus dirty white; outer bristles ca. 3 mm; inner bristles 8–10 mm. Fl. and fr. Jun–Aug.

Steppe meadows, thickets. N Xinjiang (Tacheng) [Kazakhstan].

No specimens of *Saussurea elata* from China have been seen by the present authors. The description here is based on plants from outside the Flora area, as well as on the treatments by Lipschitz (Fl. URSS 27: 422. 1962) and G. M. Shen (Fl. Xinjiang. 5: 285. 1999).

112. Saussurea cana Ledebour, Icon. Pl. 1: 18. 1829.

灰白风毛菊 hui bai feng mao ju

Saussurea cana var. *angustifolia* Ledebour; *S. fruticulosa* Karelin & Kirilov.

Herbs 8–25 cm tall, perennial, densely caespitose. Caudex much branched, with many leaf rosettes and flowering shoots. Stems erect, simple or apically branched. Rosette and lower stem leaves petiolate; petiole 1.5–3 cm; leaf blade narrowly elliptic, linear-oblong, or linear, 1.5–10 × 0.2–1.5 cm, abaxially grayish white and densely tomentose, adaxially grayish green and sparsely tomentose, margin entire, dentate, or pinnately lobed; lateral lobes or lateral teeth few, small, apex acuminate. Middle and upper stem leaves petiolate or sessile; leaf blade gradually smaller upward on stem. Uppermost stem leaves sessile, linear. Capitula 4–20, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly cylindric, 4–8 mm in diam. Phyllaries in 4–7 rows, apically purplish red, sparsely arachnoid, apex acute to obtuse; outer phyllaries ovate, 3–3.5 × ca. 2 mm; middle phyllaries ovate to narrowly elliptic, 3.5–9 × 1.5–2 mm; inner phyllaries linear, 9–10 × ca. 1.5 mm. Receptacle bristles subulate, to 8 mm. Corolla pale red, 1.2–1.3 cm, gland-dotted, tube 6–7 mm, limb 6–7 mm. Achene brown, cylindric, 4–7 mm, glabrous. Pappus white; outer bristles 2–3 mm; inner bristles 7–11 mm. Fl. and fr. Jul–Sep.

River valleys, rocky and dry mountain slopes; 800–2800 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang [Kazakhstan, Russia (Siberia)].

113. Saussurea petrovii Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 524. 1972.

西北风毛菊 xi bei feng mao ju

Saussurea petrovii var. *latifolia* H. C. Fu.

Herbs 5–30 cm tall, perennial. Roots woody, fibrous. Caudex branched, covered with remains of leaf sheaths. Stem 1.5–2 mm in diam., erect, simple or apically branched. Lower and middle stem leaves sessile, linear, linear-oblong, or oblong, 2–11 × 0.1–0.4 cm, abaxially grayish white and densely tomentose, adaxially green and glabrous, base attenuate, margin revolute and entire or with 1–5 pairs of remote teeth, apex acute to acuminate. Upper stem leaves narrowly linear, 1–4 × ca. 0.1 cm. Capitula 2–6, in a corymbiform synflorescence, pedunculate. Involucre cylindric, 5–8 mm in diam. Phyllaries in 4 or 5 rows, greenish yellow to straw-colored, apically purple, sparsely arachnoid, gland-dotted, apex shortly acuminate; outer phyllaries ovate, 2–3 × 1–2 mm; middle phyllaries oblong, 3–7 × 1–2 mm; inner phyllaries narrowly elliptic to linear, 7–9 × 1–2 mm. Receptacle with bristles. Corolla purple, (0.8–)1–1.4 cm, minutely gland-dotted, tube 5–7 mm, limb 5–7 mm, lobes 3–3.5 mm. Achene brown, cylindric, 3–4 mm, obtusely 4-angled, glabrous. Pappus white; outer bristles 2–3 mm, scabrid; inner bristles (0.7–)0.9–1.1 cm. Fl. and fr. Jun–Sep.

● Mountain slopes; 1700–2500 m. Gansu, Nei Mongol, Ningxia.

Saussurea cana and *S. petrovii* are very closely related and may even be conspecific. Further studies are needed to clarify if the characters that distinguish *S. petrovii* fall within the variation range of *S. cana*.

114. Saussurea canescens C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 168. 1889.

伊宁风毛菊 yi ning feng mao ju

Saussurea canescens var. *major* C. Winkler.

Herbs 1.5–20 cm tall, perennial, caespitose. Rootstock stout, fibrously split. Caudex much branched, with many leaf rosettes and flowering shoots, covered with remains of leaf sheaths. Stem solitary, ascending or erect, simple. Rosette and lower stem leaves petiolate; leaf blade narrowly elliptic or narrowly obovate, 1.5–7 × 0.2–0.6 cm, both surfaces grayish green to grayish white and densely arachnoid tomentose, margin sinuate-dentate or pinnately lobed. Upper stem leaves subsessile, linear to subulate, 0.6–2 cm. Capitula 1–3, solitary or in a condensed corymbiform synflorescence, slightly nodding, shortly pedunculate. Involucre campanulate, (5–)7–10 mm in diam. Phyllaries in ca. 5 rows, apically purple, arachnoid pubescent, glabrescent, apex acuminate; outer phyllaries ovate; inner phyllaries narrowly ovate-elliptic to linear. Receptacle with bristles. Corolla pink, 1.1–1.3 cm, tube 5–6 mm, limb ca. 7 mm. Achene brown, cylindric, 2–3 mm, with a short crown. Pappus basally pale brown, apically white; outer bristles 2–3 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Aug.

Rocky mountain slopes; 1600–2500 m. Xinjiang [Kazakhstan].

115. Saussurea salemannii C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 166. 1889.

倒卵叶风毛菊 dao luan ye feng mao ju

Herbs 15–25 cm tall, perennial. Roots stout, fibrous. Caudex branched, with several leaf rosettes and flowering shoots. Stem solitary, erect, simple or branched. Basal and lower stem leaves petiolate; leaf blade obovate, 7–8 × 1.5–2 cm, pinnately lobed, pinnately dentate, or lyrate-pinnately lobed, both surfaces green, strongly scabrous, hispid, apex rounded. Middle and upper stem leaves sessile, gradually smaller upward on stem, narrowly ovate-elliptic, base amplexicaul, margin pin-

nately dentate, apex acuminate. Capitula 1 to few, solitary or in a corymbiform synflorescence, sessile or shortly pedunculate. Involucre obconic, 7–10 mm in diam. Phyllaries in 4–6 rows, pubescent, apex attenuate into a short cusp; outer phyllaries ovate; inner phyllaries narrowly ovate-elliptic to linear. Receptacle with bristles. Corolla pale red, 1.4–1.5 cm, tube ca. 7 mm, limb ca. 8 mm, lobes ca. 4 mm. Achene cylindric, 4–5 mm, glabrous. Pappus white; outer bristles 1–5 mm; inner bristles 1.2–1.3 cm. Fl. and fr. Jun–Aug.

Mountain steppes and rock crevices; 1600–2200 m. NW Xinjiang (Bole, Huocheng) [Kazakhstan].

116. Saussurea popovii Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 82. 1954.

寡头风毛菊 gua tou feng mao ju

Herbs or subshrubs, 20–50(–100) cm tall, perennial, densely caespitose. Rootstock stout and fibrous. Caudex much branched. Stems very numerous, 1.5–2 mm in diam., ascending or erect, virgately branched from base, woody at base. Rosette and lower stem leaves shortly petiolate; leaf blade linear, 4.5–5.5 × 0.5–0.6 cm, thick, both surfaces grayish green, abaxially arachnoid and gland-dotted, margin entire or sparsely dentate, apex mucronate. Middle and upper stem leaves gradually smaller upward on stem, 3–30 × 1–3 mm. Capitula solitary or to 3 clustered on end of branches in a corymbiform synflorescence, pedunculate. Involucre narrowly campanulate to tubular, 3–6 mm in diam. Phyllaries in 4–6 rows, straw-colored, apically purplish, pubescent, gland-dotted, glabrescent, apex obtuse to shortly acuminate; outer phyllaries broadly ovate, 1–2 × 0.5–1 mm; middle and inner phyllaries narrowly ovate to linear, 2–7 × ca. 1 mm. Receptacle bristles subulate, to 8 mm. Corolla pink, ca. 1.6 cm, gland-dotted, tube ca. 6 mm, limb ca. 1 cm, lobes ca. 4 mm. Achene dark brown, 5–6 mm, 4-ribbed. Pappus white; outer bristles 1–4 mm; inner bristles 1–1.1 cm. Fl. and fr. Aug–Sep.

Gravelly shores, saline deserts; ca. 600 m. Xinjiang [W Mongolia].

117. Saussurea yabulaiensis Y. Y. Yao, Fl. Desert. Reipubl. Popularis Sin. 3: 472. 1992.

雅布赖风毛菊 ya bu lai feng mao ju

Herbs 12–35 cm tall, perennial. Rootstock stout. Stems many, erect or ascending, apically few branched, base densely covered with yellowish white or yellowish brown remains of leaf petiole and rachis. Lower stem leaves 2–15 cm, irregularly pinnately parted; segments 2 or 3, distant, needlelike, 3–20 × 0.5–3 mm, both surfaces sparsely gland-dotted otherwise glabrous, base widened and semiamplexicaul, margin entire, apex acuminate or sometimes obtuse and mucronate. Middle and upper stem leaves gradually smaller upward on stem, filiform, 1.5–3 cm, undivided. Capitula 1–4, solitary or in a lax corymbiform synflorescence. Involucre obconic, obovoid, or campanulate, 5–8 mm in diam. Phyllaries yellowish green, in 7 or 8 rows, glandular hairy, apex acute to acuminate and mucronate; outer phyllaries ovate; middle phyllaries narrowly ovate; inner phyllaries linear. Receptacle bristles subulate, 2–2.5 mm. Corolla purple, 1.2–1.5 cm, gland-dotted, tube 7–8 mm, limb 5–7 mm. Achene cylindric to ovoid, 4- or 5-angled, sparsely glandular. Pappus white; outer bristles 2–3 mm; inner bristles 9–10 mm. Fl. and fr. Aug–Sep.

• Desert areas; 1300–1400 m. Nei Mongol (Alxa Meng).

No specimens of *Saussurea yabulaiensis* were seen by the present authors. The description here is based on the original publication and on the treatment by H. C. Fu (in Ma, Fl. Intramongol., ed. 2, 4: 749. 1993).

This species is close to and may be conspecific with *Saussurea catharinae* Lipschitz from Mongolia, which was described as having always undivided leaves.

118. Saussurea mae H. C. Fu in Ma, Fl. Intramongol., ed. 2, 4: 848. 1993.

毓泉风毛菊 yu quan feng mao ju

Herbs 4–15 cm tall, perennial. Caudex stout, much branched. Stems many, erect or ascending, base densely covered with brown remains of old petioles. Basal and lower stem leaves 3–7 cm, pinnately divided; segments 3–5, linear to narrowly ovate-linear, 3–10 × 0.5–2 cm, both surfaces sparsely arachnoid and glandular, margin entire or denticulate, apex acute to subobtuse and mucronate. Middle and upper stem leaves gradually smaller upward on stem, pinnately parted or undivided. Capitula 1–3, solitary or in a corymbiform synflorescence. Involucre campanulate, 8–10 mm in diam. Phyllaries in 5 or 6 rows, purplish, arachnoid, glandular; outer phyllaries ovate, apex acute; inner phyllaries narrowly ovate to linear, apex acuminate. Receptacle with bristles. Corolla rose, 1.3–1.6 cm, tube 6–7 mm, limb 7–9 mm. Achene cylindric, ca. 4 mm, 4- or 5-angled, rugose, densely glandular. Pappus white; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Aug.

• Stony mountain slopes; ca. 2400 m. Nei Mongol (Alxa Meng, Longshou Shan).

No specimens of *Saussurea mae* were seen by the present authors, and the treatment here is based on the original description.

119. Saussurea deserticola H. C. Fu, J. Inner Mongolia Inst. Agric. Anim. Husb. 1: 50. 1981.

荒漠风毛菊 huang mo feng mao ju

Herbs 30–40 cm tall, perennial. Caudex stout, apically covered with blackish brown remains of old petioles. Stem solitary, erect, apically branched. Lower stem leaves petiolate; petiole 1–2 cm, winged, base semiamplexicaul; leaf blade ovate to narrowly ovate-elliptic in outline, 5–9 × 1.5–2 cm, bipinnately parted; segments 11–13 pairs, linear, needlelike, 2–12 × 1–3 mm, both surfaces arachnoid and densely glandular, apex obtuse to acute. Middle and upper stem leaves gradually smaller upward on stem, linear, undivided, margin subentire to dentate. Capitula many, in a paniculiform or corymbiform synflorescence, pedunculate. Involucre campanulate, 7–12 mm in diam. Phyllaries in 5–7 rows, apical half and margin purple, arachnoid pubescent, midvein dark; outer phyllaries ovate, apex obtuse or mucronate; middle phyllaries oblong-elliptic, apex acute; inner phyllaries narrowly elliptic to linear, apex obtuse. Receptacle bristles 1.5–6 mm. Corolla rose-purple, ca. 1.4 cm, tube ca. 6 mm, limb ca. 8 mm. Achene dark green, obconic, 3.5–4 mm, 4-angled, sparsely glandular, apically squamulose, apex with an

obtusely dentate crown. Pappus white; outer bristles short; inner bristles 1–1.1 cm. Fl. Sep.

• Desert areas; 1300–1400 m. Nei Mongol (Ih Ju Meng).

No specimens of *Saussurea deserticola* were seen by the present authors, and the description here is based on the treatment by H. C. Fu (in Ma, Fl. Intramongol., ed. 2, 4: 749. 1993).

120. Saussurea salicifolia (Linnaeus) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 200. 1810.

柳叶风毛菊 liu ye feng mao ju

Serratula salicifolia Linnaeus, Sp. Pl. 2: 817. 1753.

Herbs 15–50 cm tall, perennial, caespitose. Roots stout, fibrous. Caudex much branched near ground level. Stems usually numerous, erect, simple or branched. Leaves shortly petiolate or sessile; leaf blade narrowly elliptic to linear, 2–10 × 0.2–0.5 cm, abaxially white and densely tomentose, adaxially green and glabrous or sparsely pubescent, base cuneate-attenuate, margin entire or rarely basally dentate and usually revolute, apex acuminate. Capitula numerous to few, in a corymbiform synflorescence, pedunculate. Involucre cylindric, 4–7 mm in diam. Phyllaries in 4 or 5 rows, purplish red; outer phyllaries ovate, 1.5–2 × 1–1.5 mm, apex acute to obtuse; middle phyllaries ovate to narrowly ovate-elliptic, 2–6 × 1–1.5 mm, apex acute; inner phyllaries narrowly ovate-elliptic to linear, 6–8 × 1–2 mm, apex acute. Receptacle bristles 6–8 mm. Corolla pink, 1.2–1.5 cm, tube 6–8 mm, limb 6–7 mm. Achene brown, 3.5–4.5 mm, glabrous. Pappus white; outer bristles ca. 2 mm; inner bristles 1–1.1 cm. Fl. and fr. Jun–Sep.

Thickets, meadows, moist places in gullies; 1600–3800 m. Gansu, Heilongjiang, Nei Mongol [Mongolia, Russia (Siberia)].

121. Saussurea lomatolepis Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 80. 1954.

纹苞风毛菊 wen bao feng mao ju

Herbs 15–35 cm tall, perennial. Roots woody, fibrous. Caudex branched, with several flowering shoots. Stem erect or ascending, simple or rarely branched from base. Basal and lower stem leaves shortly petiolate; leaf blade ovate-elliptic to oblong, 8–10 × 1.5–2 cm, abaxially grayish white and densely arachnoid tomentose, adaxially green, almost glabrous, and scabrous, margin sinuate-dentate to pinnately cleft. Upper stem leaves sessile, gradually smaller upward on stem, usually with sterile shoots in axils. Capitula 2–5, in a condensed corymbiform synflorescence, pedunculate. Involucre campanulate, 8–10 mm in diam. Phyllaries in 4 or 5 rows, straw-colored, pubescent, margin distinct, narrow, and brown or black, apex obtuse to rounded; outer phyllaries ovate; inner phyllaries oblong. Receptacle bristles subulate, to 8 mm. Corolla dark red, ca. 1.2 cm, gland-dotted, tube ca. 6 mm, limb ca. 6 mm. Achene dark brown, cylindric, 4–6 mm, glabrous. Pappus white; outer bristles 1.5–3 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Oct.

• Mountain steppes, meadows; 1300–2700 m. Xinjiang.

122. Saussurea polycephala Handel-Mazzetti, Acta Horti Gothob. 12: 313. 1938.

多头风毛菊 duo tou feng mao ju

Saussurea thibetica Franchet, J. Bot. (Morot) 8: 338. 16 Oct 1894, not *S. tibetica* C. Winkler (1894); *S. leucota* Handel-Mazzetti.

Herbs 60–100 cm tall, perennial. Rhizome stout. Stem solitary, erect, much branched in apical part, unwinged. Basal and lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole 4–7 mm; leaf blade narrowly ovate to narrowly elliptic, 10–18 × 1.5–3 cm, abaxially white and densely tomentose, adaxially green and sparsely strigose, base cuneate, margin denticulate, apex acuminate. Upper stem leaves narrowly ovate-elliptic, gradually smaller upward on stem. Capitula very numerous, in an ample corymbiform-paniculiform synflorescence, pedunculate. Involucre cylindric, 5–6 mm in diam. Phyllaries in 5 or 6 rows; outer phyllaries ovate, 2–3 × 1.5–2 mm, sparsely arachnoid, apex acuminate; middle phyllaries narrowly elliptic, 3–6 × 1–1.5 mm, densely villous, apex acute; inner phyllaries narrowly elliptic, 6–9 × 1–1.5 mm, sparsely villous, apex obtuse. Receptacle bristles to 5 mm. Corolla purple, 0.9–1.1 cm, tube 5–6 mm, limb 4–5 mm, lobes 2.5–3 mm. Achene brown, ca. 3 mm, ribbed. Pappus white; outer bristles ca. 2 mm; inner bristles ca. 8 mm. Fl. and fr. Aug–Sep.

• Forests, forest margins, near mountain trails, mountain slopes; 1200–2200(–4600) m. Hubei, Sichuan.

Saussurea leucota, described from W Sichuan, is preliminarily included here as a synonym; it may deserve separate taxonomic status. It is certainly not conspecific with *S. salicifolia*.

123. Saussurea chinensis (Maximowicz) Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 51: 1496. 1966.

中华风毛菊 zhong hua feng mao ju

Saussurea salicifolia (Linnaeus) Candolle var. *chinensis* Maximowicz, Bull. Soc. Imp. Naturalistes Moscou 54(1): 28. 1879; *S. denticulata* Ledebour var. *chinensis* (Maximowicz) Y. Ling.

Herbs 30–75 cm tall, perennial. Stem solitary, simple or apically branched. Basal leaves withered at anthesis. Lower stem leaves sessile, narrowly ovate-elliptic to narrowly elliptic, 9–10 × 1.5–2.5 cm, abaxially white, densely tomentose, and gland-dotted, adaxially green and glabrous, base cuneate, margin denticulate, apex long acuminate. Middle stem leaves sessile, narrowly ovate-elliptic, 9–12 × 1.5–2.5 cm, base semi-amplexicaul, margin denticulate, apex acuminate. Upper stem leaves sessile, narrowly elliptic to linear, margin entire. Capitula 10–20, in a compact corymbiform synflorescence, pedunculate. Involucre cylindric, 4–5 mm in diam. Phyllaries in 4 or 5 rows, greenish yellow, apically purple, sparsely pubescent; outer phyllaries ovate, 2–3 × 1–1.5 mm, sparsely arachnoid, apex acuminate; middle phyllaries narrowly elliptic to linear, 3–8 × 1–2 mm, apically densely appressed villous; inner phyllaries linear, 7–8 × 1–1.5 mm, apex obtuse to acute. Receptacle bristles 2–3 mm. Corolla pale purple, 8–9 mm, tube 3–4 mm, limb 4–5 mm, lobes 2–2.5 mm. Achene brown, ca. 2 mm, glabrous. Pappus straw-colored; outer bristles 1–3 mm; inner bristles 5–7 mm. Fl. and fr. Aug–Sep.

• Grasslands on mountain slopes; 1900–2300 m. Hebei (Xiaowutai Shan).

Saussurea chinensis is very close to *S. polycephala*, only differing by fewer capitula in a smaller and more compact synflorescence.

124. Saussurea zhuxiensis Y. S. Chen & Q. L. Gan, J. Syst. Evol. 49: 160. 2011.

竹溪风毛菊 zhu xi feng mao ju

Herbs 30–50 cm tall, perennial. Rhizome stout, with numerous fibrous roots. Stems solitary or 3–5, erect, apically branched. Basal and lower stem leaves sessile, narrowly ovate-elliptic, 5–15 × 1–2 cm, abaxially light green and puberulent, adaxially green and puberulent, base attenuate, margin sparsely dentate or incised, apex acuminate and mucronate. Middle stem leaves narrowly ovate-elliptic, margin usually entire or sometimes minutely denticulate. Upper stem leaves smaller upward on stem, margin entire. Capitula numerous, in a lax corymbiform synflorescence, shortly pedunculate. Involucre campanulate, 8–10 mm in diam. Phyllaries in ca. 5 rows; outer phyllaries green, narrowly ovate-oblong, 4–5 × ca. 1 mm, sparsely arachnoid, apex acute; inner phyllaries light green, narrowly ovate-elliptic, 10–12 × 1–1.5 mm, glabrous, apex acuminate. Receptacle bristles filiform, 5–6 mm. Corolla purplish red, ca. 1.4 cm, tube ca. 7 mm, limb ca. 7 mm. Achene ellipsoid, ca. 3 mm. Pappus bristles in 1 row, grayish white, ca. 1 cm, plumose. Fl. Aug.

• Rock crevices, sandy places along streams; ca. 900 m. Hubei (Zhuxi).

125. Saussurea virgata Franchet, J. Bot. (Morot) 8: 340. 1894.

帚状风毛菊 zhou zhuang feng mao ju

Herbs 20–90 cm tall, perennial. Stem solitary, 5–7 mm in diam., erect, apically branched, winged, densely leafy. Lower and middle stem leaves shortly petiolate or sessile; leaf blade narrowly ovate-elliptic, 6–10 × 1–2 cm, abaxially grayish white or grayish green and arachnoid, adaxially green and glabrous or with short glandular hairs, base decurrent, margin entire, crenate, or apically denticulate, apex acute to acuminate. Upper stem leaves linear, 1–5 × 0.1–0.3 cm, margin entire. Capitula numerous, clustered at end of branches, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly obovoid, 5–8 mm in diam. Phyllaries in ca. 5 rows, narrowly ovate-elliptic to linear, arachnoid, apex acute; outer phyllaries ovate-elliptic, 5–6 × 2–2.5 mm, apical part herbaceous and reflexed, apex acuminate to caudate; middle and inner phyllaries 7–11 × 1–2 mm, apically and near margin purplish red, scarious, apex acute and erect. Receptacle bristles 4–7 mm. Corolla purplish red, ca. 9 mm. Achene glabrous. Pappus pale brown; outer bristles scabrid; inner bristles ca. 8 mm. Fl. and fr. Jul–Sep.

• Grasslands on mountain slopes; 2800–3400 m. Yunnan (Dali, Huize).

126. Saussurea integrifolia Handel-Mazzetti, Acta Horti Gothob. 12: 313. 1938.

全缘叶风毛菊 quan yuan ye feng mao ju

Herbs 30–100 cm tall, perennial. Stem erect, simple or branched in apical part. Basal and lower stem leaves withered at anthesis. Middle stem leaves sessile or subsessile; leaf blade narrowly ovate-elliptic to linear, 5–12 × 0.6–0.7 cm, abaxially white and densely tomentose, adaxially green and slightly scabrid, base cuneate-attenuate, margin entire and revolute, apex long acuminate. Upper stem leaves similar to middle stem leaves, gradually smaller upward on stem. Capitula numerous, in a corymbose-paniculate synflorescence, shortly pedunculate. Involucre narrowly campanulate, ca. 5 mm in diam. Phyllaries in 5 or 6 rows, dark purple, sparsely pubescent, glabrescent; outer phyllaries ovate, ca. 3 × 1–1.5 mm, apex acute to obtuse; middle phyllaries elliptic, ca. 7 × 2 mm, apex obtuse; inner phyllaries narrowly linear-elliptic, 7–8 × ca. 1 mm, apex acute to obtuse. Corolla purple, ca. 9 mm, tube ca. 4 mm, limb ca. 5 mm. Achene brown, ca. 3 mm. Pappus straw-colored; outer bristles ca. 3 mm; inner bristles ca. 9 mm. Fl. and fr. Aug–Sep.

• Thickets in mountain valleys, grasslands, by trails on mountain slopes; 2000–3500 m. NW Sichuan, ?NW Yunnan (Dêqên).

It is not clear if the much smaller specimens of *Saussurea integrifolia* from Yunnan (10–18 cm tall) with fewer (3–7) but slightly larger capitula really belong to the same taxon as the plants from NW Sichuan.

127. Saussurea sutchuenensis Franchet, J. Bot. (Morot) 8: 353. 1894.

四川风毛菊 si chuan feng mao ju

Saussurea dutaillyana Franchet var. *macrocephala* (Y. Ling) X. Y. Wu; *S. dutaillyana* var. *shensiensis* Y. Y. Pai; *S. rufostrigillosa* Y. Ling; *S. rufostrigillosa* var. *macrocephala* Y. Ling.

Herbs 40–100 cm tall, perennial. Rhizome stout. Stem solitary, erect, apically branched. Basal and lower stem leaves petiolate; petiole 10–25 cm; leaf blade ovate to triangular-ovate, ca. 14 × 10 cm, both surfaces green and glabrous or strigillose, base truncate to cordate, margin sharply dentate, apex acuminate. Median stem leaves petiolate; petiole 1.5–3.5 cm; leaf blade gradually smaller upward on stem, ovate to triangular-ovate, 4–6 × 2–4 cm. Upper stem leaves petiolate; leaf blade narrowly ovate, base cuneate-attenuate. Capitula numerous, clustered 3–6 at end of branches in a corymbiform-paniculiform synflorescence, pedunculate. Involucre campanulate to obconic, 5–9(–15) mm in diam. Phyllaries in 6 or 7 rows, arachnoid lanate; outer and middle phyllaries narrowly ovate to narrowly ovate-elliptic, 3–10 × 1–2 mm, margin apically crenate-dentate, apex herbaceous, acute, and reflexed; inner phyllaries linear, 8–10 × 1.5–2 mm, apex obtuse and erect. Receptacle bristles subulate, 4–6 mm. Corolla purple or white, 1–1.2(–1.5) cm, tube 6–7 mm, limb 5–5.5 mm, lobes 3–3.5 mm. Achene brown, ca. 3 mm, smooth, glabrous. Pappus straw-colored; outer bristles 2–4 mm; inner bristles 7–9 mm. Fl. and fr. Jul–Sep.

• Forests, forest margins; 700–2000 m. N Chongqing (Chengkou), Henan (Lushi), ?Hubei, Shaanxi.

128. Saussurea dolichopoda Diels, Bot. Jahrb. Syst. 29: 623. 1901.

长梗风毛菊 chang geng feng mao ju

Saussurea saligniformis Handel-Mazzetti; *S. wilsoniana* Handel-Mazzetti.

Herbs 0.6–1.4 m tall, perennial. Rhizome stout. Stems solitary or few, (2–)5–8 mm in diam., erect, apically much branched, apically flexuous. Basal leaves withered at flowering

time. Lower and middle stem leaves petiolate; petiole 1.5–5 cm; leaf blade narrowly ovate to oblong, 8–19 × 2–6.5 cm, both surfaces green, abaxially with a few isolated articulate hairs, adaxially glabrous, base cordate to rounded, margin denticulate and sparsely ciliate, apex acuminate to caudate. Upper stem leaves gradually smaller upward on stem; petiole 0.5–1.5 cm; leaf blade narrowly elliptic, base cuneate to rounded. Capitula numerous, in a diffuse corymbiform-paniculiform synflorescence, pedunculate. Involucre campanulate, 6–8(–13) mm in diam. Phyllaries in 4–6 rows, straw-colored, sometimes apically tinged purple, glabrous or apically bearded, apex obtuse to subacute; outer phyllaries ovate, 1.5–3 × 1–2 mm; middle phyllaries narrowly ovate, 3–10 × 1.5–2 mm; inner phyllaries narrowly elliptic to linear, 10–14 × 1–1.5 mm. Receptacle bristles brownish, subulate, 4–8 mm. Corolla purple, 1–1.3 cm, tube 4.5–7 mm, limb 5–6.5 mm, lobes 3–3.5 mm. Achene blackish brown, cylindric, 3–5 mm, smooth, glabrous. Pappus pale brown; outer bristles 2–4 mm; inner bristles (0.8–)1–1.1 cm. Fl. and fr. Jul–Oct.

• Forests, forest margins, montane meadows, rocky slopes; 1400–3700 m. Gansu, Guizhou, Henan, Hubei, Shaanxi, Sichuan, NW Yunnan (Lijiang, Zhongdian).

129. Saussurea saligna Franchet, J. Bot. (Morot) 8: 345. 1894.

尾尖风毛菊 wei jian feng mao ju

Herbs 70–120 cm tall, perennial. Stem solitary, 5–7 mm in diam., erect, apically much branched. Lower and middle stem leaves petiolate; petiole 1–3 cm; leaf blade narrowly ovate-elliptic to oblong, 10–20 × 3–4 cm, both surfaces green and glabrous or subglabrous, base rounded to truncate, margin denticulate, apex caudate-acuminate. Upper stem leaves shortly petiolate; leaf blade narrowly ovate-elliptic, 7–15 × 1–3 cm. Capitula numerous, clustered 5–7 at end of branches in a congested corymbiform synflorescence, shortly pedunculate. Involucre campanulate to obconic, 6–10 mm in diam. Phyllaries in 5–7 rows, straw-colored with green veins, subglabrous, scarious, apically bearded, apex obtuse; outer phyllaries ovate, 2–3 × 1–1.5 mm; middle phyllaries oblong to narrowly elliptic, 3–8 × 1–1.5 mm; inner phyllaries narrowly obovate-elliptic to linear, 8–10 × 1–1.5 mm. Receptacle bristles subulate, 5–7 mm. Corolla white or purple, 9–10 mm, tube 4–6 mm, limb 4–5 mm, lobes 3–3.5 mm. Achene cylindric, 4–5 mm, ribbed, glabrous. Pappus dirty white; outer bristles 2–3 mm; inner bristles 8–10 mm. Fl. and fr. Jul–Oct.

• Mountain slopes, forests; 1200–2500 m. N Chongqing (Chengkou), Shaanxi.

130. Saussurea conyzoides Hemsley, J. Linn. Soc., Bot. 29: 309. 1892.

假蓬风毛菊 jia peng feng mao ju

Saussurea oppositicolor H. Léveillé & Vaniot; *S. rosthornii* Diels var. *oppositicolor* (H. Léveillé & Vaniot) F. H. Chen ex Handel-Mazzetti; *S. silvestrii* Pampanini.

Herbs 0.9–1.2 m tall, perennial. Stem solitary, ca. 5 mm in diam., erect, branched from middle. Middle stem leaves petiolate; petiole to 2.5 cm; leaf blade elliptic to ovate, 7.5–15(–20) × 5–6 cm, abaxially grayish green to grayish white and densely tomentose, adaxially green and sparsely strigose but glabrescent, base cuneate-attenuate, margin denticulate, shallowly crenate, or entire, apex acuminate. Upper leaves similar, gradually smaller upward on stem, narrowly elliptic, 8–15 × 1.5–3 cm. Uppermost stem leaves narrowly elliptic to linear. Capitula numerous, in a corymbiform-paniculiform synflorescence, sessile or shortly pedunculate. Involucre narrowly cylindric, 3–5 mm in diam. Phyllaries in 5 or 6 rows, yellowish green, sparsely arachnoid or glabrescent; outer phyllaries oblong, 1.5–2 × 0.5–0.8 mm, apex acute and mucronate; middle phyllaries ovate to narrowly elliptic, 2–7 × 0.8–1.5 mm, apex acute to obtuse and without a mucro; inner phyllaries narrowly elliptic to linear, 7–9 × 0.5–1 mm, apically bearded, apex obtuse. Receptacle bristles 4–5 mm. Corolla purple, 0.9–1.1 cm, tube 4–5 mm, limb 5–6 mm, lobes 3.5–4 mm. Achene (immature) ca. 2 mm, glabrous. Pappus dirty white; outer bristles 3–4 mm; inner bristles 8–9 mm. Fl. Jul–Aug.

• Forests; 1000–2300 m. Guizhou, Henan, Hubei, Shaanxi, Sichuan.

131. Saussurea flexuosa Franchet, J. Bot. (Morot) 8: 341. 1894.

城口风毛菊 cheng kou feng mao ju

Saussurea flexuosa var. *penicillata* Franchet; *S. tsinlingensis* Handel-Mazzetti.

Herbs 50–100 cm tall, perennial. Rhizome stout. Stem solitary, erect, apically branched. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 2–7 cm, winged and usually with a pair of lobes; leaf blade ovate, elliptic, or narrowly ovate-elliptic, 6–17 × 4–9 cm, abaxially grayish white and densely arachnoid tomentose, adaxially green, scabrid, and sparsely strigose, base cordate, truncate, or cuneate, margin serrulate or sinuate-dentate, apex acuminate. Upper stem leaves shortly petiolate; leaf blade gradually smaller upward on stem, narrowly elliptic, base cuneate, margin denticulate or entire. Capitula numerous or few, in a laxly corymbiform or paniculiform synflorescence, pedunculate. Involucre narrowly campanulate, 7–10 mm in diam. Phyllaries in 4 or 5 rows, apically red to blackish purple, sparsely arachnoid lanate; outer phyllaries ovate, 2–3 × 1–1.5 mm, apex acute, with a black straight mucro; middle phyllaries ovate-elliptic, 3–7 × 1.5–2 mm, apex acute; inner phyllaries narrowly elliptic to linear, 7–10 × 1.5–2 mm, apex acute to obtuse. Corolla red, 1–1.1 cm, tube 4–5 mm, limb ca. 6 mm. Achene brown, cylindric, ca. 4 mm, glabrous. Pappus pale brown; outer bristles 2–4 mm, scabrid; inner bristles 9–10 mm. Fl. and fr. Jul–Sep.

• Forests, forest margins, thickets, near trails, meadows; 1300–2000 m. Chongqing, Gansu, Henan, W Hubei, S Shaanxi, Sichuan.

132. Saussurea elegans Ledebour, Icon. Pl. 1: 19. 1829.

优雅风毛菊 you ya feng mao ju

Saussurea amoena Karelin & Kirilov; *S. elegans* var. *latifolia* Karelin & Kirilov; *S. elegans* var. *nivea* Lipschitz; *S. salicifolia* (Linnaeus) Candolle var. *elegans* (Ledebour) Trautvetter; *S. tenuis* Ledebour.

Herbs 10–70 cm tall, perennial. Roots fibrous. Stems solitary or few, erect, apically branched, usually with short sterile shoots in leaf axils. Basal and lower stem leaves petiolate; petiole 1.5–6 cm; leaf blade oblong to ovate-oblong, to 15 × 1.5–4 cm, pinnately lobed or lyrate-pinnately lobed, abaxially grayish white or green, arachnoid tomentose or glabrous, and gland-dotted, adaxially green, scabrous, and strigose or glabrous. Middle stem leaves shortly petiolate or sessile; leaf blade ovate to elliptic, 3–10 × 0.5–3 cm, undivided, margin entire or dentate, apex acuminate. Upper stem leaves narrowly ovate-elliptic to linear, 3–8 mm wide. Capitula numerous, in a corymbiform or paniculiform synflorescence. Involucre cylindric, 5–8 mm in diam. Phyllaries in 5 rows, yellowish green, apically purple, sparsely arachnoid, gland-dotted; outer phyllaries ovate, 2–3 × 1.5–2 mm, apex shortly acuminate; middle phyllaries narrowly ovate, 3–8 × 1.5–3 mm, apex shortly acuminate; inner phyllaries linear, 8–10 × 1.5–2 mm, apex obtuse. Receptacle bristles to 7 mm. Corolla purple, 1.1–1.4 cm, tube 6–8 mm, limb 5–6 mm, lobes 2.5–4 mm. Achene brown, cylindric, 3–5 mm, glabrous. Pappus white; outer bristles 2–4 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Sep.

Grassy or stony mountain slopes, forest meadows, fields; 1100–3200 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Uzbekistan].

133. Saussurea acroura Cummins, Bull. Misc. Inform. Kew 1908: 19. 1908.

川甘风毛菊 chuan gan feng mao ju

Herbs 30–80 cm tall, perennial. Stem solitary, 2–4 mm in diam., erect, branched from middle. Lower stem leaves petiolate; petiole to 5 cm; leaf blade oblong, 4–15 × 2–6 cm, pinnatisect, both surfaces green, abaxially sparsely arachnoid pubescent and gland-dotted, adaxially scabrid and strigose; lateral segments 4–10 pairs, linear-oblong, to 3 × 0.7 cm, margin entire or with a single tooth and revolute, apex mucronate. Middle and upper stem leaves gradually smaller upward on stem, base auriculate-amplexicaul. Uppermost stem leaves linear, undivided or with 1–4 segments. Capitula numerous, in a paniculiform-corymbiform synflorescence, pedunculate. Involucre tubular to narrowly campanulate, 5–8 mm in diam. Phyllaries in ca. 4 rows, apically ± villous; outer phyllaries ovate, 2–3 × 1–1.5 mm, apex acuminate; middle phyllaries narrowly elliptic, 3–7 × 1–1.2 mm, apex acute to obtuse; inner phyllaries linear, 7–8(–11) × 0.8–1 mm, apex obtuse. Receptacle bristles 2–3 mm. Corolla pink, 8–9 mm, glabrous, tube 2.5–3.5 mm, limb 5–6 mm, lobes 2.5–3 mm. Achene brown, obconic to cylindric, 3–3.5 mm, gland-dotted, with a short crown. Pappus light brown; outer bristles 2–2.5 mm; inner bristles 8–10 mm. Fl. and fr. Aug.

• Riverbanks, grassy slopes, clay soil at roadsides; 2100–3600 m. Gansu, Sichuan.

134. Saussurea megaphylla (X. Y. Wu) Y. S. Chen, J. Syst. Evol. 49: 160. 2011.

秦岭风毛菊 qin ling feng mao ju

Saussurea carduiformis Franchet var. *megaphylla* X. Y. Wu, Fl. Tsinling. 1(5): 423. 1985.

Herbs to 45 cm tall, perennial. Stem solitary, 4–5 mm in diam., erect, simple. Stem leaves petiolate, usually arranged around middle of stem; petiole 0.7–1.8 cm; leaf blade oblong, 6–20 × 2.5–6 cm, pinnatipartite, abaxially pale green and densely glandular hairy, adaxially green and sparsely shortly glandular hairy; lateral lobes 13–17 pairs, oblong, narrowly ovate-elliptic, or linear, 0.6–3 × 0.1–0.5 cm, usually curved downward, margin entire, apex acuminate. Capitula usually 10–14, in a laxly corymbiform synflorescence, long pedunculate. Involucre globose to campanulate, 1–1.5 cm in diam. Phyllaries in 5 or 6 rows, brownish, leathery; outer phyllaries ovate, ca. 5 × 2 mm; inner phyllaries apically black, narrowly oblong, 10–12 × ca. 2 mm, tomentose, apex long acuminate and recurved. Receptacle bristles yellowish brown, 5–6 mm. Corolla pink, 1–1.2 cm, glabrous, tube 5–6 mm, limb 5–6 mm, lobes ca. 4 mm. Achene brown, cylindric, ca. 5 mm, glabrous. Pappus yellowish white; outer bristles 3–4 mm; inner bristles ca. 8 mm. Fl. Aug–Sep, fr. Sep–Oct.

• Montane meadows, margins of mixed forests; 1800–2000 m. Shaanxi (Huxian).

135. Saussurea tianshuiensis X. Y. Wu, Fl. Loess-Plat. Sin. 5: 520. 1989.

天水风毛菊 tian shui feng mao ju

Herbs ca. 1.5 m tall, perennial. Stem solitary, erect, apically branched, unwinged. Basal and lower stem leaves petiolate; petiole 1–2 cm; leaf blade narrowly ovate, elliptic, or obovate, 10–21 × 3–7 cm, pinnately lobed or pinnately parted, both surfaces green, abaxially glabrous, adaxially scabrid, glandular, or glabrescent, base cuneate, margin sinuate-dentate, apex acute; main segments or lobes 3–5 pairs, triangular to narrowly triangular-ovate, margin entire or dentate, apex acute and mucronate. Middle and upper stem leaves gradually smaller upward on stem, narrowly elliptic, undivided, margin dentate, apex long acuminate. Capitula 1–4, on end of branch apices, solitary or in a corymbiform synflorescence, long pedunculate. Involucre tubular-campanulate, 5–8 mm in diam. Phyllaries in 5 or 6 rows, apex acute to subobtuse; outer phyllaries triangular-ovate, ca. 5 mm; middle phyllaries narrowly elliptic, 0.6–1.5 cm; inner phyllaries narrowly elliptic to linear, 1–1.8 cm. Corolla purple, ca. 1.3 cm, tube ca. 6 mm, limb ca. 4 mm. Achene ca. 4 mm, glabrous. Pappus white or yellowish brown; outer bristles 2–5 mm; inner bristles ca. 1 cm. Fl. Aug–Sep.

• Montane meadows, forest margins, thickets; 1800–2500 m. SE Gansu, S Ningxia, Shaanxi.

No specimens of *Saussurea tianshuiensis* or *S. tianshuiensis* var. *huxianensis* were seen by the present authors. The descriptions here are based on the original publication.

1a. Involucre tubular-campanulate, ca. 8 mm in diam.; inner phyllaries 1.3–1.8 cm ..... 135a. var. *tianshuiensis*

1b. Involucre turbinate to campanulate-turbinate, 5–7 mm in diam.; inner phyllaries ca. 1 cm ..... 135b. var. *huxianensis*

135a. Saussurea tianshuiensis var. **tianshuiensis**

天水风毛菊(原变种) tian shui feng mao ju (yuan bian zhong)

Involucre tubular-campanulate, ca. 8 mm in diam. Inner phyllaries to 1.8 cm.

• Montane meadows, forest margins, thickets; 1800–2500 m. SE Gansu, S Ningxia, SW Shaanxi.

135b. Saussurea tianshuiensis var. **huxianensis** X. Y. Wu, Fl. Loess-Plat. Sin. 5: 521. 1989.

户县风毛菊 hu xian feng mao ju

Involucre turbinate to campanulate-turbinate, 5–7 mm in diam. Inner phyllaries to 1 cm.

• Montane meadows, forest margins, thickets; 2300–2400 m. Shaanxi (Huxian).

136. Saussurea pteridophylla Handel-Mazzetti, Symb. Sin. 7: 1149. 1936.

延翅风毛菊 yan chi feng mao ju

Herbs 60–90 cm tall, perennial. Rhizome stout, apically branched. Stem solitary, erect, apically branched, partly winged. Basal and stem leaves petiolate; petiole to 2.5 cm, winged; leaf blade elliptic to narrowly elliptic, 10–16 × 2.5–4(–6) cm, pinnately lobed to pinnatisect, abaxially light green and with articulate hairs, adaxially dark green, scabrous, and with short spinulose prickles; lateral lobes 6–10 pairs, ovate to narrowly ovate-elliptic, 1–3 × 0.2–0.5 cm, margin ciliate and dentate or entire, apex acute and mucronate. Uppermost leaves linear-subulate, 5–15 × ca. 1 mm. Capitula numerous, in a laxly paniculiform synflorescence, pedunculate, with 5–10 florets. Involucre narrowly campanulate to tubular, 4–6 mm in diam. Phyllaries in ca. 6 rows, straw-colored, apically dark purple, sparsely arachnoid; outer phyllaries ovate, 2–3 × ca. 1 mm, apex acuminate; middle phyllaries narrowly ovate-oblong, 3–7 × 1–1.5 mm, apex acute; inner phyllaries narrowly oblong to obovate, 7–9 × 1–1.5 mm, apex obtuse and barbellate. Receptacle bristles 2–5 mm. Corolla red, 7–8(–10) mm, tube 2–3 mm, limb 4–5 mm, lobes 2–2.5 mm. Achene obconic, 2.5–3 mm, glabrous. Pappus pale brown; outer bristles 2–3 mm; inner bristles 5–7 mm. Fl. and fr. Oct.

• Thickets; ca. 3000 m. SW Sichuan (Yanyuan).

137. Saussurea compta Franchet, J. Bot. (Morot) 10: 422. 1896.

华美风毛菊 hua mei feng mao ju

Herbs 30–80 cm tall, perennial. Stem solitary, ca. 3 mm in diam., simple or apically branched. Basal and lower stem leaves withered at anthesis. Middle stem leaves shortly petiolate; leaf blade narrowly elliptic, 4–7 × 1–2 cm, pinnately lobed, abaxially white and densely tomentose, adaxially green, scabrous, and sparsely hispid; lateral segments 2 or 3 pairs, oblong to narrowly triangular-ovate, margin entire or with a pair of lobes, apex acute to obtuse; terminal segment caudate. Upper stem leaves sessile or subsessile, similar to middle stem leaves, gradually smaller upward on stem; lateral lobes 1 or 2 pairs. Capitula 3–15, in a corymbiform synflorescence, pedunculate. Involucre narrowly obconic, 6–8 mm in diam. Phyllaries in 5 or 6 rows, apically sparsely pubescent to villous; outer phyllaries ovate, 2–3 × 1–1.5 mm, apex acute; middle phyllaries narrowly elliptic, 3–7 × 1–1.5 mm, apex obtuse; inner phyllaries narrowly elliptic-linear, 7–10 × 1–1.5 mm, apex obtuse. Corolla purple, 7–8 mm, tube 4–5 mm, limb 2.5–3 mm, lobes 1.5–2 mm. Achene blackish brown, 2.5–3 mm. Pappus dirty white; outer bristles ca. 2 mm; inner bristles ca. 1 cm. Fl. Aug–Sep, fr. Sep–Nov.

• Montane steppes; 2300–2600 m. W Sichuan (Kangding).

The record of this species from Yunnan (S. W. Liu, Fl. Yunnan. 13: 572. 2004) must be referable to *Saussurea chrysanthemoides* (which was cited as a synonym).

138. Saussurea variiloba Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 71. 1949.

变裂风毛菊 bian lie feng mao ju

Herbs 40–100 cm tall, perennial. Rhizome short and stout, with many fibrous roots. Stem solitary, ca. 6 mm in diam., erect, apically branched. Lower stem leaves withered at anthesis. Middle stem leaves shortly petiolate to sessile; leaf blade narrowly elliptic, 4–18 × 2–6 cm, pinnately lobed, lyrate-pinnately lobed, or undivided and sinuate-dentate, abaxially pale green and thinly arachnoid, adaxially green and strigose, base ± decurrent, apex ± long acuminate; lateral lobes 4–14 pairs, ovate-oblong, 5–13 × 2–6 mm. Upper stem leaves narrowly elliptic to linear, base decurrent, margin dentate, teeth broadly triangular, apex long acuminate and mucronate. Uppermost stem leaves linear, margin entire. Capitula several, in a corymbiform synflorescence, pedunculate or sessile. Involucre narrowly campanulate or tubular, ca. 5 mm in diam. Phyllaries in ca. 6 rows, apically purplish red, sparsely arachnoid; outer phyllaries ovate, apex acute; inner phyllaries narrowly elliptic to linear, to 9 mm, apically densely arachnoid villous, apex subobtuse. Receptacle bristles subulate, ca. 4 mm. Corolla purple, 8–11 mm, tube 4–4.5 mm, limb 4–4.5 mm, lobes ca. 3 mm. Achene grayish brown, ca. 4 mm, glabrous. Pappus pale yellowish brown; outer bristles 2–3 mm; inner bristles 8–9 mm. Fl. and fr. Aug–Sep.

• Mountain slopes; 1900–2700 m. S Gansu, E Qinghai (Xunhua), N Sichuan.

No specimens of *Saussurea variiloba* were seen by the present authors, and the description here is based on the original publication and the treatments by X. Y. Wu (Fl. Loess-Plat. Sin. 5: 446. 1989) and S. W. Liu (Fl. Qinghai. 3: 481. 1996). This species is similar to *S. compta* but differs in the decurrent leaf bases, thinly arachnoid abaxial leaf surface, and higher number of lateral leaf lobes. The application of the name is problematic because the type material seems to be lost (Lipschitz, Rod *Saussurea*, 251. 1979). Lipschitz's choice of a neotype (loc. cit.), which seems even closer to *S. compta* and may well be conspecific with that taxon, is not entirely in accordance with the original description.

139. Saussurea chrysanthemoides F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 97. 1935 [*"chrysanthemumoides"*].

菊状风毛菊 ju zhuang feng mao ju

Herbs 30–60 cm tall, perennial. Rootstock stout, fibrously split. Stem solitary, 2–3 mm in diam., erect, apically branched, densely covered at base with fibrous remains of petioles. Basal and lower stem leaves petiolate; petiole 4–10 cm; leaf blade ovate to elliptic, 8–12 × 2–5 cm, bipinnately divided, abaxially white, with conspicuous veins, arachnoid tomentose, and gland-

dotted, adaxially green, scabrous, sparsely strigose, and gland-dotted; primary segments 8–10 pairs, elliptic, apex obtuse and mucronate; secondary lobes 1–3 pairs, obliquely triangular-ovate. Upper stem leaves shortly petiolate to sessile, pinnatisect to pinnately lobed; lateral segments 4–6 pairs. Capitula few, in a corymbiform synflorescence, long pedunculate. Involucre campanulate, 6–10 mm in diam. Phyllaries in 5 or 6 rows, arachnoid, gland-dotted; outer phyllaries ovate, 2–3 × 1–2 mm, apex acuminate; middle phyllaries narrowly elliptic, 3–10 × 1–2 mm, apex acute; inner phyllaries narrowly elliptic-linear, 10–12 × 1–1.5 mm, apex acute. Receptacle bristles subulate, 2–3 mm. Corolla purple, 1–1.1 cm, gland-dotted, tube 4–5 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene blackish brown, 2.5–3 mm. Pappus straw-colored; outer bristles 2–3 mm; inner bristles 9–10 mm. Fl. and fr. Aug–Oct.

• Open stony meadows, thickets; ca. 4000 m. NW Yunnan (Lijiang).

Saussurea chrysanthemoides is apparently only known from the type collection and is clearly different from *S. compta* in leaf division and shape and size of the capitula.

140. Saussurea bartholomewii S. W. Liu & T. N. Ho, Novon 20: 172. 2010.

玉树风毛菊 yu shu feng mao ju

Herbs 7–12 cm tall, perennial. Caudex simple, densely covered with fibrous remains of petioles. Stem solitary, 2–3 mm in diam., erect, apically branched. Lower and middle stem leaves petiolate; petiole 3–5 cm; leaf blade narrowly obovate-elliptic, 4–8 × 1.5–4.5 cm, lyrate-pinnatisect, abaxially grayish green, sparsely arachnoid tomentose, and gland-dotted, adaxially green, strigose, and gland-dotted; lateral segments 1–3 pairs, triangular-ovate, margin entire or denticulate, apex acute to obtuse; terminal segment large, margin dentate, apex obtuse. Upper stem leaves petiolate; leaf blade narrowly obovate-elliptic, 2–5 × 0.4–2 cm, undivided, margin entire or sinuate-dentate. Capitula numerous, in a laxly corymbiform synflorescence, pedunculate. Involucre tubular-campanulate, 7–10 mm in diam. Phyllaries in 5 or 6 rows, apically blackish, villous; outer and middle phyllaries ovate to ovate-oblong, 3–10 × 1.5–2 mm, apex obtuse to rounded; inner phyllaries narrowly ovate-elliptic, 10–15 × 1–1.5 mm, apex obtuse to acute. Receptacle bristles ca. 1.5 mm. Corolla bluish purple, 1.2–1.5 cm, gland-dotted, tube 6–7 mm, limb 5–8 mm, lobes 3.5–4 mm. Achene cylindric, ca. 3 mm, 4-ribbed, apex with a short crown. Outer pappus bristles white, 7–12 mm, barbellate; inner pappus bristles pale brown, 1–1.2 cm. Fl. and fr. Aug–Sep.

• *Picea* forests; ca. 3600 m. S Qinghai (Yushu).

5. Saussurea sect. **Lagurostemon** (Cassini) Candolle, Prodr. 6: 532. 1838.

全叶风毛菊组 quan ye feng mao ju zu

Lagurostemon Cassini in Cuvier, Dict. Sci. Nat. 53: 466. 1828.

Herbs, perennial, sometimes densely caespitose, usually with developed stems, sometimes substemless. Stem usually simple, erect, rarely apically branched. Leaf blade often narrowly linear and grasslike or narrowly ovate-elliptic, narrowly elliptic, narrowly oblong, or linear, almost always undivided. Capitula (1–)1.5–3 cm in diam., usually solitary but sometimes ± numerous and in a racemiform or corymbiform synflorescence. Receptacle with apiculate papillae or with subulate bristles. Corolla glabrous or gland-dotted. Anther tails usually lanate. Achene glabrous or sometimes densely sericeous, apically with a short and entire or denticulate crown. Pappus always in 2 rows; outer bristles usually scabrid.

About 24 species: C, E, and S Asia, C Europe; 21 species (14 endemic) in China.

Saussurea sect. *Pycnocephala*, the name used by Lipschitz (Rod *Saussurea*, 143. 1979) and typified with *S. baicalensis*, is not the earliest legitimate name for this taxon at sectional rank. Lipschitz included the type of *S.* sect. *Lagurostemon*, *S. pygmaea* (Jacquin) Sprengel (not present in China), in his *S.* sect. *Pycnocephala*.

1a. Leaf blade ovate, elliptic, narrowly ovate-elliptic, or oblong, 0.8–7 cm wide, margin sinuate-dentate or denticulate; capitula usually several.
2a. Capitula in a racemiform or lax corymbiform synflorescence; leaf blade usually more than 2 cm wide.
3a. Stem densely leafy; leaf blade narrowly ovate-elliptic, 1–3 cm wide; capitula in a dense racemiform synflorescence, sessile or shortly pedunculate; receptacle with short papillae or few short bristles to 3 mm ..... 155. *S. baicalensis*
3b. Stem with distant leaves; leaf blade ovate to elliptic, 2–7 cm wide; capitula in a lax corymbiform or racemiform synflorescence, pedunculate; receptacle with dense bristles 5–7 mm ..... 161. *S. sordida*
2b. Capitula in a corymbiform synflorescence; leaf blade 0.8–2 cm wide.
4a. Leaf blade abaxially grayish green and densely sericeous-tomentose, adaxially green ..... 158. *S. souliei*
4b. Leaf blade concolorous, green, abaxially not sericeous-tomentose.
5a. Stem not winged.
6a. Plants 10–50 cm tall; stem ca. 0.5 cm in diam.; involucre campanulate, less than 2 cm in diam. ..... 154. *S. krylovii*
6b. Plants 60–70 cm tall; stem 1–1.5 cm in diam.; involucre hemispheric-campanulate, more than 2 cm in diam. ..... 160. *S. megacephala*
5b. Stem winged.
7a. Leaf blade retrorsely denticulate, apex obtuse to acute; lower stem leaves petiolate ..... 156. *S. sylvatica*

7b. Leaf blade coarsely sinuate-dentate, apex acuminate; lower stem leaves sessile.
8a. Capitula pedunculate; involucre 2–3.5 cm in diam.; middle stem leaves ovate to narrowly ovate ..... 157. *S. sobarocephala*
8b. Capitula subsessile; involucre 1.5–2 cm in diam.; middle stem leaves narrowly ovate-triangular to linear ..... 159. *S. semifasciata*
1b. Leaf blade narrowly linear or narrowly elliptic, 0.1–1 cm wide, margin entire or inconspicuously dentate; capitula solitary or rarely 2.
9a. Capitula obconic; uppermost leaves and phyllaries dark purple ..... 142. *S. tibetica*
9b. Capitula campanulate; uppermost leaves green and phyllaries straw-colored, brown, or green, sometimes purplish tinged.
10a. Phyllaries villous, with brown and white hairs.
11a. Achene glabrous; plants 7–45 cm tall ..... 148. *S. brunneopilosa*
11b. Achene densely white villous; plants 2–6 cm tall.
12a. Leaves abaxially white, densely villous, adaxially green, sparsely pilose ..... 149. *S. pubescens*
12b. Leaves concolorous, grayish white, densely sericeous ..... 150. *S. sericea*
10b. Phyllaries white lanate, villous, or glabrous, without brown hairs.
13a. Leaf blade with stalked glandular hairs ..... 141. *S. schlagintweitii*
13b. Leaf blade without stalked glandular hairs.
14a. Stem base densely covered with fibrously lacerate remains of old leaves ..... 144. *S. romuleifolia*
14b. Stem base not densely covered with fibrously lacerate remains of old leaves.
15a. Leaf blade concolorous, grayish white, lanate, sericeous, or pubescent.
16a. Outer phyllaries reflexed; leaf apex obtuse ..... 147. *S. loriformis*
16b. Outer phyllaries erect and appressed; leaf apex acuminate ..... 152. *S. leucophylla*
15b. Leaf blade abaxially subglabrous, lanate, or tomentose, adaxially green, glabrous or sparsely arachnoid and glabrescent.
17a. Stem densely and fluffily lanate; base of basal and lower stem leaves widened into a membranous sheath ..... 145. *S. graminifolia*
17b. Stem glabrous, appressed tomentose, or pilose; base of basal and lower stem leaves not widened into a membranous sheath.
18a. Achene densely gland-dotted; corolla white or pink; leaf blade sometimes pinnately lobed ..... 151. *S. cinerea*
18b. Achene glabrous; corolla purple; leaf blade always undivided.
19a. Leaf blade narrowly elliptic, 3–5 mm wide; involucre 1–1.2 cm in diam. ..... 143. *S. rockii*
19b. Leaf blade narrowly linear, 1–3 mm wide; involucre 1.5–2.5 cm in diam.
20a. Leaf blade abaxially grayish white and lanate tomentose ..... 146. *S. graminea*
20b. Leaf blade abaxially green, glabrous or glabrescent ..... 153. *S. schanginiana*

141. Saussurea schlagintweitii Klatt, Sitzungsber. Math.-Phys. Cl. Königl. Akad. Wiss. München 8: 94. 1878.

腺毛风毛菊 xian mao feng mao ju

Saussurea glanduligera Schultz Bipontinus ex J. D. Hooker.

Herbs 10–20 cm tall, perennial, sometimes caespitose. Caudex branched, with several sterile leaf rosettes and flowering stems. Stem solitary, erect, simple, covered at base with remains of petioles. Rosette and basal stem leaves petiolate; petiole adaxially densely white lanate or sericeous at base; leaf blade narrowly elliptic to linear, 2–10 × 0.7–1.2 cm, both surfaces green and densely glandular hairy, margin sinuate-dentate. Middle and upper stem leaves similar to lower ones. Capitulum solitary, terminal on stem, usually surrounded by uppermost linear leaves. Involucre broadly campanulate, 2.5–3.5 cm in diam. Phyllaries in 3 or 4 rows, narrowly triangular-ovate to subulate, densely villous, apex acuminate; outer phyllaries green, 12–20 × 2–3 mm; middle and inner phyllaries purple, 1.8–2 × 0.1–0.2 cm. Corolla purplish red, 1.5–1.7(–2.5) cm, tube 7–8 mm, limb 8–9 mm, lobes 4–5 mm. Achene cylindric or obconic, 4–5 mm, 4-angled, apically with glands. Pappus pale brown or purplish; outer bristles 1–4 mm; inner bristles 1.2–1.4 cm. Fl. and fr. Jul–Sep.

Scree slopes, grasslands, rock crevices; 4700–5500 m. SW Xinjiang (Yecheng), W Xizang [NW India, Kashmir].

142. Saussurea tibetica C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 242. 1894.

西藏风毛菊 xi zang feng mao ju

Herbs 8–25 cm tall, perennial. Caudex simple or few branched. Stem solitary, erect, simple. Rosette and basal leaves petiolate; leaf blade linear, 3–12 × 0.1–0.7(–1) cm, abaxially grayish green and white tomentose, adaxially green or purplish, glabrous, base attenuate, margin revolute and entire or very shallowly crenate, apex acute or obtuse. Stem leaves few, similar to basal leaves, but sessile, base amplexicaul. Uppermost stem leaves usually dark purple. Capitula solitary or 2, terminal on stem. Involucre obconic, 1.5–2 cm in diam. Phyllaries in 3 or 4 rows, dark purple, densely to sparsely villous, apex acumi-

nate; outer phyllaries narrowly triangular-ovate, 8–10 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 10–12 × 2–3 mm; inner phyllaries linear, 12–14 × 1–2 mm. Corolla purple, 0.9–1.2 cm, glabrous, tube 5–7 mm, limb 4–6 mm, lobes 2.5–4 mm. Achene narrowly obconic, 3.5–4 mm, glabrous, 5-angled, apex with a short crown. Pappus dirty white to pale yellowish brown; outer bristles 1–4 mm; inner bristles 7–11 mm. Fl. and fr. Jul–Aug. $2n = 36$*.

• Alpine pastures and meadows; 3400–4700 m. Qinghai, NW Sichuan (Sêrxü), N Xizang.

143. Saussurea rockii J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 211. 1934.

显鞘风毛菊 xian qiao feng mao ju

Herbs 10–15 cm tall, perennial, caespitose. Caudex stout, branched, densely covered with blackish brown remains of petioles, sterile leaf rosettes, and flowering stems. Stem ca. 4 mm in diam., erect, simple. Rosette and basal leaves sessile, narrowly elliptic to linear, 5–9 × 0.2–0.5 cm, abaxially grayish green and densely tomentose, adaxially green or yellowish green, sparsely pilose, glabrescent, and nitid, base widened and sheathing, margin revolute and entire or denticulate, apex acute. Stem leaves few, similar to basal leaves. Uppermost stem leaves subtending and exceeding capitulum, merging into phyllaries. Capitulum solitary, terminal on stem. Involucre turbinate-campanulate, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, sparsely to densely villous, apex acuminate; outer phyllaries narrowly ovate, 12–13 × 2.5–3 mm; middle phyllaries narrowly elliptic, 12–13(–16) × 2–3 mm; inner phyllaries broadly linear, 14–15 × 1.5–2 mm. Corolla dark purple, 0.9–1.1(–1.5) cm, tube 4–5 mm, limb 5–6 mm, lobes 2.5–3 mm. Achene brown, ca. 2.5 mm, glabrous, apex with a short crown. Pappus pale brown; outer bristles 1.5–3 mm; inner bristles 7–8 mm. Fl. and fr. Sep–Oct.

• Rocky slopes; 2700–3900 m. NW Yunnan (Gongshan, Lijiang).

144. Saussurea romuleifolia Franchet, J. Bot. (Morot) 2: 339. 1888.

鸢尾叶风毛菊 yuan wei ye feng mao ju

Herbs 10–40 cm tall, perennial, rarely almost stemless. Caudex fusiform, densely covered with many fibrous remains of leaves. Stem solitary, erect, simple. Leaves sessile, narrowly linear, (3–)15–25(–45) × 0.1–0.2(–0.5) cm, longer than stem, rigid, abaxially grayish white and sparsely pubescent, adaxially green and glabrous, margin revolute and entire, apex acute. Capitulum solitary, terminal on stem. Involucre turbinate-campanulate, 2–2.5(–3.5) cm in diam. Phyllaries in ca. 5 rows, apically purple, sericeous, margin entire or denticulate, apex long acuminate; outer phyllaries narrowly triangular-ovate, 13–20 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 2–2.5 × 0.2–0.4 cm; inner phyllaries linear, 2.5–3.2 × 0.1–0.2 cm. Corolla purple, 1.8–2.5(–3) cm, gland-dotted, tube 0.6–2 cm, limb 0.9–1.2 cm, lobes 6–7 mm. Achene 4–5 mm, apex with a short crown. Pappus dirty white; outer bristles 1–5 mm; inner bristles 1.9–2.2 cm. Fl. and fr. Jul–Aug.

• Grasslands on mountain slopes, forests, forest margins; 2200–4000 m. W Sichuan, SE Xizang (Zayü), NW Yunnan.

145. Saussurea graminifolia Wallich ex Candolle, Prodr. 6: 536. 1838.

密毛风毛菊 mi mao feng mao ju

Herbs 7–20 cm tall, perennial. Caudex branched, with sterile leaf rosettes and flowering stems. Stem solitary, erect, simple, densely white lanate. Basal leaves sessile, narrowly linear, 3–14 × 0.1–0.2 cm, abaxially grayish white and densely lanate, adaxially green and glabrous, base widened and sheathlike, margin revolute and entire, apex acuminate. Stem leaves similar to basal leaves, reflexed, basally widened to a purple membranous sheath. Capitulum solitary, terminal on stem. Involucre subglobose, 1.8–2.5 cm in diam. Phyllaries in 4 or 5 rows, lanate; outer phyllaries narrowly ovate-elliptic, 7–15 × 2–4 mm, apically purple, apex long acuminate and reflexed; middle phyllaries narrowly ovate-elliptic, 9–15 × 1.5–3 mm; inner phyllaries linear, 10–15 × 1–2 mm. Corolla purple, 1.1–1.2 cm, glabrous, tube 4–5 mm, limb 6–7 mm, lobes 3–3.5 mm. Achene cylindric, ca. 3 mm, glabrous, apex with a short crown. Pappus pale yellowish brown; outer bristles 1–3 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Sep. $2n = 32$*.

Grasslands on mountain slopes, grasslands near gravel beaches; 4500–4700 m. S Xizang [Bhutan, NW India, Kashmir, Nepal].

146. Saussurea graminea Dunn, J. Linn. Soc., Bot. 35: 509. 1903.

禾叶风毛菊 he ye feng mao ju

Herbs 3–40 cm tall, perennial, caespitose, often in large clumps. Caudex much branched, apically covered with fibrous remains of old leaf bases, sterile leaf rosettes, and flowering stems. Stem erect, simple, densely sericeous or pubescent. Basal leaves sessile, narrowly linear, 3–15 × 0.1–0.3 cm, abaxially densely tomentose, adaxially sparsely pubescent to subglabrous, base sheathing stem, margin revolute and entire, apex acuminate. Stem leaves few, gradually smaller upward on stem. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–1.8 cm in diam. Phyllaries in 4 or 5 rows, sparsely to densely to sericeous-villous; outer phyllaries narrowly ovate, 10–12 × 2–3 mm, apically reflexed or erect, apex long acuminate; middle phyllaries narrowly ovate-elliptic, ca. 12 × 2 mm; inner phyllaries linear, ca. 12 × 1 mm. Corolla purple, 1.4–1.6 cm, sometimes gland-dotted, tube 6–8 mm, limb 6–9 mm, lobes 4–4.5 mm. Achene cylindric, 3–4 mm, glabrous, apex with a short crown. Pappus pale yellowish brown; outer bristles 1–3 mm; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep. $2n = 32$*.

• Alpine and montane grasslands and steppes, meadows, thickets; 3000–5400 m. Gansu, Nei Mongol, Ningxia, Qinghai, W Sichuan, Xizang, NW Yunnan.

1a. Outer phyllaries densely lanate, apically reflexed ..... 146a. var. *graminea*

1b. Outer phyllaries sparsely pubescent, apically erect ..... 146b. var. *ortholepis*

146a. Saussurea graminea var. **graminea**

禾叶风毛菊(原变种) he ye feng mao ju (yuan bian zhong)

Saussurea geraeocephala Diels; *S. lanicaulis* Handel-Mazzetti; *S. poophylla* Diels.

Outer phyllaries densely lanate, apically reflexed.

• Alpine and montane grasslands and steppes, meadows, thickets; 3000–4400 m. Gansu, Nei Mongol, Ningxia (Liupan Shan), W Sichuan, NW Yunnan (Ninglang, Zhongdian).

146b. Saussurea graminea var. **ortholepis** Handel-Mazzetti, Acta Horti Gothob. 12: 339. 1938.

直鳞禾叶风毛菊 zhi lin he ye feng mao ju

Saussurea romuleifolia Franchet var. *ortholepis* (Handel-Mazzetti) Handel-Mazzetti ex S. Y. Hu.

Outer phyllaries appressed, sparsely pubescent, apically erect.

• Alpine and montane steppes; 3300–5400 m. Gansu, Qinghai, W Sichuan, Xizang.

In S. W. Liu (Fl. Qinghai. 3: 465 1996) this taxon was treated under *Saussurea eopygmaea*. Plants from S Qinghai (Chindu, Nangqên, Yushu) often have several (2–4) clustered heads and usually grow taller (10–40 cm); they may deserve separate taxonomic status.

147. Saussurea loriformis W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 114. 1913.

带叶风毛菊 dai ye feng mao ju

Herbs 10–15 cm tall, perennial, caespitose. Caudex thick, densely covered with dark brown remains of leaf sheaths. Stem erect, simple, grayish white, lanate. Basal and stem leaves sessile, linear, 2–8 × 0.2–0.4 cm, abaxially grayish white and densely lanate, adaxially brownish or yellowish and lanate, base widened and sheathing stem, margin entire, apex obtuse. Capitulum solitary, terminal on stem. Involucre campanulate, 2–3 cm in diam. Phyllaries in 4 or 5 rows, narrowly ovate-elliptic to linear, densely villous, apex acuminate; outer phyllaries ca. 8 × 2 mm, apically reflexed; middle phyllaries ca. 13 × 2 mm, apically reflexed; inner phyllaries ca. 13 × 2 mm, apex acuminate. Corolla pale reddish purple, 1.1–1.2 cm, tube 8–9 mm, limb ca. 3 mm. Achene black, ca. 2.6 mm, apex with a short crown. Pappus white; outer bristles ca. 2 mm; inner bristles ca. 1 cm. Fl. and fr. Jun–Sep.

• Alpine scree slopes, grassy slopes, thickets; 4100–5100 m. W Sichuan, Xizang, NW Yunnan (Dêqên, Lijiang, Zhongdian).

148. Saussurea brunneopilosa Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 651. 1937.

异色风毛菊 yi se feng mao ju

Saussurea brunneopilosa var. *eopygmaea* (Handel-Mazzetti) Lipschitz; *S. eopygmaea* Handel-Mazzetti.

Herbs 7–45 cm tall, perennial. Caudex branched, covered with fibrous remains of leaf sheaths, sterile leaf rosettes, and flowering stems. Stem solitary, erect, simple. Rosette and basal leaves sessile, narrowly linear, 3–10(–15) × ca. 0.1 cm, abaxially white and densely sericeous, adaxially green and glabrous, basally widened and sheathing stem, margin revolute and entire. Stem leaves similar to basal leaves. Capitulum solitary, terminal on stem. Involucre broadly campanulate, ca. 2 cm in diam. Phyllaries in ca. 4 rows, apically purple, densely brown and white villous; outer phyllaries ovate-elliptic, 7–8 × 2–3 mm, apically usually reflexed, apex long acuminate; middle phyllaries narrowly ovate-elliptic, 8–10 × 2–3 mm; inner phyllaries narrowly ovate to linear, 10–12 × 1–1.5 mm. Receptacle bristles 4–5 mm. Corolla purple to pink, 1.2–1.4 cm, sometimes gland-dotted, tube 6–7 mm, limb 5–7 mm, lobes 3.5–4 mm. Achene obconic, 3.5–4 mm, glabrous, apex with a denticulate crown. Pappus yellowish brown; outer bristles 1–2 mm, barbellate to plumose; inner bristles 0.9–1.1 cm. Fl. and fr. Jul–Sep. $2n$ = 30*.

• Alpine pastures and meadows, grassy slopes among rocks; 2900–4900 m. Gansu, Qinghai.

The plants treated as *Saussurea eopygmaea* by S. W. Liu (Fl. Qinghai. 3: 465 1996) usually lack the typical brown hairs on the phyllaries and belong to *S. graminea*. The type specimen of *S. eopygmaea* is intermediate between *S. brunneopilosa* and *S. graminea* var. *ortholepis*.

149. Saussurea pubescens Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 95. 1981.

毛果风毛菊 mao guo feng mao ju

Herbs to 6 cm tall, perennial. Caudex branched, apically covered with brown remains of leaf sheaths, sterile leaf rosettes, and flowering stems. Stem erect, simple, densely white lanate. Basal leaves sessile, linear, 3–8 × 0.2–0.3 cm, abaxially densely lanate and with a conspicuous midvein, adaxially sparsely pilose, base somewhat widened, sheathing stem, and densely lanate, margin revolute, apex acute to acuminate. Stem leaves few, shorter. Capitula 1 or 2, terminal on stem. Involucre campanulate, (0.6–)1.5–2 cm in diam. Phyllaries in 3 or 4 rows, densely brown villous; outer phyllaries green, narrowly ovate, ca. 10 × 2 mm, apically reflexed, apex long acuminate; inner phyllaries basally straw-colored but apically purplish red, linear, 13–15 × 1–2 mm. Corolla dark pink, 1.2–1.3 cm, tube 5–6 mm, limb ca. 7 mm, lobes ca. 3 mm. Achene cylindric, ca. 2 mm, densely white villous. Pappus pale brown but basally purplish. Fl. and fr. Jul–Sep.

• Mountain slopes; ca. 4900 m. SC Xizang (Namling).

Saussurea pubescens is only known from the type collection.

150. Saussurea sericea Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 96. 1981.

绢毛风毛菊 juan mao feng mao ju

Herbs 2–3 cm tall, perennial, caespitose. Caudex branched, covered with brown remains of leaf sheaths. Stem erect, simple, white sericeous. Leaves sessile, linear, 1–2.5 × 0.2–0.3 cm, both surfaces grayish white, densely sericeous, and with a conspicuous midvein, base somewhat widened and sheathing stem, apex acute. Capitulum solitary, terminal on stem. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 3 or 4 rows, densely brown villous; outer phyllaries green, narrowly ovate-elliptic, 8–10 × 2–2.5 mm, apically reflexed; middle and inner phyllaries basally yellowish green and apically purplish red, linear, 10–12 × 1–2 mm. Corolla purplish red, 0.9–1.3(–1.6) cm, usually gland-dotted, tube 4–6(–9.5) mm, often with hairs, limb 5–7 mm, lobes 3–4.5 mm. Achene cylindric, 2–3 mm, densely white villous. Pappus straw-colored; outer bristles 0.5–2 mm, inner bristles basally purple, 1–1.2 cm. Fl. and fr. Jul–Sep.

• Mountain slopes, scree slopes, alpine mats; 5000–5200 m. SC Xizang (Lhünzê).

The reported records of *Saussurea sericea* from Bhutan and India (Sikkim) (Grierson & Springate, Fl. Bhutan 2(3): 1442. 2001) do not belong here because the achenes from these collections are glabrous and not white villous.

151. Saussurea cinerea Franchet, Bull. Mus. Hist. Nat. (Paris) 3: 324. 1897.

昆仑风毛菊 kun lun feng mao ju

Saussurea pusilla Lipschitz.

Herbs 3–7(–9) cm tall, perennial, stemless or shortly stemmed. Caudex long and thin, ascending, apically branched, covered with brownish remains of leaf sheaths. Stems solitary or few, erect, simple, arachnoid tomentose. Basal leaves indistinctly petiolate; leaf blade narrowly linear, 1–7 × 0.1–0.4 cm, undivided or pinnately lobed, abaxially grayish white and arachnoid tomentose, adaxially grayish green and arachnoid, margin revolute and entire or sparsely dentate, apex acute. Stem leaves few, shortly petiolate; petiole basally widened, semiamplexicaul; leaf blade gradually smaller upward on stem. Capitula solitary or 2, terminal on stem. Involucre cylindric to campanulate, (0.6–)1–1.5 cm in diam. Phyllaries in 4 or 5 rows, pale green, densely lanate, apex acuminate; outer phyllaries ovate to narrowly ovate, ca. 5 × 2 mm; middle phyllaries narrowly ovate-elliptic, 5–10 × 2–2.5 mm; inner phyllaries narrowly elliptic to linear, 10–13 × 1.5–2 mm. Receptacle naked or with very short papillae but without bristles. Corolla pink or white, 1.5–1.7 cm, sparsely gland-dotted, tube 8–9 mm, limb 6–8 mm, lobes 2.5–3 mm. Achene brown, cylindric, 3–5 mm, ribbed, densely gland-dotted. Pappus dirty white; outer bristles 0.5–3.5 mm, plumose; inner bristles 1.2–1.4 cm. Fl. and fr. Jul–Aug.

• Alpine stony slopes, scree slopes, grazed areas, silt or mud; 3000–3800 m. S Xinjiang (Kunlun Shan).

152. Saussurea leucophylla Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg 10: 354. 1842.

白叶风毛菊 bai ye feng mao ju

Herbs 3–12 cm tall, perennial, caespitose. Caudex branched, with many sterile leaf rosettes and flowering stems, covered with brown fibrous remains of old leaf sheaths. Stem erect, simple, purple and densely sericeous. Rosette and basal stem leaves sessile, narrowly linear, 3–8 × 0.1–0.2 cm, both surfaces grayish white and lanate, base widened and sheathing stem, margin revolute and entire, apex acuminate. Capitulum solitary, terminal on stem. Involucre obconic, 2.5–3.5 cm in diam. Phyllaries in 3 or 4 rows, purple, white villous; outer phyllaries ovate, 10–12 × 4–5 mm, apex acuminate to caudate; middle phyllaries narrowly ovate-elliptic, 12–15 × 2–4 mm; inner phyllaries linear, 14–15 × 1–2 mm. Corolla rose-purple, 1.6–1.8 cm, tube 9–10 mm, limb 7–9 mm, lobes 5–6 mm. Achene brown, cylindric, ca. 2 mm, apex with a short crown. Pappus yellowish brown; outer bristles 1–3 mm; inner bristles 1.1–1.5 cm. Fl. and fr. Jul–Aug.

Alpine pastures and meadows, mountain slopes; 2600–4000 m. Xinjiang [Kazakhstan, Kyrgyzstan, W Mongolia, Russia (Siberia), Tajikistan].

153. Saussurea schanginiana (Wydler) Fischer ex Sergievskaya in Krylov, Fl. Zapadnoi Sibiri 11: 2906. 1949.

暗苞风毛菊 an bao feng mao ju

Lagurostemon pygmaeus (Jacquin) Cassini var. *schanginianus* Wydler, Linnaea 5: 427. 1830 [*"Schanginiana"*]; *Saussurea pygmaea* (Jacquin) Sprengel var. *schanginii* Candolle, nom. illeg. superfl.

Herbs [4–]10–34 cm tall, perennial. Stems solitary or few, erect, simple. Leaves sessile, narrowly elliptic to linear, 4–20 × 0.1–0.5(–1) cm, both surfaces dark green and sparsely villous to subglabrous, margin entire or sparsely denticulate, apex acute to acuminate. Capitulum solitary, terminal on stem. Involucre campanulate, 1–2 cm in diam. Phyllaries in ca. 3 rows, villous, subequal in length; outer and middle phyllaries ovate-triangular to narrowly elliptic, 14–15 × 3–4 mm; inner phyllaries narrowly elliptic to linear, 14–15 × 1–1.5 mm. Receptacle bristles 3–5 mm. Corolla violet, 1.4–1.6 cm, tube 7–9(–10) mm, limb 6–7 mm, lobes 3–5 mm. Achene brown, cylindric, 5–6 mm, ribbed, apex with a short crown. Pappus dirty white to light brown; outer bristles 1–4 mm; inner bristles 1–1.2 cm. Fl. and fr. Jul–Aug. $2n = 36$.

Alpine meadows, tundra, scree and rocky slopes; 2100–2800 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia)].

154. Saussurea krylovii Schischkin & Sergievskaya, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1944(1): 1. 1944.

阿尔泰风毛菊 a er tai feng mao ju

Herbs 10–50 cm tall, perennial. Stem solitary, erect, simple. Basal and lower stem leaves shortly petiolate; leaf blade narrowly elliptic to linear, 10–20 × 0.6–1.5 cm, both surfaces green and scabrid, margin sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile, gradually smaller upward on stem. Capitula (1 or)2–4, in a corymbiform synflorescence, shortly pedunculate. Involucre campanulate, to 2 cm in diam. Phyllaries in ca. 3 rows; outer phyllaries ovate to narrowly elliptic; inner phyllaries narrowly elliptic, apex long acuminate. Receptacle bristles to 5 mm. Corolla dirty violet, 1.3–1.4(–1.6) cm, tube 7–8 mm, limb 5–6 mm, lobes ca. 3 mm. Achene brown, cylindric, (3–)5–7 mm. Pappus dirty white; outer bristles 1–2 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep.

Alpine meadows, forest margins; 2300–2800 m. N Xinjiang [Kazakhstan, Mongolia, Russia (W Siberia)].

155. Saussurea baicalensis (Adams) B. L. Robinson, Proc. Amer. Acad. Arts 47: 216. 1911.

大头风毛菊 da tou feng mao ju

Liatris baicalensis Adams, Mém. Soc. Imp. Naturalistes Moscou 5: 115. 1817; *Saussurea calobotrys* Diels; *S. pycnocephala* Ledebour.

Herbs 30–45(–60) cm tall, perennial. Stem solitary, 0.8–1.5 cm in diam., erect, simple, covered at base with lacerate remains of leaf sheaths. Leaves shortly petiolate; leaf blade narrowly ovate to narrowly elliptic, 10–20 × 1–3 cm, both surfaces

green and scabrous, abaxially glabrous, adaxially sparsely villous to subglabrous, base cuneate, margin dentate, apex acute to acuminate. Capitula 7–16, in a dense racemiform 10–25 cm synflorescence, sessile or shortly pedunculate, subtended by narrowly triangular-ovate herbaceous bracts. Involucre campanulate, 1.5–2.5(–3) cm in diam. Phyllaries in 3 or 4 rows, green but dark on midvein and apically, narrowly triangular-ovate, 1.5–2.2 × 0.2–0.4 cm, villous, apex acute to acuminate. Receptacle with apiculate papillae or short to 3 mm bristles. Corolla purple, 1.5–1.7 cm, tube 8–9 mm, limb 7–8 mm, lobes 4–4.5 mm. Achene brown, cylindric, 5–6 mm, ribbed, apex with a short crown. Pappus straw-colored; outer bristles 2–5 mm; inner bristles 1.3–1.4 cm. Fl. and fr. Jun–Jul. $2n = 26, 36$.

Alpine meadows, around exposed ledges and boulders; 2000–3200 m. Hebei (Dongling Shan, Xiaowutai Shan) [Mongolia, Russia (Siberia)].

Material of *Saussurea baicalensis* from both known localities in China has receptacle bristles to 3 mm.

156. Saussurea sylvatica Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 495. 1882.

林生风毛菊 lin sheng feng mao ju

Saussurea hsiaowutaishanensis F. H. Chen; *S. sylvatica* var. *hsiaowutaishanensis* (F. H. Chen) Lipschitz.

Herbs 20–80 cm tall, perennial. Stem 2–4 mm in diam., erect, simple or apically branched, with dentate wings, covered at base with fibrous remains of petioles. Lower stem leaves petiolate; petiole 1–5 cm; leaf blade narrowly elliptic, obovate, or narrowly ovate, (3–)7–13 × 0.8–2 cm, abaxially glaucous, adaxially green and glabrous or sparsely pubescent, base cuneate, margin denticulate, apex rounded to subacute. Middle and upper stem leaves sessile, narrowly ovate-elliptic, 3.5–12 × 0.5–1.5 cm, base decurrent, apex acute. Uppermost stem leaves narrowly triangular to subulate-linear, 2–4 × 0.1–0.5 cm. Capitula 1–6, in a ± condensed corymbiform synflorescence, sessile to long pedunculate. Involucre campanulate, 1.2–2 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, pilose-sericeous to glabrescent, apex acute to acuminate; outer phyllaries ovate-triangular, 6–7 × 2–4 mm; middle and inner phyllaries narrowly triangular-ovate to linear, 7–15 × 2–3 mm. Corolla purple, 1.5–1.6 cm, tube 8–8.5 mm, limb 7–7.5 mm, lobes 3–3.5 mm. Achene brown, cylindric, 5–5.5 mm, 4- or 5-angled, glabrous, with a short crown. Pappus brown; outer bristles (2–)3–5 mm; inner bristles 1.2–1.3 cm. Fl. and fr. Jun–Sep. $2n = 30$*.

• Alpine and montane grasslands, thickets, forest margins; 1900–4500 m. Gansu, Hebei (Xiaowutai Shan), Qinghai, Shaanxi, Shanxi, Sichuan.

157. Saussurea sobarocephala Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 108. 1905.

昂头风毛菊 ang tou feng mao ju

Herbs 20–60 cm tall, perennial. Stem solitary, erect, simple or apically branched, winged, covered at base with numerous fibrous remains of old petioles. Basal and lower stem leaves sessile, ovate to oblong, 8–12 × 1–2 cm, both surfaces green and glabrous, base decurrent, margin serrulate, apex acute. Middle and upper stem leaves ovate to narrowly ovate, gradually smaller upward on stem, 4–7 × 1–1.5 cm, apex long acuminate. Capitula 2–11, in a corymbiform synflorescence, sessile to pedunculate. Involucre campanulate to hemispheric, 2–3.5 cm in diam. Phyllaries in 4 or 5 rows, usually black, apex acuminate; outer phyllaries narrowly ovate-triangular, 10–15 × 2–3(–5) mm; middle and inner phyllaries narrowly elliptic to linear, (10–)15–20 × 1–3(–4) mm. Corolla purple, 1.6–1.7 cm, glabrous, tube 9–10 mm, limb 5–6 mm, lobes 3.5–4 mm. Achene cylindric, 5–6 mm, ribbed, apex with a short crown. Pappus pale yellowish brown; outer bristles 1–5 mm, scabrid; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Aug. $2n = 34$*.

• Forest margins, grasslands on mountain slopes; 1900–3600 m. Hebei, Henan, Shaanxi, Shanxi, Sichuan.

Saussurea sobarocephala has often been confused with *S. sylvatica*.

158. Saussurea souliei Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 147. 1891.

披针叶风毛菊 pi zhen ye feng mao ju

Herbs 35–55 cm tall, perennial. Stem solitary, 3–5 mm in diam., erect, simple, winged, covered at base with lacerate remains of leaf sheaths. Leaves sessile, narrowly ovate-elliptic, 7–10 × 1.5–2 cm, abaxially grayish white and sericeous-tomentose, adaxially dark green and pubescent, base decurrent, margin dentate, apex acute. Capitula 10–20(–30), in a subglobose, densely congested corymbiform synflorescence 4–5 cm in diam., shortly pedunculate. Involucre campanulate to globose, 0.8–1.2 cm in diam. Phyllaries in 6–8 rows, basally brown to straw-colored, apically green, villous, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, 4–6 × ca. 2 mm; middle phyllaries narrowly ovate-elliptic, 6–8 × 2–3 mm; inner phyllaries linear, 8–12 × 1.5–2 mm. Corolla purple, ca. 1.2 cm, tube ca. 6 mm, limb ca. 6 mm, lobes ca. 3 mm. Pappus dirty white; inner bristles ca. 8 mm. Fl. Aug.

• W Sichuan (Kangding).

159. Saussurea semifasciata Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 100. 1923.

锯叶风毛菊 ju ye feng mao ju

Herbs 15–100 cm tall, perennial. Stem solitary, 6–8 mm in diam., erect, simple or apically branched, with sinuate-lobate, dentate wings, covered at base with fibrous remains of leaf sheaths. Leaves sessile, narrowly ovate-triangular, 5–18 × 0.8–2 cm, abaxially green and glabrous, adaxially dark green and sparsely arachnoid, base decurrent, margin sinuate-lobate and doubly dentate, apex acute to long acuminate. Capitula 8–25, in a basally lax but apically clustered corymbiform synflorescence, long pedunculate to subsessile. Involucre broadly campanulate to subglobose, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, basally brown or straw-colored, apically green with a blackish to black margin, pilose, apex acute; outer phyllaries narrowly triangular-ovate, 8–10 × 2–3 mm; middle phyllaries narrowly elliptic, 10–13 × 1.5–2 mm; inner phyllaries linear, 13–14 × 1–1.5 mm. Corolla red, 1.1–1.5 cm, tube 6–9 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene dark brown, cylindric, ca. 3 mm, obtusely 4-angled, glabrous, apex with a short crown.

Pappus light brown; outer bristles ca. 2 mm; inner bristles 1–1.2 cm. Fl. and fr. Aug–Sep.

• Forests, thickets, near rivers; 3800–4800 m. Gansu, Qinghai, Sichuan, NW Yunnan (Dêqên, Zhongdian).

160. Saussurea megacephala C. C. Chang ex Y. S. Chen, Ann. Bot. Fenn. 48: 142. 2011.

察隅风毛菊 cha yu feng mao ju

Herbs 60–70 cm tall, perennial. Stem solitary, 1–1.7 cm in diam. at base, erect, simple, hollow. Basal and lower stem leaves petiolate; petiole 1–6 cm; leaf blade narrowly elliptic, 13–16 × 1–2.5 cm, both surfaces green and glabrous, base decurrent, margin coarsely sinuate-dentate, apex acute. Middle and upper stem leaves sessile, gradually smaller upward on stem, 4–9 × 0.2–1.2 cm, margin denticulate or entire, apex acuminate. Uppermost stem leaves linear, 10–15 × ca. 1 mm. Capitula 3 or 4, in a clustered corymbiform synflorescence, sessile. Involucre globose, 2–2.5 cm in diam. Phyllaries in 6 or 7 rows, brown, densely villous, apex acuminate; outer phyllaries triangular-oblong, 9–10 × 2.8–3 mm; middle phyllaries ovate-oblong, 8–10 × 2.5–2.8 mm; inner phyllaries narrowly ovate, 14–15 × ca. 2 mm. Receptacle bristles yellowish brown, 5–6 mm. Corolla dark purple, 1.4–1.5 cm, glabrous, tube ca. 7 mm, limb 7–8 mm, lobes ca. 3 mm. Achene brown, cylindric, 2.8–3(–4) × 0.5–1 mm, glabrous. Pappus yellowish white; outer bristles 5–6 mm; inner bristles 1.1–1.4 cm. Fl. Aug.

• *Juniperus* forests; ca. 3500 m. SE Xizang (Zayü).

Saussurea megacephala is only known from the type and is very close to *S. semifasciata*, from which it differs by its petiolate lower leaves, non-decurrent stem leaves, and sessile and glomerate capitula.

161. Saussurea sordida Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 389. 1842.

污花风毛菊 wu hua feng mao ju

Saussurea pycnocephala Ledebour var. *sordida* (Karelin & Kirilov) Herder; *S. russowii* C. Winkler; *S. sordida* var. *oligocephala* C. Winkler ex Lipschitz; *S. tuoliensis* K. M. Shen.

Herbs 40–100 cm tall, perennial. Stem solitary, erect, simple or apically branched, covered at base with fibrous remains of leaf sheaths. Lower stem leaves petiolate; petiole to 10 cm, winged; leaf blade ovate to narrowly ovate-elliptic, 15–40 × 2–7 cm, both surfaces green, abaxially pilose but glabrescent, adaxially scabrid, margin serrulate-dentate, apex acuminate. Middle and upper stem leaves sessile, elliptic to narrowly ovate-elliptic, gradually smaller upward on stem. Capitula solitary to numerous, in a lax corymbiform or racemiform synflorescence, pedunculate. Involucre broadly campanulate, 2–2.5 cm in diam. Phyllaries in 4 or 5 rows, blackish brown or straw-colored with a dark margin, triangular-ovate to narrowly triangular-ovate, pilose but later glabrescent, apex acuminate; outer phyllaries 9–12 × 3–4 mm; middle phyllaries narrowly elliptic, 13–15 × 2–3 mm; inner phyllaries 15–18 × 1.5–2 mm. Corolla purple, 1.2–1.5 cm, tube 5–8 mm, limb 5–9 mm, lobes 2–4 mm. Achene brown with dark spots, cylindric, 5–6 mm, obtusely 4- or 5-angled, glabrous, apex with a short crown. Pappus straw-colored; outer bristles 1–5 mm; inner bristles 1–1.5 cm. Fl. and fr. Jul–Sep.

Meadows, gravelly mountain slopes; 2000–2800 m. C and NW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

According to Lipschitz (Fl. URSS 27: 402. 1962), *Saussurea sordida* is a widespread and very variable taxon, including larger plants from China that had been described as *S. russowii*. Following this wide concept, we also include *S. tuoliensis* here, which perfectly matches *S. russowii*.

6. Saussurea sect. Strictae C. B. Clarke, Compos. Ind. 221. 1876.

羽裂风毛菊组 yu lie feng mao ju zu

Aplotaxis Candolle; *Cyathidium* Lindley ex Royle; *Eriostemon* Lessing (1832), not Smith (1798).

Herbs, perennial, stemless, substemless, or with developed leafy or scapiform stems. Leaves usually pinnately dentate, pinnately lobed, or pinnatisect, rarely undivided. Capitula usually relatively large, solitary, sometimes 2 or 3 in center of leaf rosette or terminal on stem, rarely numerous in a clustered corymbiform synflorescence. Phyllaries in many rows, imbricate, often subequal in length. Receptacle usually with subulate bristles, rarely naked. Anther tails usually lanate or villous. Achene ribbed, smooth or transversely rugose, glabrous. Pappus usually in 2 rows, white, straw-colored, or brown; outer bristles short, deciduous, scabrid, rarely plumose or barbellate, rarely lacking; inner bristles long, plumose.

About 44 species: Bhutan, China, NE and NW India, Kashmir, Nepal; 36 species (27 endemic) in China.

Saussurea sect. *Strictae* occurs mainly on the Qinghai-Xizang Plateau and in the Hengduan Shan region.

Saussurea sect. *Cyathidium*, the name used by Lipschitz (Rod *Saussurea*, 154. 1979) for both stemless and cauliferous species with predominantly pinnately divided and often dandelion-like leaves, is not the earliest legitimate name for this taxon at sectional rank. *Saussurea taraxacifolia*, the type species of the genus *Cyathidium*, was included in *S.* sect. *Strictae* by C. B. Clarke (loc. cit.) and chosen as a lectotype of that section by Lipschitz (loc. cit.: 155). *Saussurea andersonii*, the lectotype species of *S.* sect. *Depressae*, is considered here to be a member of *S.* sect. *Strictae* as well. *Saussurea* sect. *Acaules*, lectotypified by Kitamura (Acta Phytotax. Geobot. 24: 22. 1969) with *S. stoliczkae* (= *S. andryaloides*), is also a synonym of this section. See also the discussion under *S.* sect. *Gymnocline*.

1a. Plants stemless or shortly stemmed, less than 10 cm tall; capitula usually in center of leaf rosette, exceeded by leaves.
2a. Leaf blade undivided with margin entire, shallowly crenate, or sinuate-dentate.
3a. Leaf blade 1–4 cm; involucre narrowly campanulate, 1–1.5 cm in diam. ..... 185. *S. dschungdienensis*

3b. Leaf blade 3–11 cm; involucre broadly campanulate, 2–3.5 cm in diam.
4a. Leaf blade narrowly elliptic to linear, 0.4–1.2 cm wide; inner phyllaries to 1.5 cm; achene transversely rugose ..... 172. *S. lhunzhubensis*
4b. Leaf blade elliptic, 1–3.5 cm wide; inner phyllaries 2–2.5 cm; achene smooth ..... 184. *S. arenaria*
2b. Leaf blade bipinnatisect, pinnatisect, pinnately lobed, or pinnately dentate.
5a. Leaf blade bipinnatisect or pinnatisect with split segments.
6a. Leaf blade narrowly elliptic, 6–15 cm; involucre campanulate, 2–2.5 cm in diam. ..... 180. *S. colpodes*
6b. Leaf blade narrowly elliptic-linear, 3–5 cm; involucre cylindric to narrowly campanulate, 1–1.5 cm in diam. ..... 186. *S. lavrenkoana*
5b. Leaf blade simply pinnatisect, pinnately lobed to pinnately dentate, or lyrate-pinnately lobed.
7a. Leaf blade adaxially grayish green, ± arachnoid tomentose.
8a. Involucre 2–3 cm in diam.; receptacle without bristles; leaf blade obovate-oblong to elliptic, 2–4 cm wide; phyllaries whitish, with a purple mucro ..... 178. *S. porphyroleuca*
8b. Involucre 1–2 cm in diam.; receptacle with bristles; leaf blade narrowly ovate-elliptic, 0.3–1.5 cm wide; phyllaries purplish red, without a purple mucro ..... 187. *S. andryaloides*
7b. Leaf blade adaxially green, glabrous, scabrid and strigose, or sparsely arachnoid.
9a. Capitula several in a clustered or lax corymbiform synflorescence; involucre ovoid or campanulate, 0.5–1.2 cm in diam.
10a. Plants usually stemless, 1–5 cm tall; leaf blade narrowly elliptic to linear, 0.5–1.5 cm wide; capitula usually 3–10, in a clustered synflorescence; pappus brown, in 1 row ..... 183. *S. salwinensis*
10b. Plants with a ± developed stem, 5–10(–15) cm tall; leaf blade obovate to narrowly obovate, 1–3 cm wide; capitula usually 2–5, in a lax synflorescence; pappus dirty white, in 2 rows ..... 191. *S. nimborum*
9b. Capitula always solitary; involucre usually campanulate, 1–4 cm in diam.
11a. Leaf blade abaxially pale green, subglabrous, sparsely pilose on veins and margin ..... 188. *S. andersonii*
11b. Leaf blade abaxially grayish green or grayish white, densely tomentose or thinly to moderately lanate.
12a. Outer pappus bristles 8–11 mm, plumose; leaf blade abaxially thinly to moderately lanate ..... 197. *S. donkiah*
12b. Outer pappus bristles 1–6 mm, scabrid; leaf blade abaxially densely tomentose.
13a. Leaf blade adaxially smooth, sparsely arachnoid ..... 195. *S. leiocarpa*
13b. Leaf blade adaxially scabrid, strigose or glandular, or glabrous but not arachnoid.
14a. Leaf blade linear, 0.3–0.8 cm wide.
15a. Leaf blade pinnately lobed or pinnately dentate; involucre broadly campanulate, 2–2.5 cm in diam. ..... 189. *S. purpurascens*
15b. Leaf blade runcinately pinnatisect; involucre narrowly campanulate, 0.6–1 cm in diam. ..... 190. *S. nyalamensis*
14b. Leaf blade narrowly elliptic, oblong, or obovate, 0.8–4 cm wide.
16a. Leaf blade narrowly elliptic, oblong, or broadly linear, pinnatisect; leaf blade lateral lobes 8–20 pairs.
17a. Achene smooth; leaf blade 4–30 × 1–4 cm; leaf blade lateral lobes 8–20 pairs; involucre 2–4 cm in diam.; phyllaries sparsely pilose ..... 194. *S. kansuensis*
17b. Achene transversely rugose; leaf blade 3–18 × 0.8–2.5 cm; leaf blade lateral lobes 8–12 pairs; involucre 1–3 cm in diam.; phyllaries glabrous ..... 193. *S. leontodontoides*
16b. Leaf blade obovate or narrowly obovate, lyrate or pinnately lobed; leaf blade lateral lobes 3–8 pairs.
18a. Plants stemless, to 3 cm tall; leaf blade obovate-elliptic, 1.5–4.5 × 0.8–1.5 cm ..... 192. *S. ceterach*
18b. Plants stemless or shortly stemmed, 3–10 cm tall; leaf blade obovate to narrowly obovate, 3–12 × 1–3 cm.
19a. Leaf blade shallowly pinnately lobed; involucre ovoid, 0.5–1.2 cm in diam. ..... 191. *S. nimborum*
19b. Leaf blade lyrate-pinnately lobed; involucre campanulate, 1.2–1.5 cm in diam. ..... 196. *S. brachylepis*
1b. Plants with well-developed flowering stems, usually more than 10 cm tall; capitula usually solitary and terminal on stem or sometimes several in a corymbiform or paniculiform synflorescence.
20a. Capitula several, in a paniculiform or corymbiform synflorescence.

21a. Capitula 4–15, in a paniculiform synflorescence, pedunculate; leaf blade green and glabrous on both surfaces ..... 162. *S. incisa*
21b. Capitula 2–20, clustered in corymbiform synflorescence, subsessile; leaf blade abaxially grayish white and densely tomentose, adaxially green.
22a. Capitula 2–5(–8); involucre campanulate, 1–1.5 cm in diam.; phyllaries subglabrous, inner ones 1.3–1.6 cm ..... 181. *S. lingulata*
22b. Capitula 3–20; involucre ovoid to globose, 0.6–1 cm in diam.; phyllaries sparsely villous, inner ones to 1 cm ..... 182. *S. przewalskii*
20b. Capitulum solitary, or rarely 2 or 3, terminal on stem.
23a. Leaf blade green on both surfaces, glabrous or subglabrous.
24a. Leaf blade pinnatisect, lateral segments linear, margin entire ..... 163. *S. henryi*
24b. Leaf blade runcinate-pinnately lobed, lateral lobes narrowly triangular-falcate, semiorbicular, or triangular, margin dentate.
25a. Stem and petioles subglabrous or whitish pubescent; leaf blade adaxially subglabrous; involucre 0.8–1.7 cm in diam.; outer pappus bristles plumose ..... 164. *S. eriostemon*
25b. Stem and petioles densely covered with pale brown multicellular articulate hairs; leaf blade adaxially scabrid, strigose; involucre 1.5–2.5 cm in diam.; outer pappus bristles scabrid ..... 165. *S. scabrida*
23b. Leaf blade abaxially grayish green or grayish white and densely tomentose, arachnoid, or lanate, adaxially green and glabrous, subglabrous, or sparsely arachnoid.
26a. Leaf blade bipinnately lobed or bipinnatisect ..... 167. *S. centiloba*
26b. Leaf blade not bipinnately lobed or bipinnatisect but rather simply pinnately lobed, pinnatisect, or rarely undivided.
27a. Leaf blade undivided with margin entire, sinuate, denticulate, or dentate.
28a. Leaf blade linear to narrowly elliptic, less than 1 cm wide (if wider then leaf blade pinnatisect) ..... 168. *S. yunnanensis*
28b. Leaf blade elliptic, obovate, or oblong, 1–2 cm wide.
29a. Outer phyllaries reflexed; corolla ca. 2 cm ..... 173. *S. paleacea*
29b. Outer phyllaries not reflexed; corolla ca. 1.5 cm ..... 174. *S. limprichtii*
27b. Leaf blade runcinate-pinnately lobed, or pinnatisect.
30a. Leaf blade adaxially grayish green and ± arachnoid tomentose, lyrate pinnately lobed; receptacle without bristles; phyllaries whitish, densely arachnoid tomentose, with purple mucro ..... 178. *S. porphyroleuca*
30b. Leaf blade adaxially green and glabrous, pubescent, glandular, or strigose, pinnately lobed to pinnatisect; receptacle with bristles; phyllaries not arachnoid, without purple mucro.
31a. Leaf blade adaxially glabrous or subglabrous.
32a. Stem ca. 5 mm in diam. at base; capitula large; involucre 2.5–3.5 cm in diam.; phyllaries densely villous ..... 177. *S. wardii*
32b. Stem 2–3 mm in diam. at base; capitula small; involucre 1.5–2.5 cm in diam.; phyllaries sparsely villous or glabrous.
33a. Leaf blade runcinately pinnatisect; leaf blade segments narrowly triangular-linear, strongly reclinate, margin revolute 168. *S. yunnanensis*
33b. Leaf blade pinnately lobed; leaf blade lobes obliquely triangular, patent or recurved, margin not revolute.
34a. Leaf blade 5–15 × 1–2.5 cm; leaf blade lobes 5–7 pairs ..... 166. *S. taraxacifolia*
34b. Leaf blade 2–6.5 × 0.6–1.7 cm; leaf blade lobes 2–5 pairs ..... 169. *S. leptolepis*
31b. Leaf blade adaxially scabrid, pubescent, glandular hairy, strigose, or sparsely arachnoid.
35a. Outer phyllaries usually reflexed, apical part green and herbaceous.
36a. Leaf blade lyrate, pinnately lobed, or subpinnatisect; involucre 1.5–2 cm in diam.; basal leaves usually shorter than flowering stem ..... 175. *S. semilyrata*
36b. Leaf blade pinnatisect; segments coarsely dentate; involucre 2–3.5 cm in diam.; basal leaves usually longer than flowering stem ..... 179. *S. pachyneura*

35b. Outer phyllaries erect, appressed, apical part straw-colored or brownish to blackish purple and not herbaceous.
37a. Leaf blade runcinate-pinnately lobed, sometimes lyrate; leaf blade lobes 3–8 pairs, obliquely triangular; capitula large; involucre 2.5–3.5 cm; outer phyllaries narrowly triangular-subulate ..... 176. *S. subulisquama*
37b. Leaf blade pinnatisect; leaf blade lobes 7–13 pairs, narrowly oblong or narrowly triangular-ovate; capitula medium-sized; involucre 1–2.5 cm in diam.; outer phyllaries narrowly ovate-triangular.
38a. Lateral leaf blade lobes 7–13 pairs, narrowly oblong, apex rounded and mucronate ..... 170. *S. polypodioides*
38b. Lateral leaf blade lobes 10–20 pairs, narrowly triangular-ovate, apex acuminate ..... 171. *S. coriacea*

162. Saussurea incisa F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 96. 1935.

锐裂风毛菊 rui lie feng mao ju

Herbs 15–20 cm tall, perennial. Stem solitary, 1–2 mm in diam., erect, branched. Basal and lower stem leaves long petiolate; leaf blade ovate-triangular, 4–10 × 3–6 cm, abaxially pale green and glabrous, adaxially dark green, base cordate-hastate, margin incised-dentate, teeth wide and triangular, apex acuminate. Upper stem leaves narrowly elliptic to linear, 1–3 × 0.2–0.8 cm. Capitula 4–15, in a paniculiform synflorescence, pedunculate. Involucre ovoid to obconic, 5–10 mm in diam. Phyllaries in ca. 4 rows, glabrous or sparsely arachnoid near margin, apex acuminate; outer phyllaries narrowly ovate, 2–4 × 0.5–1.5 mm; middle phyllaries narrowly elliptic, 4–7 × 1–1.5 mm; inner phyllaries linear, 7–9 × 0.5–1 mm, with conspicuous green veins. Corolla 0.9–1.1 cm, tube 4–5 mm, limb 4–5 mm, lobes 3–3.5 mm. Achene grayish brown with blackish dots, cylindric, 4–5 mm, glabrous. Pappus white; outer bristles 1–3 mm; inner bristles 7–8 mm. Fl. and fr. Aug–Oct.

• Meadows, thickets. Hebei (Changli, Xiaowutai Shan).

163. Saussurea henryi Hemsley, J. Linn. Soc., Bot. 29: 311. 1892.

巴东风毛菊 ba dong feng mao ju

Herbs 12–80 cm tall, perennial. Stem solitary, 1–2 mm in diam., erect, usually simple. Basal and lower stem leaves petiolate; petiole 2–9 cm; leaf blade narrowly elliptic, 5–12.5 × 2–4.5 cm, pinnatisect, both surfaces green, abaxially glabrous, adaxially sparsely strigose; lateral segments 6–11 pairs, linear, 10–20 × 3–6 mm, margin revolute and entire, apex acute and mucronate; terminal segment linear, 5–20 × 2–3 mm. Middle stem leaves much smaller and with fewer segments. Upper stem leaves linear-filiform, 1–2 × 0.2–0.4 cm, margin entire, apex caudate. Capitulum solitary, sometimes 2 or 3, terminal on stem. Involucre obconic, 1.3–1.6 cm in diam. Phyllaries in ca. 5 rows, sparsely arachnoid tomentose, glabrescent, apex long acuminate; outer phyllaries narrowly ovate-elliptic, 5–6 × 1–2 mm, basally straw-colored, apically green; middle phyllaries narrowly ovate-elliptic, 8–13 × 1.5–2 mm; inner phyllaries narrowly elliptic, 12–14 × 1–1.5 mm, apically brown. Corolla purple, 1.4–1.6 cm, tube 7–8 mm, limb 6.5–7 mm, lobes 4.5–5 mm. Achene blackish brown, obconic, ca. 3 mm, glabrous. Pappus straw-colored; outer bristles 2–4 mm, scabrid, sometimes very few; inner bristles 1–1.1 cm. Fl. and fr. Jul–Aug.

• Forests, rocky slopes; 2000–2800 m. Chongqing, Hubei, Shaanxi, ?Sichuan.

164. Saussurea eriostemon Wallich ex C. B. Clarke, Compos. Ind. 229. 1876.

尼泊尔风毛菊 ni bo er feng mao ju

Centaurea taraxacifolia D. Don, Prodr. Fl. Nepal. 167. 1825, not *Saussurea taraxacifolia* (Lindley ex Royle) Wallich ex Candolle (1838); *Aplotaxis nepalensis* Candolle, nom. illeg. superfl.; *Eriostemon taraxacifolius* (D. Don) Lessing; *Saussurea chapmannii* C. E. C. Fischer; *S. nepalensis* Sprengel, nom. illeg. superfl.

Herbs 20–30 cm tall, perennial. Stems solitary or 2, erect, simple, covered at base with fibrously lacerate remains of petioles. Basal and lower stem leaves petiolate; petiole 1–7 cm; leaf blade oblong to narrowly obovate-elliptic, 4–18 × 1–3 cm, runcinate-pinnately lobed, abaxially pale green, subglabrous, adaxially green; lateral lobes 4–10 pairs, narrowly triangular to semiorbicular, 3–15 × 3–18 mm, margin mucronate-dentate, apex acute. Middle and upper stem leaves 1 or 2, smaller than lower leaves. Capitulum solitary, terminal on stem. Involucre campanulate, 0.8–1.7 cm in diam. Phyllaries in 5 or 6 rows, apically blackish green to purple, apex acute to acuminate; outer phyllaries narrowly triangular-ovate, ca. 10 × 4 mm; inner phyllaries ca. 1.9 × 0.3 cm. Receptacle bristles 5–11 mm. Corolla purple, 1.8–2.3 cm, lobes 3.5–6 mm. Achene cylindric, 3.5–4.5[–6] mm, ribbed, smooth, glabrous, apex with a short crown. Pappus brown; outer bristles 2–3(–6) mm, plumose; inner bristles 1.3–1.8 cm. Fl. and fr. Aug–Oct. $2n = 32$.

Alpine grasslands, thickets, river valleys, by trails; 3500–4200 m. S Xizang (Yadong) [Bhutan, India (Sikkim), Nepal].

Saussurea nepalensis is illegitimate because Sprengel cited *Centaurea taraxacifolia* in synonymy but did not take up the epithet, which was at that time still available in *Saussurea*. Candolle also should have used the earlier epithet, *"taraxacifolia,"* when he transferred the name to *Aplotaxis*. When C. B. Clarke validated the nomen nudum *S. eriostemon* by Wallich, another nomen nudum, *S. taraxacifolia*, used for a different taxon by Wallich, had already been validated by Candolle, so the earliest epithet *"taraxacifolia"* was no longer available in *Saussurea*.

165. Saussurea scabrida Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 146. 1891.

糙毛风毛菊 cao mao feng mao ju

Saussurea leontodon Dunn; *S. pseudoleontodon* F. H. Chen.

Herbs 30–60 cm tall, perennial. Stem solitary, erect, simple, densely covered with pale brown articulate hairs. Basal and lower stem leaves shortly petiolate; leaf blade narrowly elliptic, 10–23 × 1.5–4.5 cm, green, concolorous, scabrid, with multicellular articulate hairs, base cuneate-attenuate, margin runcinate-pinnately lobed; lateral lobes 3–12 pairs, triangular, margin mucronate-dentate. Middle and upper stem leaves gradually smaller upward on stem. Uppermost stem leaves sessile, usually narrowly ovate-elliptic, undivided, base semiamplexicaul, margin dentate. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–2.5 cm in diam. Phyllaries in ca. 5 rows, densely villous or with articulate hairs, apex acuminate; outer phyllaries narrowly triangular-ovate, ca. 16 × 3–4 mm; middle phyllaries narrowly elliptic, ca. 15 × 3.5 mm; inner phyllaries linear, ca. 18 × 1–1.5 mm. Corolla purple, ca. 1.1 cm, tube ca. 8 mm, limb ca. 3 mm. Achene brown, cylindric, ca. 6 mm, glabrous. Pappus pale brown; outer bristles 3.5–5 mm, scabrid; inner bristles ca. 1.3 cm. Fl. and fr. Jul–Sep.

• Thickets, forests, forest margins, meadows; 2700–4200 m. W Sichuan, SE Xizang (Zayü, Zogang), NW Yunnan (Dêqên, Zhongdian).

166. Saussurea taraxacifolia (Lindley ex Royle) Wallich ex Candolle, Prodr. 6: 532. 1838.

蒲公英风毛菊 pu gong ying feng mao ju

Cyathidium taraxacifolium Lindley ex Royle, Ill. Bot. Himal. Mts. 251, t. 56, f. 2. 1835.

Herbs 15–50 cm tall, perennial. Stem solitary, erect, simple. Basal and lower stem leaves petiolate; petiole 4–6 cm; leaf blade narrowly elliptic or narrowly obovate, 5–15 × 1–2.5 cm, runcinate, pinnately lobed to pinnatisect, abaxially grayish green and densely tomentose, adaxially green and glabrous; lateral lobes 5–7 pairs, triangular-ovate, 6–10 × 4–10 mm, reclinate, margin entire or dentate with 1 or 2 teeth on distal side, apex acute to obtuse and mucronate; terminal lobe triangular, 1–1.5(–2.5) × 0.5–1.5 cm. Upper stem leaves narrowly elliptic to linear, margin dentate. Capitulum usually solitary, terminal on stem. Involucre campanulate, (1–)2.5–3 cm in diam. Phyllaries in 4 or 5 rows, sparsely pilose, apically blackish green, apex long acuminate; outer phyllaries narrowly ovate-elliptic, 9–10 × 1–2 mm; middle phyllaries narrowly ovate-linear, 10–14 × 1–2 mm; inner phyllaries broadly linear, 14–16 × 1–1.5 mm. Corolla purple, 1.5–1.6 cm, tube 7–8 mm, limb 7–8 mm, lobes 4–5 mm. Achene cylindric, 4–4.5 mm, glabrous, apex with a small crown. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Sep.

Thickets; 3800–4700 m. Xizang, NW Yunnan (Gongshan) [Bhutan, NE and NW India, Kashmir, Nepal].

167. Saussurea centiloba Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 144. 1920.

百裂风毛菊 bai lie feng mao ju

Saussurea leveillei F. H. Chen; *S. vaniotii* H. Léveillé.

Herbs 10–50 cm tall, perennial. Caudex simple, apically covered with fibrous remains of petioles. Stem solitary, erect, simple. Basal leaves petiolate; petiole 1–6 cm; leaf blade narrowly elliptic, 8–21 × 1.3–4.5 cm, bipinnately lobed or bipinnatisect, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid; primary lobes 10–28 pairs. Stem leaves few, similar to basal leaves. Capitulum solitary, terminal on stem. Involucre broadly campanulate, 1.5–2 cm in diam. Phyllaries in 5–7 rows, purple, yellowish tomentose, apex obtuse or acute; outer phyllaries narrowly ovate-elliptic, 6–7 × 1–2 mm; middle phyllaries narrowly ovate, 7–14 × 1.5–2 mm; inner phyllaries narrowly ovate-elliptic, 14–16 × 1–1.5 mm. Corolla purplish red, 1.4–1.7 cm, tube 0.9–1.2 cm, limb 5–7 mm, lobes 3–4 mm. Achene brown, cylindric, 4–5 mm, smooth, glabrous, apex with short crenulate crown. Pappus straw-colored; outer bristles 1.5–4 mm, scabrid; inner bristles 1.2–1.3(–1.7) cm. Fl. and fr. Jul–Aug.

• Forest margins, thickets, grasslands; 3200–4200 m. SW Sichuan (Muli), NW Yunnan.

168. Saussurea yunnanensis Franchet, J. Bot. (Morot) 2: 340. 1888.

云南风毛菊 yun nan feng mao ju

Saussurea mairei H. Léveillé; *S. vaginata* Dunn; *S. yunnanensis* var. *integrifolia* Franchet; *S. yunnanensis* var. *runcinata* Franchet; *S. yunnanensis* var. *sessilifolia* J. Anthony.

Herbs 10–40 cm tall, perennial. Stem solitary, erect, simple, covered at base with fibrous remains of petioles. Basal and lower stem leaves petiolate; petiole 1.5–4 cm; leaf blade elliptic, narrowly elliptic, or linear, 3–20 × 0.2–2(–4) cm, undivided, runcinate-pinnately lobed, or pinnatisect, abaxially grayish white and arachnoid tomentose, adaxially green and glabrous, margin entire, apex acute to acuminate; lateral lobes 1–7 pairs, linear or obliquely narrowly triangular, strongly reclinate; terminal lobe linear. Middle and upper stem leaves gradually smaller upward on stem. Capitulum solitary, terminal on stem. Involucre campanulate, ca. 2 cm in diam. Phyllaries in ca. 5 rows, apically purplish red, apex long acuminate; outer phyllaries triangular-subulate, ca. 12 × 1 mm; middle phyllaries narrowly ovate-elliptic, 10–13 × ca. 1.5 mm; inner phyllaries narrowly elliptic, ca. 15 × 1.5–2 mm. Corolla purple, ca. 1.5 cm, tube ca. 9 mm, limb ca. 6 mm. Achene cylindric, ca. 4 mm, glabrous. Pappus dirty white; outer bristles ca. 4 mm, plumose; inner bristles ca. 1.3 cm. Fl. and fr. Jul–Oct.

• Stone cliffs, grasslands, gravelly mountain slopes, forests; 2300–4300 m. SW Sichuan (Muli), NW Yunnan (Dêqên, Lijiang).

169. Saussurea leptolepis Handel-Mazzetti, Acta Horti Gothob. 12: 337. 1938.

薄苞风毛菊 bao bao feng mao ju

Saussurea handeliana Y. Ling; *S. inconspicua* Handel-Mazzetti; *S. modesta* Handel-Mazzetti.

Herbs 3–20 cm tall, perennial. Stem solitary, purple, slender, erect, densely or sparsely villous. Basal leaves petiolate; petiole to 2 cm; leaf blade narrowly elliptic, 2.5–6.5 × 0.6–1.7

cm, pinnately lobed, abaxially grayish white and densely tomentose, adaxially green to purple and glabrous; lateral lobes 2–5 pairs, triangular, apex obtuse and mucronate. Stem leaves 1 or 2, narrowly elliptic to linear, margin irregularly triangular-dentate. Capitulum solitary, terminal on stem. Involucre obconic, ca. 1.7 cm in diam. Phyllaries in ca. 5 rows, apically sparsely villous, apex long acuminate; outer phyllaries narrowly ovate-elliptic, ca. 11 × 1 mm; middle phyllaries ovate-elliptic, ca. 13 × 3 mm; inner phyllaries narrowly ovate-elliptic, ca. 1.9 × 0.2 cm. Corolla purplish red, ca. 1 cm, tube ca. 7 mm, limb ca. 3 mm. Achene purplish red, cylindric, ca. 5 mm, glabrous. Pappus yellowish brown; outer bristles 2–3 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Aug.

• Alpine meadows; 4200–4400 m. W Sichuan.

170. Saussurea polypodioides J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 209. 1934.

水龙骨风毛菊 shui long gu feng mao ju

Herbs 10–20 cm tall, perennial. Stem solitary, erect, simple. Basal leaves petiolate; petiole 2–5 cm; leaf blade narrowly elliptic, 5–12 × 1–3 cm, pinnatisect, abaxially grayish white and densely tomentose, adaxially green and sparsely pubescent; lateral lobes (4–)7–15 pairs, oblong, patent, margin entire or with 1 or 2 teeth, apex rounded or obtuse and mucronate; terminal lobe triangular-ovate, apex acute. Stem leaves few or almost absent, sessile, linear, ca. 4 × 0.2 cm. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–2.5 cm in diam. Phyllaries in ca. 4 rows, sparsely villous, apex long acuminate; outer phyllaries subulate, ca. 10 × 2 mm; middle phyllaries narrowly elliptic, ca. 15 × 2 mm; inner phyllaries narrowly elliptic, ca. 17 × 2 mm. Corolla purple, ca. 1.2 cm, tube ca. 7 mm, limb ca. 5 mm. Achene cylindric, ca. 3 mm, transversely rugose. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Aug–Nov.

• Alpine grasslands, thickets; 2700–4300 m. SE Xizang (Zayü), NW Yunnan (Dali, Dêqên, Lijiang).

171. Saussurea coriacea Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 101. 1981.

黄苞风毛菊 huang bao feng mao ju

Herbs 15–20 cm tall, perennial, laxly caespitose. Caudex stout, simple or apically few branched, apically covered with blackish brown remains of petioles, with sterile leaf rosettes and flowering stems. Stem solitary, purplish red, erect, simple, arachnoid lanate. Rosette leaves petiolate; petiole purplish red, to 2.5 cm, arachnoid lanate; leaf blade narrowly oblong, 5–10 × 1–1.5 cm, pinnatisect or pinnately lobed, abaxially grayish white and densely tomentose, adaxially green and glandular; lateral lobes 10–20 pairs, narrowly ovate-triangular, margin revolute and mucronate-dentate, apex acuminate. Capitulum solitary, terminal on stem. Involucre campanulate, 1.2–2 cm in diam. Phyllaries in 4 or 5 rows, narrowly ovate-elliptic, basally yellowish brown, apically dark purplish red, margin arachnoid lanate and leathery, apex acuminate. Receptacle bristles 3.5–4 mm. Corolla purple, 2–2.4 cm, tube 1–1.3 cm, limb 0.9–1.1 cm, lobes 5–6 mm. Achene blackish, cylindric, ca. 4 mm, apex with a short crown. Pappus pale yellowish brown, in 2 rows. Fl. and fr. Jul–Aug.

• Scree slopes, river terraces; 3600–4400 m. W Sichuan, Xizang.

172. Saussurea lhunzhubensis Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 100. 1981.

林周风毛菊 lin zhou feng mao ju

Herbs 4–6 cm tall, perennial, caespitose, shortly stemmed. Caudex branched, apically covered with brown remains of petioles, with several sterile rosettes and flowering stems. Stem erect, simple, arachnoid. Basal leaves petiolate; petiole purplish red, 1.5–2 cm, base enlarged; leaf blade narrowly elliptic to narrowly obovate, 5–8 × 0.4–1.2 cm, abaxially grayish white and densely tomentose, adaxially green and densely arachnoid pubescent, margin entire or sinuate-lobate, apex acute and mucronate. Stem leaves linear, smaller than basal leaves. Capitulum solitary, terminal on stem. Involucre broadly campanulate, 2–3 cm in diam. Phyllaries in ca. 4 rows, straw-colored to pale brown, apically greenish or purplish red, arachnoid; outer phyllaries narrowly ovate-elliptic, pale brown; inner phyllaries linear. Receptacle bristles 2–2.5 mm. Corolla purplish red, ca. 2 cm, tube 9–10 mm, limb 8–9 mm. Achene oblong, 3–5 mm, transversely rugose, apex with a short crown. Pappus pale brown; outer bristles scabrid. Fl. and fr. Jul–Aug.

• Alpine grasslands, on sandy soils; 4000–4600 m. C Xizang.

173. Saussurea paleacea Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 99. 1981.

糠秕风毛菊 kang bi feng mao ju

Herbs 5–12 cm tall, perennial. Caudex branched, apically covered with brown remains of petioles, with sterile leaf rosettes and flowering stems. Stem solitary, erect, simple, with glandular hairs. Basal leaves petiolate; petiole 2–3.5 cm; leaf blade oblong, 5–8 × 1.4–2 cm, abaxially grayish white and densely tomentose, adaxially green and strigose, margin subentire, sinuolate, or rarely coarsely dentate with mucronate teeth, apex acuminate. Stem leaves similar to basal leaves. Capitulum solitary, terminal on stem. Involucre broadly campanulate, ca. 2 cm in diam. Phyllaries in ca. 5 rows, yellowish green or slightly purplish red, with dark purple margin, densely pubescent; outer phyllaries narrowly ovate-elliptic, ca. 10 × 3 mm, apically herbaceous and reflexed; inner phyllaries linear, ca. 14 × 2 mm. Corolla purple, ca. 2 cm, tube 1.2–1.3 cm, limb ca. 7 mm, lobes 4–4.5 mm. Achene cylindric, 3–3.5 mm, smooth, glabrous. Pappus pale brown; outer bristles scabrid. Fl. and fr. Jul–Aug.

• Alpine grasslands; 4300–4400 m. E Xizang (Qamdo).

Saussurea paleacea is apparently only known from the type collection. This taxon may be conspecific with *S. limprichtii*.

174. Saussurea limprichtii Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 512. 1922.

巴塘风毛菊 ba tang feng mao ju

Herbs to 15 cm tall, perennial. Stem solitary, erect, simple. Leaves petiolate; petiole 2.5–5 cm; leaf blade narrowly obovate or narrowly elliptic, 6–9 × 1–1.5 cm, abaxially grayish white, gland-dotted, and tomentose, adaxially green, gland-dotted, and

scabrid with short articulate hairs, base attenuate, margin subentire and repand to sinuate-dentate, apex acute and mucronate. Uppermost stem leaves narrowly elliptic to linear, 3.5–6 × 0.2–0.8 cm. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, narrowly triangular-linear, sparsely villous, apex acuminate. Corolla purple, 1.4–1.5 cm, tube 9–10 mm, limb ca. 5 mm, lobes ca. 3 mm. Achene brown, cylindric, ca. 3 mm, glabrous. Pappus pale yellow; outer bristles scabrid to barbellate, 1–3 mm; inner bristles 1.1–1.2 cm. Fl. and fr. Jul–Sep.

• Alpine grasslands; ca. 5100 m. W Sichuan (Batang).

Saussurea limprichtii has long been misunderstood because the type was thought to be lost. This description is based on the rediscovered type material of H. Limpricht (at WRSL). The specimens from NW Yunnan (S. W. Liu, Fl. Yunnan. 13: 576. 2004) treated under *S. limprichtii* are clearly different from the type specimen from W Sichuan. They either belong to *S. semilyrata* or to a yet undescribed species. The real *S. limprichtii* is apparently only known from the type collection and may be conspecific with *S. paleacea*, described from adjacent E Xizang.

175. Saussurea semilyrata Bureau & Franchet, J. Bot. (Morot) 5: 76. 1891.

半琴叶风毛菊 ban qin ye feng mao ju

Saussurea lanata Y. L. Chen & S. Yun Liang; *S. stoetzneriana* Diels; *S. viridibracteata* F. H. Chen.

Herbs 20–50 cm tall, perennial. Caudex apically covered with remains of petioles. Stem solitary, erect, simple, white arachnoid. Basal and lower stem leaves petiolate; petiole to 5 cm; leaf blade oblong to narrowly elliptic, 7–15(–30) × 1.5–4 cm, lyrate or pinnately lobed, abaxially grayish white and densely tomentose, adaxially green; lateral lobes 6–10 pairs, ovate-triangular, margin coarsely dentate or entire, apex obtuse to acuminate. Middle and upper stem leaves sessile, gradually smaller upward on stem. Uppermost stem leaves subtending capitulum; leaf blade linear, undivided, margin entire or dentate. Capitula solitary or 2, terminal on stem. Involucre campanulate, 1.5–2(–2.5) cm in diam. Phyllaries in 4–6 rows, basally straw-colored, apically purplish brown, sparsely villous, apex acuminate; outer phyllaries narrowly triangular, 10–12 × ca. 2 mm, apical part green, herbaceous, and usually reflexed; middle phyllaries narrowly ovate-elliptic, 9–10 × 2–3 mm; inner phyllaries linear, 11–13 × 1–2 mm. Receptacle with bristles. Corolla purple, 1.2–1.6 cm, tube 4–8 mm, limb ca. 8 mm. Achene brown, cylindric, ca. 4 mm, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Sep.

• Montane forests, forest margins, thickets, grasslands; 3200–4800 m. W Sichuan, SE Xizang (Bomi, Mainling), NW Yunnan.

176. Saussurea subulisquama Handel-Mazzetti, Acta Horti Gothob. 12: 326. 1938.

钻苞风毛菊 zuan bao feng mao ju

Saussurea kokonorensis Y. Ling.

Herbs 4–18(–30) cm tall, perennial. Caudex slender, apically densely covered with blackish brown sometimes fibrously lacerate remains of petioles. Stem erect, densely arachnoid, sometimes glabrescent. Rosette leaves petiolate; petiole to 7 cm; leaf blade narrowly elliptic, 5–23 × 2.5–4 cm, pinnately parted or pinnately lobed, abaxially grayish white and arachnoid tomentose, adaxially green and glabrous; lateral lobes 3–8 pairs, ovate to triangular, margin entire or dentate, apex acute to obtuse and mucronate; terminal lobe triangular. Stem leaves 1–3, shortly petiolate; leaf blade same in division as basal leaves. Capitulum solitary, terminal on stem. Involucre campanulate, 2–3.5 cm in diam. Phyllaries in 5 or 6 rows, sparsely arachnoid, apex acuminate; outer phyllaries narrowly triangular-subulate, 12–14 × ca. 3 mm; middle phyllaries subulate-linear, 15–17 × ca. 3 mm; inner phyllaries linear, ca. 2.2 × 0.2 cm. Corolla purple, ca. 1.8(–2.5) cm, tube ca. 1.4 cm, limb ca. 4 mm. Achene cylindric, ca. 4 mm, smooth, glabrous. Pappus pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Jul–Sep.

• Montane grasslands, thickets, forests; 2400–4600 m. Gansu, Qinghai, W Sichuan.

177. Saussurea wardii J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 216. 1934.

川滇风毛菊 chuan dian feng mao ju

Saussurea bomiensis Y. L. Chen & S. Yun Liang; *S. graminicola* F. H. Chen.

Herbs 18–40 cm tall, perennial. Caudex apically covered with blackish remains of petioles. Stem solitary, purple, ca. 5 mm in diam., erect, simple, arachnoid. Basal and lower stem leaves petiolate; petiole 2.5–6 cm; leaf blade narrowly elliptic to narrowly obovate, 6–15 × 1–4 cm, runcinate-pinnately lobed or pinnately dentate, abaxially grayish green and densely arachnoid tomentose, adaxially green and glabrous; lateral lobes 3–6 pairs, semiorbicular, ovate, or obliquely triangular, base cuneate-attenuate, margin entire or with 1 or 2 small teeth, apex acute to rounded. Middle and upper stem leaves narrowly elliptic to linear, smaller than basal and lower stem leaves, margin pinnately dentate. Uppermost stem leaves subtending capitulum, linear, margin entire. Capitulum solitary, terminal on stem. Involucre hemispheric, 2.5–3.5 cm in diam. Phyllaries in 5 or 6 rows, densely villous, apex acuminate; outer phyllaries narrowly triangular-subulate, 9–12 × ca. 2 mm, apically green, herbaceous, and usually reflexed; middle and inner phyllaries subulate-linear, 13–18 × 1–2 mm. Corolla purple, (1–)1.2–1.5 cm, tube 6–8 mm, limb 6–7 mm, lobes 3–4 mm. Achene brown, cylindric, 3–4.5 mm, smooth, glabrous. Pappus brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Aug–Nov.

• Alpine meadows, thickets, *Larix* forests; 3500–4800 m. Qinghai, W Sichuan, SE Xizang (Bomi, Mainling, Nyingchi), NW Yunnan (Dêqên, Weixi, Zhongdian).

The type material of *Saussurea bomiensis* and other material at PE perfectly match *S. wardii*.

178. Saussurea porphyroleuca Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 15. 1925.

紫白风毛菊 zi bai feng mao ju

Herbs 4–12 cm tall, perennial, shortly stemmed. Caudex short, covered with remains of petioles. Stem solitary, erect, simple, arachnoid tomentose. Basal leaves petiolate; petiole 2–4 cm; leaf blade obovate-oblong to elliptic, 4–11 × 2–4 cm, lyrate, pinnately lobed, or undivided and margin obtusely dentate, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid but glabrescent; lateral lobes 2–5 pairs, ovate, obliquely triangular, or semiorbicular, margin sinuolate, apex obtuse to rounded and usually mucronate; terminal lobe ovate to narrowly ovate, large, margin subserrate or sinuolate. Stem leaves absent or very few, narrowly linear. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 2–3 cm in diam. Phyllaries in ca. 4 rows, apically whitish, arachnoid tomentose, apex acute; outer phyllaries linear, ca. 12 × 1 mm; middle phyllaries narrowly ovate-elliptic, 14–17 × 2.5–3 mm, apically dull purple; inner phyllaries broadly linear, ca. 2.2 × 0.2 cm. Corolla dark purple, ca. 1.8 cm, tube ca. 1 cm, limb ca. 8 mm. Achene cylindric, ca. 2 mm, transversely rugose. Pappus pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Aug–Sep.

• Grasslands on mountain slopes; 3000–4200 m. NW Yunnan (Dêqên, Lijiang).

179. Saussurea pachyneura Franchet, J. Bot. (Morot) 8: 354. 1894.

东俄洛风毛菊 dong e luo feng mao ju

Saussurea bodinieri H. Léveillé; *S. kunthiana* C. B. Clarke var. *caulescens* Kitamura; *S. kunthiana* var. *major* J. D. Hooker; *S. sikangensis* F. H. Chen.

Herbs 5–30 cm tall, perennial. Caudex simple or branched, densely covered with dark brown remains of petioles. Stem solitary, erect, simple, with brown glandular hairs or glabrous. Basal leaves petiolate; petiole purplish red, 2–9 cm, arachnoid; leaf blade elliptic to narrowly obovate, 5–30 × 1.5–4 cm, pinnatisect, abaxially grayish white and densely tomentose, adaxially green and glandular hairy; lateral segments 6–12 pairs, elliptic to ovate, margin coarsely triangular-dentate. Stem leaves 1–3, similar and same in division as basal leaves but smaller. Capitulum solitary, terminal on stem. Involucre campanulate, 2–3.5 cm in diam. Phyllaries in 5 or 6 rows, rigid, sparsely pubescent, basally straw-colored, apically green, margin purple, apex acuminate; outer phyllaries oblong to narrowly elliptic, ca. 7 × 2 mm, apically herbaceous, green, reflexed; middle phyllaries narrowly ovate, 1.5–1.7 × ca. 0.5 cm; inner phyllaries narrowly ovate-elliptic, ca. 2 × 0.3 cm. Corolla purple to violet, ca. 1.8 cm, tube ca. 1.1 cm, limb ca. 7 mm. Achene brown, oblong, 3–3.5 mm, transversely rugose. Pappus white or brownish; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Aug–Sep.

Rhododendron thickets, alpine meadows, scree slopes; 3000–4700 m. Guizhou, W Sichuan, SE Xizang, NW Yunnan [Bhutan, India (Sikkim), N Myanmar, E Nepal].

180. Saussurea colpodes Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 104. 1981.

鞘基风毛菊 qiao ji feng mao ju

Herbs 3–7 cm tall, perennial, shortly stemmed. Caudex simple, covered with dark brown remains of petioles. Stem solitary, erect, simple. Rosette leaves petiolate; petiole 2–3.5 cm; leaf blade narrowly elliptic, 6–15 × 1.5–2 cm, bipinnatisect, abaxially whitish and densely lanate, adaxially green and with articulate glandular hairs; primary segments 10–15 pairs, ovate; secondary lobes 1–3 pairs, triangular, margin revolute, apex acute and mucronate. Capitulum solitary, terminal on stem. Involucre broadly campanulate, 2.2–2.5 cm in diam. Phyllaries in 4 or 5 rows, pale brown or yellowish green, scarious, glabrous, apex acuminate; outer phyllaries narrowly triangular-ovate, apically green and reflexed; inner phyllaries linear, erect. Receptacle bristles subulate, ca. 2 mm. Corolla bluish purple, 2.2–2.5 cm, tube 1–1.2 cm, limb 8–10 mm, lobes 5–6 mm. Achene brown, cylindric, 3–4.5 mm, glabrous, apex with a short crown. Pappus pale brown; outer bristles 1.1–1.2 cm, plumose; inner bristles 1.5–1.7 cm. Fl. and fr. Jul–Aug.

• Forest margins, by trails; 3300–3400 m. S Xizang (Nyalam).

181. Saussurea lingulata Franchet, J. Bot. (Morot) 10: 423. 1896.

小舌风毛菊 xiao she feng mao ju

Herbs (6–)10–50 cm tall, perennial. Caudex simple or branched, densely covered with dark brown remains of petioles. Stem simple, purplish red, 1–4 mm in diam., erect, arachnoid. Basal leaves petiolate; petiole 2–7 cm, narrowly winged; leaf blade elliptic to narrowly elliptic, 3–15 × 1–2.5 cm, runcinate-pinnately lobed or undivided and margin obtusely dentate, abaxially grayish white and densely arachnoid tomentose, adaxially green and glabrous; lateral lobes 4–9 pairs, obliquely triangular, margin entire, apex obtuse to acute and mucronate; terminal lobe triangular, margin entire, apex acute. Stem leaves few, sessile or subsessile, similar and same in division as basal leaves. Capitula 2–5(–8), clustered in a corymbiform synflorescence or rarely solitary, subsessile. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in ca. 5 rows, green, glabrous, apex long acuminate; outer and middle phyllaries narrowly ovate-elliptic, 4–13 × 1–2 mm; inner phyllaries linear, 14–16 × 1–1.5 mm. Receptacle bristles 4–6 mm. Corolla blackish purple, 1.2–1.4 cm, tube 6–8 mm, limb ca. 6 mm. Achene cylindric, ca. 2.5 mm. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles 9–10 mm. Fl. and fr. Jul–Oct.

• Rocky slopes, grassy slopes; 3000–4200 m. W Sichuan, NW Yunnan.

182. Saussurea przewalskii Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 494. 1882.

弯齿风毛菊 wan chi feng mao ju

Saussurea cirsioides Hemsley; *S. giraldii* Diels; *S. likiangensis* Franchet; *S. likiangensis* var. *integrifolia* Handel-Mazzetti; *S. likiangensis* var. *siningensis* Handel-Mazzetti.

Herbs (6–)10–80 cm tall, perennial. Caudex stout, covered with remains of petioles. Stem solitary, blackish purple, erect, simple, arachnoid lanate. Basal leaves petiolate; petiole 4–8 cm, winged; leaf blade narrowly elliptic, 6–18 × 1–3 cm, pinnately lobed, abaxially grayish white or rarely green, golden gland-dotted, densely arachnoid tomentose, and sometimes glabrescent, adaxially green and sparsely arachnoid or glabrous;

lateral lobes 4–6 pairs, triangular, margin denticulate, apex mucronate; terminal lobe triangular, apex acute to obtuse. Stem leaves 2–5, shortly petiolate to sessile, gradually smaller upward on stem. Uppermost stem leaves subtending synflorescence, sessile, narrowly elliptic to linear, pinnately lobed to pinnately cleft. Capitula 3–20, clustered in a corymbiform or globose synflorescence, subsessile. Involucre ovoid to globose, 6–10 mm in diam. Phyllaries in ca. 5 rows, apically blackish purple, sparsely villous; outer phyllaries narrowly ovate-elliptic, 5–6 × 2–3 mm, apex long acuminate; middle phyllaries elliptic, 6–8 × 1.5–2 mm apex acute; inner phyllaries narrowly elliptic, 8–9 × 1–1.5 mm. Corolla purple, 8–9(–15) mm, tube 4–5(–10) mm, limb 4–5 mm. Achene cylindric, 2.5–4 mm, glabrous. Pappus pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 7 mm. Fl. and fr. Jul–Sep. $2n = 32$*.

Alpine grasslands, scree slopes, thickets, forest margins; 3000–5100 m. Gansu, Qinghai, Shaanxi, W Sichuan, SE Xizang, NW Yunnan [Bhutan].

183. Saussurea salwinensis J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 211. 1934.

怒江风毛菊 nu jiang feng mao ju

Saussurea ochrochlaena Handel-Mazzetti.

Herbs 1–5 cm tall, perennial, caespitose, stemless or shortly stemmed. Caudex densely covered with remains of petioles, sterile leaf rosettes, and flowering stems. Rosette leaves petiolate; petiole to 2.5 cm; leaf blade narrowly obovate, narrowly elliptic, or broadly linear, 2–7 × 0.5–1.5 cm, abaxially grayish white or rarely yellowish and arachnoid tomentose, adaxially green and glabrous, margin pinnately lobed, sinuate-dentate, or rarely entire; lateral lobes or teeth 4 or 5 pairs, triangular, apex acute and mucronate. Stem leaves if present few, narrowly elliptic to linear. Capitula 3–10, clustered in a corymbiform or hemispheric synflorescence or rarely solitary, shortly pedunculate. Involucre ovoid, 6–8 mm in diam. Phyllaries in 3 or 4 rows, basally straw-colored, apically green, sparsely villous, apex long acuminate; outer phyllaries narrowly ovate-elliptic, 6–7 × ca. 3 mm; middle phyllaries narrowly ovate-elliptic, 9–10 × 3–4 mm; inner phyllaries elliptic, 7–9 × 1–2 mm. Corolla pale purple, ca. 9 mm, tube ca. 5 mm, limb ca. 4 mm. Achene brown, cylindric, 2–4 mm, smooth, glabrous. Pappus in 1 row, brown, bristles 8–10 mm, plumose. Fl. and fr. Aug–Sep.

• Thickets, alpine meadows, grasslands, scree slopes; 3500–4900 m. SE Xizang (Zayü), NW Yunnan (Dêqên, Gongshan, Weixi).

184. Saussurea arenaria Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 490. 1882.

沙生风毛菊 sha sheng feng mao ju

Herbs 3–10 cm tall, perennial, stemless or shortly stemmed. Caudex simple or branched, apically covered with fibrously lacerate remains of petioles. Stem if present solitary, very short, erect, simple, densely white tomentose. Rosette leaves petiolate; petiole 1.5–4 cm; leaf blade narrowly elliptic, 3–11 × 1–3.5 cm, abaxially grayish white and densely tomentose, adaxially green, densely gland-dotted, and arachnoid, margin entire or sinuate-dentate, apex acute to acuminate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre broadly campanulate to ovoid, 2–3.5 cm in diam. Phyllaries in 5 or 6 rows, apically purplish, gland-dotted, sparsely tomentose, apex acuminate; outer phyllaries narrowly ovate-elliptic, 15–16 × ca. 4 mm; middle phyllaries narrowly elliptic, 1.6–2 × ca. 0.2 cm; inner phyllaries linear, 2–2.5 × ca. 0.1 cm. Corolla purple, 1.5–2.2 cm, tube 1–1.4 cm, limb 5–8 mm. Achene cylindric, ca. 3 mm, smooth, glabrous. Pappus dirty white; outer bristles ca. 1 mm; inner bristles ca. 1.3 cm. Fl. and fr. Jun–Sep. $2n = 30$*.

• Mountain slopes, mountaintops, meadows, sandy areas, dry riverbeds; 2800–4500 m. Gansu, Qinghai, E Xizang.

Saussurea arenaria is similar to *S. andryaloides*, which differs by smaller capitula, denser leaf indumentum, and lyrate or pinnately lobed leaves. Some specimens are intermediate between the two species.

185. Saussurea dschungdienensis Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 205. 1924.

中甸风毛菊 zhong dian feng mao ju

Herbs 2–4 cm tall, perennial, stemless or shortly stemmed. Caudex slender, usually branched, apically covered with brown remains of petioles. Rosette leaves petiolate; petiole 1–1.5 cm; leaf blade narrowly elliptic to obovate, 1–4 × 0.8–1.7 cm, sublyrate with 5–8 pairs of lobes or undivided and margin shallowly crenate or subentire, abaxially grayish white and densely tomentose, adaxially green and glabrous, apex obtuse to rounded and mucronate. Capitula solitary or rarely 2, in center of leaf rosette or terminal on stem. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 3 or 4 rows, apically pale purple, glabrous, apex acuminate; outer phyllaries narrowly triangular, 7–10 × ca. 2 mm; middle phyllaries narrowly elliptic, ca. 12 × 2 mm; inner phyllaries broadly linear, ca. 15 × 2 mm. Receptacle naked. Corolla purple, ca. 1.5 cm, tube 9–10 mm, limb ca. 6 mm. Achene cylindric, ca. 3 mm, transversely rugose, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Aug–Oct.

• Forest margins, grasslands by small streams, gravelly mountain slopes; 3000–4000 m. SW Sichuan (Muli), NW Yunnan (Dêqên, Zhongdian).

186. Saussurea lavrenkoana Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 532. 1972.

双齿风毛菊 shuang chi feng mao ju

Herbs 1–6 cm tall, perennial, stemless or shortly stemmed. Rootstock fibrously split. Caudex simple or few branched, covered with fibrously lacerate remains of petioles. Stem if present straw-colored, 1–3 cm, sparsely arachnoid, leafless or with 1 single leaf. Rosette leaves petiolate; leaf blade narrowly elliptic-linear, 3.5–5 × 0.6–1 cm, pinnatisect, abaxially white tomentose, adaxially green and glabrous; lateral segments 10–20 pairs, split in 2 unequal lobes or simple, linear, 3–5 × 0.8–1.5 mm, margin revolute, apex acuminate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre cylindric to narrowly campanulate, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, straw-colored or brown, glabrescent, apex acute to acuminate; outer phyllaries narrowly ovate-triangular, 9–10 × 2–3.5 mm; middle phyllaries narrowly ovate, 10–13 × 2–2.5 mm;

inner phyllaries linear, 13–17 × 1–1.5 mm. Receptacle bristles subulate, 1–2.5 mm. Corolla purple, 1.5–1.7 cm, tube 0.9–1.1 cm, limb 5.5–7 mm, lobes 3–4 mm. Achene straw-colored, gray, or ivory white, 3–4 mm, glabrous, apex with a short crenulate crown. Pappus in 1 row, light brown, bristles 1.3–1.5 cm and plumose. Fl. and fr. Sep–Oct.

• Alpine grasslands; ca. 4000 m. SW Sichuan (Muli).

187. Saussurea andryaloides (Candolle) Schultz Bipontinus, Linnaea 19: 331. 1846.

吉隆风毛菊 ji long feng mao ju

Aplotaxis andryaloides Candolle, Prodr. 6: 542. 1838; *Saussurea stoliczkae* C. B. Clarke.

Herbs 2–6 cm tall, perennial, stemless or shortly stemmed. Caudex simple or few branched, apically covered with remains of petioles. Stem if present simple, whitish, erect, densely tomentose. Rosette leaves shortly petiolate or sessile, exceeding capitula; petiole to 2 cm; leaf blade broadly linear to narrowly ovate-elliptic, 2–8.5 × 0.3–1.5 cm, lyrate to runcinate-pinnately lobed, or undivided and margin sinuate-dentate, grayish green to grayish white and ± concolorous, abaxially densely tomentose, adaxially densely arachnoid pubescent; lateral lobes 2–5 pairs, obliquely triangular, apex acute and mucronate; terminal lobe narrowly triangular, apex acuminate to caudate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 1–2 cm in diam. Phyllaries in 3–6 rows, purplish red, sparsely to densely tomentose, apex acuminate; outer phyllaries narrowly ovate-triangular, 11–12 × 3–4 mm; middle phyllaries narrowly ovate-elliptic, 12–17 × 3–4 mm; inner phyllaries narrowly elliptic, 15–20 × 1–3 mm. Corolla purplish red, 0.9–1.8 cm, tube 5–12 mm, limb 4–6 mm. Achene brown, cylindric, 2.5–4.5 mm, ribbed, smooth, glabrous. Pappus pale brown; outer bristles 0.5–4 mm, scabrid; inner bristles 1.4–1.5 cm. Fl. and fr. Aug–Oct.

Scree slopes, steppes, meadows, thickets; 3200–5400 m. Qinghai, Xinjiang, Xizang [NW India, Kashmir].

Saussurea andryaloides is very widespread in the W and C parts of the Qinghai-Xizang Plateau. In Chinese provincial floras of Xizang and Xinjiang, it has been treated as *S. stoliczkae*. It is not quite clear if the records of *S. stoliczkae* from Qinghai belong to this species, to *S. arenaria*, or to *S. leiocarpa*. In the Hengduan Shan area (W Sichuan and NW Yunnan), records of *S. stoliczkae* mostly are misidentifications of *S. leiocarpa*, which is more closely related to *S. leontodontoides*.

188. Saussurea andersonii C. B. Clarke, Compos. Ind. 226. 1876.

卵苞风毛菊 luan bao feng mao ju

Saussurea flavovirens Y. L. Chen & S. Yun Liang.

Herbs 2–5[–15] cm tall, perennial, stemless or shortly stemmed. Caudex slender, simple or few branched, covered with dark brown remains of petioles. Rosette leaves petiolate; petiole 5–10 mm, base enlarged to an ovate sheath; leaf blade linear, 2.5–6[–11] × 0.2–0.5[–1.5] cm, pinnately lobed or pinnately dentate, abaxially pale green and sparsely pilose on veins and margin, adaxially green and glabrous; lateral lobes or teeth 3–7 pairs, obliquely triangular, recurved, margin entire or dentate, apex acuminate. Capitulum solitary, in center of leaf rosette or terminal on a short stem. Involucre campanulate, [0.6–]1–1.5 cm in diam. Phyllaries in 4 or 5 rows, yellowish green, glabrous, apex acuminate; outer phyllaries narrowly ovate, 8–11 × 3–4[–5] mm, apically green, apex reflexed; middle and inner phyllaries narrowly elliptic-linear, 10–15[–18] × 1–3 mm, apically purplish red. Receptacle naked or with few short bristles. Corolla purplish red, 2–2.3 cm, tube 1–1.2 cm, limb 8–11 mm, lobes 5–5.5 mm. Achene cylindric, 3–4 mm, transversely rugose, apex with a short crown. Pappus reddish brown; outer bristles short, scabrid, sometimes very few or absent; inner bristles 1.5–1.8 cm. Fl. and fr. Aug–Oct.

Alpine meadows, thickets; 3500–4300 m. S Xizang (Yadong), NW Yunnan (Fugong, Gongshan) [India (Sikkim)].

189. Saussurea purpurascens Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 105. 1981.

紫苞风毛菊 zi bao feng mao ju

Herbs to 5 cm tall, perennial, shortly stemmed. Caudex covered with brown remains of petioles. Stem solitary, erect, simple, pubescent. Rosette leaves sessile or shortly petiolate; leaf blade linear, 4–9 × 0.3–0.8 cm, runcinate pinnately lobed, abaxially grayish green and densely tomentose, adaxially green and glabrous; lateral lobes 8–15 pairs, narrowly triangular, apex acute and mucronate. Capitulum solitary, terminal on stem. Involucre broadly campanulate, 2–2.5 cm in diam. Phyllaries in ca. 4 rows, glabrous, apex acuminate; outer phyllaries narrowly ovate-elliptic, 13–14 × ca. 4 mm, apically green, herbaceous, and reflexed; inner phyllaries linear, ca. 17 × 2 mm, basally pale green, apically purple and erect. Receptacle bristles ca. 2 mm. Corolla purplish red, 1.5–1.8 cm, tube 8–10 mm, limb 7–9 mm, lobes 4–5 mm. Achene brown, cylindric, ca. 2 mm, smooth, glabrous, apically with a short crown. Pappus pale brown; outer bristles 8–10 mm; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Aug.

• Thickets on mountain slopes; ca. 4200 m. S Xizang (Yadong) [?Bhutan].

Saussurea purpurascens is only known from the type and may well be only a variety of *S. andersonii* with developed short stems and adaxially tomentose leaves.

190. Saussurea nyalamensis Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 103. 1981.

聂拉木风毛菊 nie la mu feng mao ju

Herbs 2–3 cm tall, perennial, usually caespitose. Caudex simple or few branched, covered with brown fibrous remains of petioles. Rosette leaves petiolate; petiole base widened to a purplish red sheath; leaf blade linear, 2.5–4.5 × 0.3–0.7 cm, runcinately pinnatisect, abaxially grayish white and densely tomentose, adaxially densely pilose with articulate hairs; lateral lobes 6–9 pairs, triangular, margin revolute and usually entire, apex acuminate and mucronate. Capitulum solitary, in center of leaf rosette, sessile. Involucre narrowly campanulate, 6–10 mm in diam. Phyllaries in 3 or 4 rows, narrowly ovate-elliptic, yellowish brown to yellowish green, margin and apically dark purplish red. Receptacle bristles subulate, 1–2 mm. Corolla purplish red, 1.2–1.4 cm, tube 4–7 mm, limb ca. 7 mm. Achene ca.

2 mm, transversely rugose. Pappus yellowish brown; outer bristles scabrid. Fl. and fr. Jul–Aug.

• Alpine grasslands, scree slopes; ca. 4700 m. S Xizang (Nyalam, Zhongba).

191. Saussurea nimborum W. W. Smith, J. Proc. Asiat. Soc. Bengal 7: 73. 1911.

倒披针叶风毛菊 dao pi zhen ye feng mao ju

Herbs 5–10(–15) cm tall, perennial. Caudex usually simple, apically covered with fibrous remains of petioles. Leaves petiolate; petiole 1–7 cm; leaf blade obovate to narrowly obovate, 3.5–12 × 1–3 cm, shallowly pinnately lobed or undivided and margin sinuate-dentate, abaxially grayish white and densely arachnoid tomentose, adaxially green, scabrid, and densely covered with articulate hairs; lateral lobes 4–6 pairs, triangular-ovate to almost orbicular, 3–8 × 5–10 mm, margin denticulate, apex acute and mucronate. Capitula solitary or 2–5, in a corymbiform synflorescence, sessile or pedunculate. Involucre ovoid-campanulate, 5–12 mm in diam. Phyllaries in 3 or 4 rows, straw-colored with dark margin, sparsely arachnoid to subglabrous, apex acuminate; outer phyllaries ovate-elliptic, 5–7 × 1.5–2 mm; middle phyllaries narrowly ovate-elliptic, 7–12 × 1.5–2 mm; inner phyllaries linear, 12–15 × 1–1.5 mm. Receptacle with bristles. Corolla pale purplish red, 1.6–1.8 cm, tube 9–10 mm, limb 7–8 mm, lobes 4–5 mm. Achene cylindric, 2–3 mm, transversely rugose, glabrous. Pappus dirty white; outer bristles 2–5 mm, barbellate; inner bristles 1.2–1.4 cm. Fl. and fr. Aug–Sep.

Alpine grasslands on slopes, near rivers; [3000–]4500–5000 m. ?SC Xizang [Bhutan, India (Sikkim)].

Specimens of *Saussurea nimborum* in PE do not match the type material of *S. nimborum* at K but belong to different *Saussurea* species. The presence of *S. nimborum* in China is doubtful.

192. Saussurea ceterach Handel-Mazzetti, Acta Horti Gothob. 12: 323. 1938.

康定风毛菊 kang ding feng mao ju

Herbs 2–2.5 cm tall, perennial, stemless. Caudex slender, usually branched, apically covered with remains of petioles. Rosette leaves petiolate; petiole 1–1.5 cm; leaf blade elliptic to obovate-elliptic, 1.5–4.5 × 0.8–1.5 cm, pinnately lobed, abaxially grayish white and densely tomentose, adaxially dull green, scabrid, and with articulate hairs; lateral lobes 4–8 pairs, ovate, oblong, or semiorbicular, margin entire or denticulate, apex rounded and mucronate. Capitulum solitary, in center of leaf rosette. Involucre campanulate, 0.8–1.3 cm in diam. Phyllaries in 3 or 4 rows, apically and near margin greenish or purple, pubescent; outer and middle phyllaries narrowly ovate-elliptic, 8–10 × 1.5–2 mm, apex long acuminate; inner phyllaries linear, 12–15 × ca. 1.5 mm, apex acute to subobtuse. Receptacle bristles to 1.5 mm. Corolla purplish red, 1.6–1.8 cm, tube 1.2–1.4 cm, limb ca. 4 mm. Achene cylindric, ca. 2 mm, transversely rugose. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1.3 cm. Fl. and fr. Aug–Sep. $2n = 30$*.

• Thickets, alpine grasslands; 3800–4900 m. Qinghai, W Sichuan, Xizang.

193. Saussurea leontodontoides (Candolle) Schultz Bipontinus, Linnaea 19: 330. 1846.

狮牙草状风毛菊 shi ya cao zhuang feng mao ju

Aplotaxis leontodontoides Candolle, Prodr. 6: 539. 1838; *Saussurea irregularis* Y. L. Chen & S. Yun Liang; *S. kunthiana* C. B. Clarke; *S. kunthiana* var. *filicifolia* J. D. Hooker; *S. leontodontoides* var. *filicifolia* (J. D. Hooker) Handel-Mazzetti; *S. rhytidocarpa* Handel-Mazzetti; *S. sungpanensis* Handel-Mazzetti.

Herbs 3–15 cm tall, perennial, stemless or shortly stemmed. Caudex usually branched, densely covered with remains of petioles, often with several leaf rosettes and flowering shoots. Stem if present simple, grayish white, arachnoid lanate, glabrescent. Rosette leaves petiolate; petiole 1–4 cm; leaf blade linear-oblong to narrowly elliptic, 3–18 × (0.4–)0.8–2.5 cm, pinnatisect, abaxially grayish white and densely tomentose, adaxially green, scabrid, strigose, and sometimes glabrescent; segments (5–)8–12 pairs, elliptic, semiorbicular, quadrangular, obliquely ovate, or subtriangular, 4–15 × 2–10 mm, margin entire, apex rounded to obtuse and mucronate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 1–3 cm in diam. Phyllaries in 4–6 rows, straw-colored or yellowish green, green or purplish at margin, glabrous; outer and middle phyllaries narrowly ovate-triangular, 9–12 × 0.5–3 mm, apex acuminate; inner phyllaries narrowly elliptic to linear, 14–15 × 1.5–2 mm, apex acute. Receptacle bristles 2–3 mm. Corolla purplish red, (1.4–)1.7–2.2 cm, tube 1–1.4 cm, limb to 7–8 mm, lobes 4–5 mm. Achene cylindric, 2–4 mm, transversely rugose, glabrous. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles 1–1.6 cm. Fl. and fr. Aug–Nov. $2n = 30$*.

Scree slopes, forests, forest margins, thickets; 3200–5500 m. Qinghai, W Sichuan, Xizang, NW Yunnan [NE and NW India, Kashmir, Nepal].

Saussurea irregularis, described from a single specimen and not recorded again, is said to differ from *S. leontodontoides* by glabrous (not scabrid and strigose) leaf surface and remote, irregularly placed leaf lobes. We think it is only a slightly deviating form of the widespread and vegetatively very variable *S. leontodontoides*.

194. Saussurea kansuensis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 648. 1937.

甘肃风毛菊 gan su feng mao ju

Herbs 3–5 cm tall, perennial, stemless or shortly stemmed. Caudex usually branched, apically covered with remains of petioles. Stem if present simple, purplish brown, densely covered with articulate hairs. Rosette leaves petiolate; petiole 0.5–3 cm; leaf blade narrowly elliptic-oblong, 4–20(–30) × 1–4 cm, pinnatisect, abaxially grayish white, gland-dotted, and densely tomentose, adaxially green, scabrid, and densely strigose with articulate hairs; lateral segments 8–20 pairs, obliquely triangular-ovate, ovate, or elliptic, 0.5–2 × 0.5–1.8 cm, margin entire or dentate. Capitulum solitary, in center of leaf rosette. Involucre campanulate, 2–4 cm in diam. Phyllaries in 4 or 5 rows, straw-colored with narrow dark margin, sparsely pilose but glabrescent, apically green and herbaceous, apex long acuminate;

outer phyllaries narrowly ovate-triangular, (1.4–)1.8–2(–3) × 0.4–0.5 cm; middle phyllaries narrowly elliptic, 1.5–2.2 × 0.3–0.4 cm; inner phyllaries linear, 2.3–2.6 × 0.1–0.2 cm. Receptacle bristles yellowish brown, subulate, 3–4 mm. Corolla dark purple, 2.5–3 cm, tube 1.7–2 cm, limb 8–10 mm, lobes 5–6 mm. Achene brown, cylindric, 4.5–5 mm, smooth, glabrous, apex with a short crown. Pappus dirty white; outer bristles 4–6 mm, scabrid; inner bristles 2–2.2 cm. Fl. and fr. Aug–Oct.

• Alpine grasslands and steppes, in sandy soils; 3400–4300 m. Gansu, Qinghai, NW Sichuan.

195. Saussurea leiocarpa Handel-Mazzetti, Acta Horti Gothob. 12: 330. 1938.

光果风毛菊 guang guo feng mao ju

Herbs 2–6 cm tall, perennial, stemless or shortly stemmed. Stem if present simple, 1–2 mm in diam., erect, covered at base with remains of petioles. Rosette leaves petiolate; petiole to 2 cm; leaf blade linear-oblong to narrowly elliptic, 3–8 × 0.5–1.5 cm, pinnatisect, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid; lateral segments 6–15 pairs, obliquely quadrangular or triangular, 3–6 × 2–6 mm, margin and apex mucronulate. Stem leaves 1–3, similar to basal leaves, 1.5–2.5 × 0.3–0.6 cm; lateral segments 3–6 pairs. Uppermost stem leaves linear, undivided, margin dentate. Capitulum solitary, terminal on stem. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in ca. 5 rows, sparsely pilose, apically ± reflexed, apex acuminate; outer phyllaries ovate-elliptic, 7–8 × 2–2.5 mm; middle phyllaries narrowly ovate-elliptic, 7–12 × 2.5–3 mm; inner phyllaries narrowly elliptic to linear, 12–14 × 1.5–2 mm, erect. Receptacle bristles subulate, 2–5 mm. Corolla dark purple, (1–)1.3–1.5 cm, tube 7–8 mm, limb 6–7 mm, lobes 3.5–4.5 mm. Achene cylindric, ca. 4.5 mm, smooth, glabrous. Pappus light brown; outer bristles 1–1.5(–2) mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Jul–Oct.

• Alpine grasslands; 3800–4500 m. W Sichuan, Xizang, NW Yunnan (Zhongdian).

Saussurea leiocarpa is very close to *S. leontodontoides*, only differing in the smooth, not transversely rugose, achene and in the arachnoid, not scabrid-strigose, indumentum on the adaxial leaf surface. Intermediate forms do occur. *Saussurea leiocarpa* is different from *S. stoliczkae* from W Xizang, with which it has been synonymized and confused in the literature.

196. Saussurea brachylepis Handel-Mazzetti, Acta Horti Gothob. 12: 326. 1938.

短苞风毛菊 duan bao feng mao ju

Herbs 3–5 cm tall, perennial, stemless or shortly stemmed. Caudex usually branched, covered with fibrous remains of petioles. Stem very short, simple. Rosette leaves petiolate; petiole to 2 cm; leaf blade narrowly obovate or elliptic, 3.5–9 × 0.8–3 cm, lyrate-pinnately lobed, abaxially white and densely tomentose, adaxially green, strigose, gland-dotted, and sparsely arachnoid floccose; lateral lobes 3–6 pairs, ovate, obliquely oblong, or triangular, margin entire or denticulate, apex rounded to obtuse and mucronate. Uppermost stem leaves subtending capitulum, linear, 1.5–3 × 0.1–0.2 cm, margin entire or denticulate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 1.2–1.5 cm in diam. Phyllaries in 5 or 6 rows, leathery, straw-colored, sparsely arachnoid, apex acuminate; outer phyllaries ovate-triangular, 6–8 × 2.5–3.5 mm; middle phyllaries narrowly ovate-elliptic, 8–12 × 1.5–2.5 mm; inner phyllaries narrowly elliptic, 14–16 × 0.5–1.5 mm. Receptacle bristles to 4 mm. Corolla purple, 1.4–1.5 cm, tube 7–8 mm, limb 7–8 mm, lobes 4–4.5 mm. Achene brown, obovoid, 2–3 mm, smooth, glabrous, apically with a short crown. Pappus pale brown; outer bristles 2.5–6 mm, scabrid; inner bristles 1.3–1.5 cm. Fl. and fr. Aug–Oct.

• Mountain slopes; ca. 3600 m. W Sichuan (Dawu).

197. Saussurea donkiah C. B. Clarke ex Springate, Edinburgh J. Bot. 57: 405. 2000.

亚东风毛菊 ya dong feng mao ju

Herbs, perennial, caespitose, stemless or shortly stemmed. Stem if present to 1 cm. Basal leaves narrowly oblong-elliptic to narrowly obovate, 3.5–11 × 0.8–2.2 cm, pinnatisect, abaxially gland-dotted and sparsely arachnoid lanate with articulate hairs, adaxially green, gland-dotted, and sparsely pilose with articulate hairs; lateral segments 8–13 pairs, ovate-triangular to obovate, to 1 × 1 cm, margin denticulate, apex mucronulate. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 0.8–1.6 cm in diam. Phyllaries in ca. 5 rows, apically purplish and villous, glabrescent; outer phyllaries ovate to narrowly triangular-ovate, 13–15 × 3.5–5.5 mm, apically reflexed, apex acuminate; middle phyllaries narrowly ovate-elliptic, 16–18 × 2–2.5 mm, apically reflexed; inner phyllaries ca. 1.5 mm wide, erect. Receptacle bristles 6–9 mm. Corolla purple, 1.4–1.9 cm, with few small capitate hairs, tube 7.5–10 mm, limb 6.5–9 mm, lobes 3.7–4.5 mm. Achene obovoid, smooth, apically with a prominent crown of many narrow scales. Pappus outer bristles 8–11 mm, plumose; inner bristles 1.1–1.3 cm. Fl. and fr. Sep.

Alpine meadows, stony slopes, scree slopes; ca. 4500 m. S Xizang (Yadong) [?Bhutan, India (Sikkim), E Nepal].

No specimens of *Saussurea donkiah* from China were seen by the present authors, and the description here is based on the protologue, which cites a specimen from S Xizang (Yadong).

7. **Saussurea** sect. **Rosulascentes** (Kitamura) Lipschitz, Rod *Saussurea*, 171. 1979.

莲座风毛菊组 lian zuo feng mao ju zu

Saussurea subsect. *Rosulascentes* Kitamura, Acta Phytotax. Geobot. 24: 22. 1969.

Herbs, perennial, rhizomatous, with well-developed, simple or branched flowering stems. Basal and lower stem leaves rosulate or subrosulate, present at anthesis. Middle and upper stem leaves few, much reduced. Capitula solitary or several, sometimes supported by uppermost stem leaves. Involucre campanulate, ovoid, cylindric, funnel-shaped, turbinate, or subglobose. Phyllaries

imbricate, margin entire, apex obtuse or acuminate. Receptacle with bristles. Anther tails ciliate or lacerate. Achene usually ribbed, glabrous, sometimes with a small crown. Pappus usually in 2 rows; outer bristles scabrid, rarely lacking.

About 17 species: China, Korea, Russia (Far East, Siberia); nine species (eight endemic) in China.

Saussurea sect. *Rosulascentes* is rather ill-defined as there are many species with few and reduced stem leaves, which have been placed in other sections, and some of the following species can have a number of stem leaves as well. *Saussurea alatipes* and *S. huashanensis* are very similar to *S. fargesii*, so they have been placed in this section. However, these three species may also be placed in *S.* sect. *Saussurea*.

1a. Petiole of basal leaves broadly winged, wings dentate or lobed.
2a. Petiole to 11 cm, with 1–6 pairs of lobes or teeth; leaf blade papery; capitula in ± clustered, corymbiform synflorescence; phyllaries papery, apex purple, shortly acuminate, reflexed ..... 198. *S. alatipes*
2b. Petiole to 6 cm, with 1–3 pairs of lobes or teeth; leaf blade leathery; capitula in lax synflorescence; phyllaries leathery, apical part green, herbaceous, reflexed ..... 200. *S. fargesii*
1b. Petiole of basal leaves wingless or narrowly winged.
3a. Leaf blade usually lyrate-pinnately lobed; plants 60–100 cm tall ..... 203. *S. kungii*
3b. Leaf blade not lyrate, pinnately lobed or undivided; plants 10–60 cm tall.
4a. Leaf blade pinnately dentate, pinnately lobed to pinnatisect.
5a. Stem simple; capitulum solitary at end of stem; leaf blade pinnately lobed or with large triangular teeth ..... 201. *S. acrophila*
5b. Stem apically few branched, capitula solitary or 2, at end of branches; leaf blade deeply pinnately lobed to pinnatisect ..... 202. *S. paucijuga*
4b. Leaf blade undivided, margin entire, sinuate-dentate, denticulate, or shallowly crenate.
6a. Capitula solitary or rarely 2, terminal on stem.
7a. Leaves green on both surfaces, concolorous ..... 252. *S. superba* (see *S.* sect. *Saussurea*)
7b. Leaves abaxially grayish white, densely tomentose, adaxially green ..... 206. *S. tomentosa*
6b. Capitula several (2–10), in corymbiform synflorescence.
8a. Leaf blade obovate to narrowly obovate, 2–4.5 cm wide ..... 204. *S. oligocephala*
8b. Leaf blade ovate or elliptic, usually more than 5 cm wide.
9a. Leaf blade usually ovate or triangular-ovate; leaf base cordate or truncate ..... 199. *S. huashanensis*
9b. Leaf blade usually elliptic; leaf base cuneate-attenuate ..... 205. *S. oblongifolia*

198. Saussurea alatipes Hemsley, J. Linn. Soc., Bot. 29: 308. 1892.

翼柄风毛菊 yi bing feng mao ju

Herbs 15–40 cm tall, perennial. Rhizome oblique-ascending, covered with blackish brown remains of petioles. Stem solitary, 1–3 mm in diam., erect, simple or branched. Rosette and lower stem leaves petiolate; petiole winged, 3–11 cm, with 1–6 obliquely triangular lobes or large teeth; leaf blade ovate to narrowly ovate-elliptic, 6–10 × 3.5–8 cm, abaxially grayish to greenish white, gland-dotted, and densely tomentose, adaxially green, scabrid, and strigose, base cordate to rounded, margin sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile, narrowly elliptic to linear, 2–7 × 0.1–1 cm. Capitula several, solitary or in groups of to 3 on end of branches in a corymbiform synflorescence, pedunculate. Involucre cylindric to campanulate, 0.7–1.3 cm in diam. Phyllaries in 5–7 rows, pale green, arachnoid tomentose to glabrescent, apex acuminate to acute; outer phyllaries triangular-ovate, 3–4 × 1–2 mm, apex dark purple; middle phyllaries narrowly ovate-elliptic, 4–9 × 2–2.5 mm; inner phyllaries narrowly elliptic to linear, 9–12 × 1–1.5 mm, apically bearded. Corolla pale purple, 1–1.2 cm, tube 5–6 mm, limb 5.5–6.5 mm. Achene cylindric, ca. 5 mm, 5-ribbed, glabrous. Pappus white; outer bristles 1.5–2.5 mm; inner bristles 8–10(–13) mm. Fl. and fr. Jul–Aug.

• Forests, grasslands, beside trails; 1500–2600 m. N and NE Chongqing (Chengkou, Wu Shan, Wuxi), W Hubei (Badong, Shennongjia).

199. Saussurea huashanensis (Y. Ling) X. Y. Wu, Fl. Tsinling. 1(5): 365. 1985.

华山风毛菊 hua shan feng mao ju

Saussurea eriolepis Bunge ex Candolle var. *huashanensis* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 163. 1935; *S. alatipes* Hemsley var. *huashanensis* (Y. Ling) Y. Ling; *S. nivea* Turczaninow var. *huashanensis* (Y. Ling) S. Y. Hu.

Herbs 40–60 cm tall, perennial. Rhizome stout, simple, apically covered with brown residue of petioles. Stem solitary, erect, apically branched, arachnoid lanate. Basal and lower stem leaves petiolate; petiole 8–11 cm, wingless or narrowly winged, 1–3-lobed or dentate; leaf blade ovate to elliptic, 7–18 × 4–10 cm, papery, abaxially grayish green and densely tomentose, adaxially green and glabrous, base cordate to rarely truncate, margin sinuate to sinuate-lobate, apex acute to acuminate. Middle and upper stem leaves few; petiole 1–4 cm; leaf blade ovate to elliptic, gradually smaller upward on stem. Capitula numerous, in a paniculiform or corymbiform synflorescence, pedunculate. Involucre narrowly campanulate, 8–10 mm in diam. Phyllaries in 6 or 7 rows, arachnoid, apex black, acuminate to acute, and mucronate; outer phyllaries ovate, ca. 2 × 2 mm; middle phyllaries oblong to narrowly elliptic, ca. 8 × 3 mm; inner phyllaries linear, ca. 11 × 2 mm. Corolla pale purple, 1.4–1.6 cm. Achene cylindric, ca. 6 mm, ribbed, glabrous, apex with a short crenulate crown. Pappus white; outer bristles ca. 5 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

• Tallgrass meadows, thickets; 1800–2100 m. W Henan, E Shaanxi (Hua Shan).

Saussurea huashanensis is very close to *S. alatipes* but differs by the unwinged or narrowly winged petioles. *Saussurea huashanensis* seems to replace *S. alatipes* in the E part of the Qin Ling range.

200. Saussurea fargesii Franchet, J. Bot. (Morot) 8: 344. 1894.

川东风毛菊 chuan dong feng mao ju

Herbs 50–60 cm tall, perennial. Rhizome stout, simple. Stem solitary, erect, apically branched, sparsely strigose. Rosette and lower stem leaves petiolate; petiole 3–6 cm, broadly winged, wing sinuolate and decurrent on stem; leaf blade broadly ovate, 16–20 × 7–10 cm, leathery, abaxially grayish white and densely tomentose, adaxially green and sparsely strigose, base cordate, truncate, or obtuse, margin shallowly crenate, apex shortly acuminate. Upper stem leaves 2, sessile, ovate-elliptic, 7–10 × 2.5–4.5 cm, base decurrent, margin subentire, apex acuminate. Uppermost stem leaves linear, 2.5–5 × 0.1–0.3 cm. Capitula 1–4, at end of branches, in a lax racemiform synflorescence. Involucre broadly campanulate, 1–2 cm in diam. Phyllaries in 4 or 5 rows, leathery, straw-colored with brown margin, villous; outer phyllaries suborbicular to broadly ovate, 8–10 × 3–5 mm, apical part green, herbaceous, and erect or reflexed, apex acuminate; inner phyllaries oblong, 10–12 × 1.5–2 mm, apex obtuse. Receptacle bristles 2–5 mm. Corolla purple, 1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene obconic, 2.5–3 mm, glabrous. Pappus in 1 row, 8–9 mm, plumose.

• N Chongqing (Chengkou).

Saussurea fargesii is apparently only known from the type and may be conspecific with *S. alatipes*.

201. Saussurea acrophila Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 108. 1905.

破血丹 po xue dan

Herbs 10–20 cm tall, perennial. Rhizome apically covered with brown residue of petioles. Stem solitary, erect, simple, apically white arachnoid, glabrescent. Basal and lower stem leaves petiolate; petiole 2–4.5 cm; leaf blade elliptic to obovate, 2.5–6.5 × 1–3 cm, papery, both surfaces green and glabrous, base cuneate, margin with large triangular teeth or rarely pinnately lobed, apex acute; lateral lobes 3 or 4 pairs, broadly triangular. Middle stem leaves petiolate; petiole 1–2.5 cm; leaf blade obovate-elliptic to linear, base cuneate, margin sinuate or entire. Upper stem leaves linear, small, margin entire. Capitulum solitary, terminal on stem. Involucre broadly campanulate to campanulate, 1–2 cm in diam. Phyllaries in 4 or 5 rows, glabrous or sparsely arachnoid lanate, apex acute to obtuse; outer phyllaries ovate, ca. 3 × 2 mm; middle phyllaries narrowly elliptic, ca. 7 × 3 mm; inner phyllaries linear, ca. 11 × 2 mm. Corolla purple, ca. 1.1 cm, tube ca. 5 mm, limb ca. 6 mm. Achene pale brown, cylindric, ca. 3 mm, glabrous, apex with denticulate crown. Pappus pale brown; outer bristles ca. 2 mm; inner bristles ca. 1 cm. Fl. and fr. Jul–Oct.

• Montane forests; 2800–3100 m. S Shaanxi (Qin Ling).

202. Saussurea paucijuga Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 88. 1949.

深裂风毛菊 shen lie feng mao ju

Herbs 10–32 cm tall, perennial. Rhizome short, apically covered with dull brown remains of petioles. Stem solitary, slender, erect, simple or few branched, sparsely white arachnoid lanate. Basal and lower stem leaves petiolate; petiole 1.5–4 cm; leaf blade narrowly elliptic to obovate-elliptic, 3–11 × 0.9–2 cm, papery, pinnately lobed to pinnatisect, abaxially pale green and sparsely arachnoid, adaxially green and glabrous, apex acute to shortly acuminate; lateral lobes 3–6 pairs, elliptic-ovate to triangular, margin entire, apex acuminate and long mucronate; terminal lobe triangular. Middle and upper stem leaves very few, narrowly elliptic to linear, ca. 10 × 2 mm. Capitula 1 or 2, at end of branches, long pedunculate. Involucre campanulate to funnel-shaped, 7–12 mm in diam. Phyllaries in ca. 4 rows, straw-colored, apically green or purple, and arachnoid, glabrescent, apex acuminate with a cartilaginous mucro; outer phyllaries ovate, 3–4 × ca. 2 mm; middle phyllaries narrowly elliptic, 4–6 × 2–3 mm; inner phyllaries narrowly obovate-elliptic to linear, 6–8 × 1–2 mm. Corolla purple, 1–1.1 cm, tube 4–5 mm, limb ca. 6 mm. Achene pale brown, cylindric, ca. 3 mm, glabrous. Pappus dirty white; outer bristles ca. 2 mm; inner bristles 7–8 mm. Fl. Aug–Oct.

• Mountain slopes; 2400–2800 m. S Shaanxi (Qin Ling).

Saussurea paucijuga is very close to and probably conspecific with *S. acrophila*.

203. Saussurea kungii Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 158. 1935.

洋县风毛菊 yang xian feng mao ju

Herbs 60–100 cm tall, perennial. Rhizome stout, obliquely ascending. Stem solitary, brownish purple, slender, erect, apically branched, arachnoid, basally glabrescent. Basal leaves petiolate; petiole 2–3.5 cm; leaf blade narrowly obovate-elliptic, 15–20 × 3–6 cm, thinly papery, lyrate-pinnately lobed, abaxially pale green and glabrous, adaxially green or purple and glabrous; lateral lobes 1–4 pairs, margin entire or subentire; terminal lobe narrowly ovate-triangular to narrowly elliptic, large, apex acute to acuminate. Middle and upper stem leaves 1 or 2, narrowly elliptic to linear, 1.5–3 × 0.2–0.5 cm, margin entire, apex acute. Capitula few to numerous, in a corymbiform synflorescence. Involucre turbinate, 5–12 mm in diam. Phyllaries in 4 or 5 rows, arachnoid; outer phyllaries triangular-ovate, ca. 11 × 3 mm, green, apex acute; middle phyllaries oblong to narrowly elliptic, ca. 9 × 1–2 mm, herbaceous, purple, apex rounded to obtuse; inner phyllaries linear, ca. 11 × 1 mm, apex acute. Receptacle bristles 5–8 mm. Corolla purple, ca. 1.3 cm. Achene oblong, ca. 4 mm, ribbed, glabrous. Pappus dirty white; outer bristles ca. 3 mm; inner bristles 6–8 mm. Fl. and fr. Sep–Oct.

• Forests on mountain slopes; 1800–1900 m. S Shaanxi (Qin Ling).

204. Saussurea oligocephala (Y. Ling) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 83. 1949.

少头风毛菊 shao tou feng mao ju

Saussurea acrophila Diels var. *oligocephala* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 155. 1935.

Herbs 10–60 cm tall, perennial. Rhizome obliquely ascending, apically covered with remains of petioles. Stem solitary, slender, erect, apically branched, sparsely arachnoid, glabrescent. Basal leaves petiolate; leaf blade obovate to narrowly obovate-elliptic, 4–12 × 2–4.5 cm, thinly papery, abaxially purplish red and subglabrous, adaxially green and with multicellular articulate hairs, base cuneate-attenuate, margin sinuate or dentate, apex acute to obtuse. Stem leaves few, linear, small, margin entire. Capitula solitary or 2–9 in a lax corymbiform synflorescence. Involucre turbinate to narrowly campanulate, 6–9 mm in diam. Phyllaries in 4 or 5 rows, arachnoid; outer phyllaries ovate, ca. 3 × 2 mm, apex obtuse; middle phyllaries elliptic, ca. 8 × 1.8 mm, apex obtuse; inner phyllaries narrowly ovate-elliptic to broadly linear, ca. 11 × 1 mm, apex obtuse. Corolla purple, ca. 1.2 cm, tube ca. 6 mm, limb ca. 6 mm. Achene oblong, ca. 3 mm, ribbed, glabrous, apex with a short crown. Pappus white; outer bristles 2–3 mm; inner bristles ca. 7 mm. Fl. and fr. Sep–Oct.

• Forests, thickets; 2000–3000 m. S Shaanxi (Qin Ling).

205. Saussurea oblongifolia F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 99. 1935.

长圆叶风毛菊 chang yuan ye feng mao ju

Herbs 40–50 cm tall, perennial. Rhizome simple. Stem solitary, erect, apically branched, arachnoid. Basal and lower stem leaves long petiolate; petiole to 5 cm; leaf blade ovate to elliptic, 12–15 × 5–6 cm, abaxially pale green and sparsely arachnoid, adaxially green and scabrid, base cuneate-attenuate, margin denticulate, apex acute. Middle and upper stem leaves sessile, narrowly elliptic, base attenuate, apex acuminate. Capitula 5–10, in a lax corymbiform synflorescence, pedunculate. Involucre campanulate or subglobose, 1–2 cm in diam. Phyllaries in 4–6 rows, yellowish brown with brown margin, sparsely pubescent; outer phyllaries ovate, 3–5 × 2–3.5 mm, apex acute; inner phyllaries narrowly elliptic, 5–10 × 1–2 mm, apex acuminate. Corolla ca. 1.2 cm. Achene immature. Pappus dirty white; outer bristles scabrid; inner bristles ca. 1 cm. Fl. Sep.

• NW Yunnan (Binchuan).

206. Saussurea tomentosa Komarov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 2: 135. 1921.

高岭风毛菊 gao ling feng mao ju

Saussurea alpicola Kitamura; *S. eriophylla* Nakai var. *alpina* Nakai.

Herbs 10–30 cm tall, perennial. Stem erect, simple, sparsely tomentose. Basal and lower stem leaves petiolate; petiole 2–4 cm; leaf blade triangular to triangular-ovate, 3–12 × 1–3.5 cm, abaxially grayish white and densely tomentose, adaxially green and sparsely arachnoid tomentose to subglabrous, base cordate, truncate, or cuneate, margin sharply dentate or entire, apex acuminate, acute, or sometimes obtuse. Middle and upper stem leaves few, narrowly elliptic to linear, margin sharply dentate or entire. Capitula solitary or 2, terminal on stem, usually subtended by 1 or 2 linear leaves. Involucre campanulate, 2–2.5 cm in diam. Phyllaries in 4 or 5 rows, whitish, tomentose, apex acute; outer phyllaries ovate, 5–7 × 2.5–3 mm; middle phyllaries narrowly ovate-elliptic, 7–10 × 2.5–3.5 mm; inner phyllaries narrowly ovate-elliptic, 10–12 × 1.5–2 mm. Corolla purple, 1.2–1.4 cm, tube 6–8 mm, limb ca. 6 mm. Achene pale brown tinged purple, cylindric, ca. 5 mm, ribbed, apex with a denticulate crown. Pappus pale brown; outer bristles 2–3 mm; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep.

By waterfalls, grasslands, rock crevices; 1500–2600 m. Jilin (Changbai Shan) [Korea, Russia (Far East)].

8. **Saussurea** sect. **Saussurea**

风毛菊组 feng mao ju zu

Herbs, perennial, often rhizomatous, usually with well-developed stems, rarely caespitose. Stems solitary, rarely few, ascending to erect, simple to branched, usually leafy. Leaves petiolate or sessile; leaf blade very varied, mostly undivided, sometimes pinnately lobed to pinnatisect, base auriculate, cordate, rounded, truncate, or cuneate, margin entire of dentate, apex rounded to acuminate. Capitula usually several to numerous, in a lax or dense corymbiform, racemiform, or paniculiform synflorescence or sometimes solitary. Involucre cylindric, narrowly to broadly campanulate, or obconic, medium-sized. Phyllary margin entire or rarely pectinate. Receptacle with subulate bristles. Corolla pink, purple, red, or rarely white, usually glabrous. Anther tails laciniate. Achene smooth, sometimes ribbed, glabrous. Pappus usually in 2 rows, rarely outer row lacking.

About 160 species: mainly in high mountains and boreal to arctic regions of Asia, Europe, and W North America; 83 species (60 endemic) in China.

1a. Phyllary margins pectinate, with 2–5 pairs of teeth.
2a. Involucre 5–8 mm in diam.; phyllaries with 2 or 3 pairs of teeth; leaves with 8–17 pairs of lobes, lobes oblong to narrowly elliptic-linear ..... 207. *S. odontolepis*
2b. Involucre 8–12 mm in diam.; phyllaries with 3–5 pairs of teeth; leaves with 4–9 pairs of lobes, lobes ovate to narrowly ovate-elliptic ..... 208. *S. pectinata*
1b. Phyllary margins entire or subentire.
3a. Basal and lower stem leaves with a shallowly or deeply cordate base.
4a. Leaf blade adaxially green, abaxially grayish white or grayish green and densely tomentose, arachnoid, or lanate.
5a. Basal and lower stem leaves narrowly ovate-elliptic, 0.7–2.5 cm wide ..... 226. *S. graciliformis*
5b. Basal and lower stem leaves 2–17 cm wide.

6a. Lower stem leaves triangular-ovate, base cordate or hastate.
7a. Leaf blade leathery, adaxially pale green or grayish green, sparsely arachnoid floccose, glabrescent; involucre narrowly campanulate, 4–7 mm in diam. ..... 225. *S. firma*
7b. Leaf blade papery, adaxially white or grayish white, densely tomentose; involucre campanulate, 6–12 mm in diam. ..... 227. *S. nivea*
6b. Lower stem leaves ovate, ovate-elliptic, or reniform.
8a. Apex of phyllaries without a mucro.
9a. Stem much branched; capitula in paniculiform synflorescence; involucre cylindric, 0.7–0.9 cm in diam. ..... 233. *S. pinetorum*
9b. Stem apically few branched; capitula in racemiform or lax corymbiform synflorescence; involucre campanulate-obconic, 1.2–1.5 cm in diam. ..... 235. *S. chetchozensis*
8b. Apex of phyllaries with a black mucro.
10a. Stem densely leafy; capitula numerous, in paniculiform to lax corymbiform synflorescence .... 229. *S. vestitiformis*
10b. Stem with few leaves; capitula few or numerous, in clustered corymbiform synflorescence.
11a. Stem with brown multicellular articulate hairs ..... 230. *S. baroniana*
11b. Stem white arachnoid or lanate.
12a. Leaf blade 2.5–6 × 2–5 cm; stem slender; involucre obconic to cylindric, 5–6 mm in diam. ..... 231. *S. flaccida*
12b. Leaf blade 3–11 × 7–10(–17) cm; stem stout; involucre campanulate, 6–10 mm in diam. ..... 232. *S. acromelaena*
4b. Leaf blade green, concolorous or abaxially paler green, abaxially glabrous or glabrescent.
13a. Capitulum usually solitary, terminal on stem, sometimes 2–5, solitary on end of branches; involucre 2–2.5 cm in diam. ..... 209. *S. populifolia*
13b. Capitula usually numerous or few, rarely solitary; involucre usually less than 2 cm in diam.
14a. Apical part of phyllaries either herbaceous or leathery and saber-shaped, usually patent or reflexed.
15a. Apical part of phyllaries leathery, saber-shaped and reflexed, apex long acuminate.
16a. Leaf blade undivided but margin dentate ..... 212. *S. subtriangulata*
16b. Leaf blade pinnately lobed or pinnately dentate.
17a. Capitula numerous, shortly pedunculate; involucre narrowly campanulate, 5–7 mm in diam. ..... 210. *S. mongolica*
17b. Capitula few, long pedunculate; involucre obconic, 10–15 mm in diam. ..... 211. *S. sinuata*
15b. Apical part of phyllaries herbaceous, not saber-shaped, reflexed, patent, or erect, apex shortly acuminate.
18a. Leaf blade hastate or narrowly cordate, longer than wide.
19a. Capitula 6–12, in paniculiform to corymbiform synflorescence; involucre narrowly campanulate, 0.7–1 cm in diam. ..... 215. *S. stricta*
19b. Capitula 1–3, long pedunculate, in corymbiform synflorescence; involucre campanulate, 1–2 cm in diam. ..... 216. *S. hylophila*
18b. Leaf blade cordate or broadly cordate, ± as long as wide.
20a. Lower and middle stem leaves broadly cordate, 8–20 × 7–18 cm; stem glabrous ..... 213. *S. cordifolia*
20b. Lower and middle stem leaves ovate-cordate, 5–11 × 5–11 cm; stem with sparse articulate hairs but glabrescent ..... 214. *S. oligantha*
14b. Apical part of phyllaries neither herbaceous nor leathery and saber-shaped, erect, usually appressed.
21a. Involucre ca. 5 mm in diam.; corolla ca. 8 mm; inner pappus bristles 6–7 mm ..... 221. *S. tenerifolia*
21b. Involucre 5–15 mm in diam.; corolla 10–16 mm; inner pappus bristles 7–13 mm.
22a. Involucre campanulate to globose, 10–15 mm in diam.
23a. Phyllaries long acuminate ..... 223. *S. hwangshanensis*
23b. Phyllaries acute to obtuse and sometimes mucronate.
24a. Leaf blade sparsely strigose on both surfaces ..... 222. *S. grandifolia*
24b. Leaf blade abaxially thinly arachnoid tomentose but glabrescent, adaxially sparsely strigose ..... 219. *S. bullockii*
22b. Involucre tubular to campanulate, 5–10 mm in diam.
25a. Leaf blade leathery, abaxially grayish green and sparsely arachnoid floccose but glabrescent ..... 225. *S. firma*
25b. Leaf blade papery, abaxially pale green and subglabrous.
26a. Involucre campanulate, 8–10 mm in diam.
27a. Phyllaries appressed, not patent or recurved ..... 220. *S. pseudobullockii*
27b. Phyllaries apically patent to recurved ..... 234. *S. paleata*
26b. Involucre tubular to narrowly campanulate, 5–8 mm in diam.
28a. Plants 30–40 cm tall; stem simple or apically few branched; capitula 3–5, subsessile in a clustered corymbiform synflorescence ..... 218. *S. triangulata*

28b. Plants 50–120 cm tall; stem much branched; capitula more numerous, shortly or long pedunculate.
29a. Capitula shortly pedunculate, clustered at end of branches in a corymbiform synflorescence ..... 224. *S. ussuriensis*
29b. Capitula long pedunculate, in a paniculiform synflorescence ..... 217. *S. manshurica*
3b. Basal and lower leaves with an attenuate, cuneate, rounded, truncate, or auriculate-amplexicaul base.
30a. Leaf blade base auriculate and amplexicaul.
31a. Capitula ca. 5, sessile, clustered in a hemispheric synflorescence ..... 236. *S. lyratifolia*
31b. Capitula either few and long pedunculate or numerous and shortly pedunculate, in a corymbiform synflorescence.
32a. Capitula 1–4, large, long pedunculate, not in a clustered corymbiform synflorescence; involucre 1.2–2 cm in diam.
33a. Leaf blade ovate to narrowly ovate-elliptic, 1.5–5 cm wide ..... 237. *S. neofranchetii*
33b. Leaf blade narrowly oblong to linear, 1–1.5 cm wide ..... 238. *S. caudata*
32b. Capitula numerous, small or medium-sized, shortly pedunculate, in a clustered corymbiform synflorescence; involucre 0.4–1 cm in diam.
34a. Leaf blade base inconspicuously auriculate.
35a. Stem winged; leaf blade abaxially grayish green or grayish white, densely arachnoid tomentose ..... 239. *S. leclerei*
35b. Stem wingless; leaf blade abaxially green, puberulent only on veins ..... 240. *S. merinoi*
34b. Leaf blade base broadly auriculate and amplexicaul.
36a. All leaves sessile; leaf blade elliptic, 8–23 × 2.5–6 cm ..... 241. *S. macrota*
36b. Lower stem leaves petiolate; leaf blade narrowly ovate-elliptic, 6–9 × 2.5–4 cm ..... 242. *S. semiamplexicaulis*
30b. Leaf blade base not auriculate or amplexicaul.
37a. Leaf blade lyrate or lyrate pinnatilobed; petiole with 1 or several pairs of lobes.
38a. Receptacle without bristles ..... 178. *S. porphyroleuca* (see *S.* sect. *Strictae*)
38b. Receptacle with bristles.
39a. Leaf blade decurrent on stem; stem winged.
40a. Leaf blade glabrous or subglabrous on both surfaces.
41a. Outer phyllaries acute to obtuse ..... 243. *S. peduncularis*
41b. Outer phyllaries apically with a 3–4 mm subulate awn ..... 244. *S. frondosa*
40b. Leaf blade adaxially green and glabrous or pubescent, abaxially grayish white and arachnoid or lanate.
42a. Involucre campanulate, 1–1.7 cm in diam. ..... 245. *S. eriocephala*
42b. Involucre ovoid or campanulate, 0.5–0.8 cm in diam.
43a. Plants 5–15 cm tall ..... 261. *S. kiraisiensis*
43b. Plants 20–90 cm tall.
44a. Stem wings entire; leaf blade ovate, undivided ..... 228. *S. dimorphaea*
44b. Stem wings sinuate-dentate; leaf blade narrowly ovate-elliptic, runcinate-pinnately lobed ..... 246. *S. dzeurensis*
39b. Leaf blade not decurrent on stem; stem wingless.
45a. Leaf blade adaxially green and glabrous, abaxially grayish white or grayish green and arachnoid tomentose.
46a. Terminal lobe of leaf blade ovate, base cuneate to subtruncate ..... 131. *S. flexuosa* (see *S.* sect. *Laguranthera*)
46b. Terminal lobe of leaf blade ovate-triangular or ovate, base conspicuously cordate.
47a. Stem with few reduced leaves; basal leaves numerous, in a basal rosette ..... 198. *S. alatipes* (see *S.* sect. *Rosulascentes*)
47b. Stem with many well-developed leaves; basal leaves few, usually withered at anthesis ..... 250. *S. lampsanifolia*
45b. Leaf blade green, ± concolorous, glabrous or subglabrous.
48a. Capitulum solitary, terminal on stem, or 2–4; phyllaries long acuminate, reflexed ..... 249. *S. morifolia*
48b. Capitula numerous, in a racemiform or corymbiform synflorescence; phyllaries not reflexed.
49a. Involucre hemispheric, 2–2.5 cm in diam. ..... 247. *S. carduiformis*
49b. Involucre narrowly campanulate, 0.4–0.9 cm in diam. ..... 248. *S. mutabilis*
37b. Leaf blade undivided or pinnately lobed but not lyrate; petiole without lobes.
50a. Leaf blade pinnately lobed or coarsely pinnately dentate.
51a. Plants 15–35 cm tall; capitulum solitary ..... 286. *S. grosseserrata*
51b. Plants 40–100 cm tall; capitula 3–5 in a clustered corymbiform synflorescence ..... 289. *S. recurvata*
50b. Leaf blade undivided, margin entire, denticulate, or shallowly sinuate-dentate.
52a. Leaf blade adaxially green, smooth, and glabrous or scabrous and strigose, abaxially white, grayish white, or grayish green and densely tomentose or thinly arachnoid.

53a. Plants stemless or shortly stemmed, 3–8 cm tall; capitulum solitary; involucre 2–2.5 cm in diam. ..... 272. *S. woodiana*
53b. Plants always with a developed stems, more than 10 cm tall; capitula usually several; involucre less than 1.5 cm in diam.
54a. Capitula 1–6.
55a. Stem and leaf petioles wingless.
56a. Plants 40–65 cm tall; involucre 0.8–1 cm in diam. ..... 270. *S. iodoleuca*
56b. Plants 10–30 cm tall; involucre 1–1.2 cm in diam. ..... 275. *S. alaschanica*
55b. Stem and leaf petioles distinctly winged.
57a. Plants 30–40 cm tall; leaf blade ovate to elliptic ..... 271. *S. smithiana*
57b. Plants 10–35 cm tall; leaf blade broadly ovate to orbicular.
58a. Involucre narrowly campanulate to cylindric, 5–7 mm in diam. ..... 273. *S. komarnitzkii*
58b. Involucre ovoid to obconic, ca. 13 mm in diam. ..... 274. *S. rotundifolia*
54b. Capitula numerous, in a racemiform, paniculiform, or corymbiform synflorescence.
59a. Stem wingless.
60a. Leaf blade orbicular to broadly ovate, abaxially white and densely tomentose ..... 281. *S. bullata*
60b. Leaf blade ovate, elliptic, or oblong to narrowly elliptic, abaxially grayish green and arachnoid.
61a. Plants to 1.2 m tall; capitula in a paniculiform to lax corymbiform synflorescence ..... 285. *S. undulata*
61b. Plants to 70 cm tall; capitula in a clustered corymbiform synflorescence.
62a. Leaf blade ovate to elliptic, adaxially grayish green, and arachnoid floccose ..... 283. *S. elliptica*
62b. Leaf blade narrowly ovate-elliptic to narrowly elliptic, adaxially green and glabrous.
63a. Plants 30–70 cm tall; leaves and phyllaries usually without glands ..... 282. *S. alpina*
63b. Plants 10–20 cm tall; leaves and phyllaries abaxially densely gland-dotted ..... 284. *S. pseudoalpina*
59b. Stem winged.
64a. Capitula 4–10, in a lax racemiform synflorescence ..... 276. *S. polygonifolia*
64b. Capitula usually more numerous, in a clustered or lax corymbiform or paniculiform synflorescence.
65a. Stem stout, much branched; leaf blade oblong to narrowly elliptic, less than 2 cm wide ..... 278. *S. platypoda*
65b. Stem slender, simple or apically few branched; leaf blade ovate to narrowly elliptic, usually more than 2 cm wide.
66a. Middle stem leaves 2–4 cm wide, apex acuminate.
67a. Middle stem leaves narrowly elliptic to linear, 10–20 cm ..... 280. *S. amurensis*
67b. Middle stem leaves ovate to elliptic, 5–8 cm ..... 228. *S. dimorphaea*
66b. Middle stem leaves 3–7.5 cm wide, apex acute to obtuse.
68a. Phyllaries yellowish green, apically purplish, densely arachnoid pubescent; outer phyllaries acuminate but without a black mucro; leaf blade apex obtuse to subacute ..... 277. *S. vestita*
68b. Phyllaries straw-colored, brownish, or purple, pubescent or arachnoid; outer phyllaries with a long black mucro; leaf blade apex acute ..... 279. *S. cauloptera*
52b. Leaf blade green, concolorous, glabrous, sparsely pubescent, or glandular hairy.
69a. Capitulum solitary, terminal on stem.
70a. Leaf blade margin coarsely sinuate-dentate.
71a. Phyllaries not reflexed; leaf blade obovate-elliptic, apex rounded to acute and mucronate ..... 286. *S. grosseserrata*
71b. Phyllaries reflexed; leaf blade ovate, narrowly ovate-elliptic, or triangular, apex acuminate ..... 288. *S. tunglingensis*
70b. Leaf blade margin entire or inconspicuously denticulate.
72a. Plants stemless or with a developed stem; involucre 1.5–4 cm in diam. ..... 252. *S. superba*
72b. Plants always with a developed stem; involucre 1–2 cm in diam.
73a. Leaf blade oblong to broadly linear, margin sinuate ..... 287. *S. pratensis*
73b. Leaf blade narrowly obovate, narrowly ovate, or narrowly elliptic, margin entire or denticulate.
74a. Leaf blade narrowly oblong to linear, glabrous; phyllaries reflexed ..... 257. *S. micradenia*
74b. Leaf blade narrowly ovate-elliptic to narrowly elliptic, sparsely villous; phyllaries not reflexed.
75a. Involucre obconic; phyllaries glabrous; leaf blade margin denticulate ..... 254. *S. acutisquama*
75b. Involucre campanulate; phyllaries villous; leaf blade margin entire and densely ciliate.

76a. Leaf blade base oblique and rounded or cuneate, apex obtuse to acute; phyllaries densely villous; corolla 1.8–2.4 cm ..... 251. *S. hieracioides*
76b. Leaf blade base attenuate, apex acute to acuminate; phyllaries sparsely villous; corolla 1.2–1.4 cm ..... 253. *S. tatsienensis*
69b. Capitula 2–6 or numerous, in a corymbiform synflorescence.
77a. Capitula 2–6.
78a. Leaf blade margin retrorsely dentate or serrate ..... 258. *S. retroserrata*
78b. Leaf blade margin entire or dentate to serrate but not retrorsely so.
79a. Leaf blade broadly ovate to narrowly elliptic, more than 3 cm wide, margin dentate to serrate.
80a. Middle and upper stem leaves narrowly ovate to narrowly elliptic ..... 256. *S. hultenii*
80b. Middle and upper stem leaves broadly ovate to ovate-elliptic ..... 255. *S. euodonta*
79b. Leaf blade narrowly ovate, narrowly elliptic, narrowly oblong, or linear, 0.8–2.5 cm wide, margin entire or denticulate.
81a. Leaf blade narrowly oblong to linear, glabrous; phyllaries reflexed ..... 257. *S. micradenia*
81b. Leaf blade narrowly ovate-elliptic to narrowly elliptic, sparsely villous; phyllaries not reflexed.
82a. Involucre campanulate; phyllaries villous; leaf blade margin entire and densely ciliate ..... 253. *S. tatsienensis*
82b. Involucre obconic; phyllaries glabrous; leaf blade margin denticulate ..... 254. *S. acutisquama*
77b. Capitula numerous.
83a. Phyllaries apically saber-shaped.
84a. Stem and petioles wingless ..... 262. *S. epilobioides*
84b. Stem and petioles narrowly winged.
85a. Leaf blade margin denticulate; involucre 5–6 mm in diam. ..... 259. *S. acuminata*
85b. Leaf blade margin dentate; involucre ca. 10 mm in diam. ..... 263. *S. umbrosa*
83b. Phyllaries apically not saber-shaped.
86a. Stem and petioles wingless; leaf blade triangular-ovate to ovate ..... 268. *S. dielsiana*
86b. Stem and petioles distinctly winged; leaf blade obovate to elliptic or narrowly so.
87a. Leaf blade abaxially glandular; involucre ca. 3 mm in diam.; phyllaries acuminate ..... 260. *S. glandulosa*
87b. Leaf blade abaxially not glandular; involucre 5–8 mm in diam.; phyllaries acute to obtuse.
88a. Leaf blade 3–9 cm wide.
89a. Leaf blade green, concolorous; lower stem leaves with base cordate and apex acute to acuminate ..... 267. *S. latifolia*
89b. Leaf blade adaxially green, abaxially glaucous-green; lower stem leaves with base attenuate and apex very long acuminate ..... 269. *S. neoserrata*
88b. Leaf blade 1–4 cm wide.
90a. Outer phyllaries with apex acuminate ..... 266. *S. candolleana*
90b. Outer phyllaries with apex obtuse or subacute.
91a. Leaf blade of middle stem leaves ovate, base abruptly narrowed into a winged petiole to 5.5 cm; leaf blade adaxially smooth; phyllaries usually yellowish green ... 264. *S. hemsleyi*
91b. Leaf blade of middle stem leaves narrowly elliptic, base attenuate into a petiole to 1(–2) cm; leaf blade adaxially scabrid; phyllaries usually dark purple ..... 265. *S. parviflora*

207. Saussurea odontolepis Schultz Bipontinus ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 29: 176. 1883.

齿苞风毛菊 chi bao feng mao ju

Saussurea aspera Handel-Mazzetti; *S. pectinata* Bunge ex Candolle var. *amurensis* Maximowicz; *S. ussuriensis* Maximowicz var. *odontolepis* Herder, nom. illeg. superfl.

Herbs 20–100 cm tall, perennial. Stem solitary, erect, apically branched. Basal, lower, and middle stem leaves petiolate; petiole 5–14 cm; leaf blade narrowly ovate-elliptic, 7–21 × 3–12 cm, pinnately lobed to pinnatisect, both surfaces green, abaxially sparsely strigose on veins and usually gland-dotted, adaxially scabrid and densely strigose; lateral lobes 8–17 pairs, oblong to linear-elliptic, margin entire or with 1 or 2 teeth, apex acute; terminal lobe narrowly triangular. Upper stem leaves shortly petiolate, gradually smaller upward on stem. Capitula several, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–8(–10) mm in diam. Phyllaries in 5–7 rows, arachnoid lanate, apex acute to obtuse; outer phyllaries narrowly ovate-triangular, 4–5 × 1–2 mm, usually reflexed, margin with 2 or 3 dark purple subulate teeth; middle phyllaries narrowly ovate-elliptic, 5–7 × 1.5–2 mm, margin entire or with 1 or 2 teeth; inner phyllaries narrowly elliptic-linear, 7–11 × 1.5–2 mm, margin entire. Receptacle bristles 6–7 mm. Corolla purple, 1–1.3 cm, tube 5–7 mm, limb 5–6 mm, lobes 4–5 mm. Achene purplish brown with dark spots, cylindric, 3–5 mm, glabrous. Pappus dirty white; outer bristles 1.5–3 mm; inner bristles (6–)8–9 mm. Fl. and fr. Aug–Oct. $2n = 26$.

Forest margins, grasslands; 100–700 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi [Korea, Mongolia, Russia (Far East)].

The validation of *Saussurea odontolepis* was effected by Maximowicz, not by Herder who treated the name as a synonym of his illegitimate *Saussurea ussuriensis* var. *odontolepis*.

208. Saussurea pectinata Bunge ex Candolle, Prodr. 6: 538. 1838.

篦苞风毛菊 bi bao feng mao ju

Saussurea davidii Franchet; *S. davidii* var. *macrocephala* Franchet; *S. pectinata* var. *macrocephala* (Franchet) Handel-Mazzetti; *S. pectinata* var. *pekinensis* Maximowicz.

Herbs 20–100 cm tall, perennial. Stem solitary, erect, apically branched. Basal and lower stem leaves petiolate; petiole 3.5–9.5(–17) cm; leaf blade ovate, ovate-oblong, or elliptic, 5–22 × 2–12 cm, pinnately lobed, abaxially pale green, gland-dotted, and strigose especially on veins but glabrescent, adaxially green, scabrid, and strigose; lateral lobes 4–9 pairs, ovate to narrowly ovate-elliptic, margin sinuate or lobed-dentate, apex acute to obtuse and mucronate. Middle and upper stem leaves shortly petiolate; leaf blade pinnately lobed or undivided and margin entire. Capitula several, in a corymbiform synflorescence, usually long pedunculate. Involucre campanulate, 0.8–1.2(–2) cm in diam. Phyllaries in 4 or 5 rows, apically arachnoid; outer phyllaries narrowly ovate, 10–13 × 3–4 mm, usually reflexed, margin pectinate with 3–5 teeth; middle phyllaries narrowly ovate-elliptic, 11–13 × 1.5–2.5 mm, margin pectinate; inner phyllaries purple, linear, 13–14 × 1–1.5 mm, margin entire. Corolla purple, 1.2–1.4 cm, tube 5–8 mm, limb 6–7 mm, lobes 4–5 mm. Achene blackish brown with black spots, cylindric, 3–5 mm, glabrous. Pappus dirty white; outer bristles 3–4 mm; inner bristles 8–10 mm. Fl. and fr. Aug–Oct.

• Forests, forest margins, trailsides, steppes, ravines; 300–1900 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi.

209. Saussurea populifolia Hemsley, J. Linn. Soc., Bot. 29: 311. 1892.

杨叶风毛菊 yang ye feng mao ju

Saussurea acropilina Diels.

Herbs 25–90 cm tall, perennial. Stems solitary or sometimes 2, erect, simple or apically branched. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 2–8 cm, not winged, glabrous; leaf blade broadly ovate, 5–11 × 3–8 cm, abaxially pale green and glabrous, adaxially dark green, scabrid, and strigose, base cordate to rounded, margin dentate, apex acuminate. Upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem; leaf blade ovate to narrowly ovate-elliptic, base cuneate, apex acuminate. Capitulum usually solitary, terminal on stem or sometimes 2–5 in a lax corymbiform synflorescence, long pedunculate. Involucre broadly campanulate, 2–2.5 cm in diam. Phyllaries in 5–7 rows, straw-colored, tinged purple, puberulent; outer phyllaries ovate, 8–18 × 2–3 mm, apical part green, herbaceous, long acuminate, and reflexed; middle phyllaries narrowly ovate, 8–12 × 2.5–3 mm, apical part patent to reflexed; inner phyllaries linear, 14–16 × 1–1.5 mm, apex acuminate and erect. Receptacle bristles 6–8 mm. Corolla purple, 1.4–1.5 cm, tube 8–9 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene brown, subcylindric, ca. 5 mm, glabrous. Pappus pale brown; outer bristles 1–3 mm, scabrid; inner bristles 1.1–1.3 cm. Fl. and fr. Jul–Oct.

• Grasslands on mountain slopes, marshes; 1700–3600 m. Chongqing, Gansu, Henan, Hubei, Shaanxi, Sichuan, ?SE Xizang, ?NW Yunnan.

The records of *Saussurea populifolia* from SE Xizang and NW Yunnan are doubtful. These records may belong to one-headed specimens of *S. cordifolia* or *S. oligantha*.

210. Saussurea mongolica (Franchet) Franchet, Bull. Herb. Boissier 5: 539. 1897.

蒙古风毛菊 meng gu feng mao ju

Saussurea ussuriensis Maximowicz var. *mongolica* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 61. 1883; *S. hopeiensis* F. H. Chen; *S. matsumurae* Nakai; *S. mongolica* var. *rigidior* Handel-Mazzetti; *S. mongolica* f. *shansiensis* (F. H. Chen) Y. Ling; *S. sinuata* Komarov var. *shansiensis* F. H. Chen.

Herbs 30–90 cm tall, perennial. Stem solitary, erect, apically branched, glabrous or sparsely strigose. Lower stem leaves petiolate; petiole 5–16 cm; leaf blade ovate-triangular to ovate, 5–20 × 2–9 cm, pinnately lobed or basal half pinnately lobed and apical part coarsely dentate, abaxially pale green and glabrescent, adaxially green and sparsely strigose but glabrescent, base cordate, apex acute; lateral lobes 1–3 pairs, oblong-elliptic, margin dentate or entire, apex acute to obtuse. Middle and upper stem leaves oblong to narrowly ovate-elliptic, margin coarsely dentate. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–7 mm in diam. Phyllaries in 5–7 rows, sparsely arachnoid, apical part saber-shaped and reflexed, apex long acuminate; outer phyllaries ovate, ca. 3 × 1 mm; middle phyllaries narrowly ovate, 7–8 × ca. 2 mm; inner phyllaries narrowly elliptic to linear, ca. 10 × 2 mm. Corolla purplish red, 0.9–1.3 cm, tube 5–6 mm, limb 4–7 mm. Achene brown, cylindric, 4–5 mm, glabrous. Pappus basally pale brown, apically white; outer bristles ca. 3 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Oct. $2n = 26$*.

Mountain slopes, forests, thickets, trailsides, grassy slopes; 500–2900 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [Korea, Mongolia].

Saussurea mongolica var. *rigidior* was described as having pectinate phyllaries just like *S. pectinata*. For these plants from Hebei (Xiaowutai Shan), Handel-Mazzetti (Acta Horti Gothob. 12: 321. 1938) postulated hybrid origin, with *S. mongolica* and *S. pectinata* as parents.

211. Saussurea sinuata Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 25: 735. 1907.

林风毛菊 lin feng mao ju

Saussurea aristata Lipschitz; *S. stenolepis* Nakai.

Herbs 40–80(–110) cm tall, perennial. Stem solitary, erect, apically branched. Basal and lower stem leaves usually withered at anthesis. Middle stem leaves petiolate; petiole to 14 cm; leaf blade narrowly triangular-cordate, triangular-ovate, or ovate, 5–15 × 3–8 cm, pinnately lobed to pinnatisect or undivi-

ded and margin coarsely dentate; base cordate to truncate, apex acute. Upper stem leaves shortly petiolate, smaller; leaf blade usually undivided, margin dentate to entire, both surfaces green and glabrous. Uppermost stem leaves linear to subulate. Capitula several, in a lax corymbiform or paniculiform synflorescence, long pedunculate. Involucre obconic, (0.5–)1–1.5 cm in diam. Phyllaries in 5 or 6 rows, apical part reflexed, apex long acuminate; outer phyllaries ovate, 5–6 × 1–2 mm; middle phyllaries narrowly ovate-elliptic, ca. 10 × 2 mm; inner phyllaries narrowly elliptic to linear, ca. 15 × 2 mm. Receptacle bristles ca. 7 mm. Corolla purplish red, 1.2–1.5 cm, tube 6–9 mm, limb 5–6 mm. Achene brown, cylindric, 4–7 mm, ribbed. Pappus dirty white; outer bristles 2–3 mm, smooth or scabrid; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep. $2n = 26$.

Montane forests, forest margins. Heilongjiang, Jilin, Nei Mongol [Korea, Russia (Far East)].

212. Saussurea subtriangulata Komarov, Bot. Mater. Gerb. Glavn. Bot. Sada S.S.S.R. 6: 18. 1926.

吉林风毛菊 ji lin feng mao ju

Saussurea eriolepis Bunge ex Candolle var. *caudata* Herder; *S. grandifolia* Maximowicz var. *caudata* (Herder) Komarov.

Herbs 40–80(–100) cm tall, perennial. Stem solitary, slender, erect, many branched, brown arachnoid. Basal and lower stem leaves petiolate; petiole to 12 cm; leaf blade 7–16 × 4–6 cm, base cordate to cuneate, margin dentate, apex acuminate. Middle stem leaves sessile, narrowly obovate to narrowly ovate-elliptic, 6–8 × 0.7–1.2 cm. Upper stem leaves narrowly ovate-elliptic to linear, smaller. Capitula numerous, in a paniculiform synflorescence, long pedunculate. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in 4 or 5(–8) rows, purple, apical part saber-shaped and recurved, apex long acuminate; outer phyllaries triangular-ovate, ca. 4 × 1 mm; middle phyllaries elliptic, ca. 7 × 3 mm; inner phyllaries linear-oblong, ca. 11 × 2 mm. Receptacle bristles 1–1.2 cm. Corolla purple, 1.3–1.5(–2) cm, tube 7–9 mm, limb 6–7 mm, lobes ca. 4 mm. Achene blackish brown with dark spots, cylindric, 3–4 mm, glabrous. Pappus dirty white; outer bristles 3–5 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Jul–Sep. $2n = 26$.

Forest margins, forests. Heilongjiang, Jilin [Korea, Russia (Far East)].

213. Saussurea cordifolia Hemsley, J. Linn. Soc., Bot. 29: 310. 1892.

心叶风毛菊 xin ye feng mao ju

Saussurea aegirophylla Diels; *S. cavaleriei* H. Léveillé & Vaniot; *S. cordifolia* var. *ombrophila* Handel-Mazzetti; *S. dutaillyana* Franchet.

Herbs 40–150 cm tall, perennial. Stem solitary, erect, apically branched, subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 8–20 cm; leaf blade cordate, 8–20 × 7–18 cm, both surfaces green, abaxially glabrous or sparsely strigose on veins, adaxially scabrid and sparsely strigose, base deeply cordate, margin coarsely dentate, apex acuminate. Uppermost stem leaves shortly petiolate or sessile; leaf blade ovate, elliptic, or narrowly ovate-elliptic, base rounded to broadly truncate. Capitula usually numerous, in a lax corymbiform synflorescence but rarely solitary, long pedunculate. Involucre campanulate, (0.8–)1.5–2 cm in diam. Phyllaries in 4–6 rows, straw-colored, leathery, conspicuously veined, glabrous or white to brown arachnoid tomentose at margin, apical part green, herbaceous, and reflexed to erect, apex acuminate; outer phyllaries ovate, 2–4(–7) × 2–3 mm; middle phyllaries narrowly ovate, 4–15 × 3–5 mm; inner phyllaries linear, 13–16 × 1.5–2 mm. Receptacle bristles 6–9 mm. Corolla pink to dark purple, (1.2–)1.5–1.7 cm, tube 6–8 mm, limb 8–9 mm, lobes 3–4 mm. Achene brown, cylindric, 5–7 mm, glabrous. Pappus pale brown; outer bristles 2–6 mm, scabrid; inner bristles 1.1–1.5 cm. Fl. and fr. Aug–Oct.

• Montane forests, forest margins; 700–2200 m. Anhui, Chongqing, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan, Zhejiang.

Saussurea dutaillyana, characterized by dense brown indumentum of articulate hairs on stem and petioles, by basal leaves crowded in a rosette, and by ample lax paniculiform synflorescences, may deserve separate taxonomic status. It has been accepted in several provincial floras and is recorded from Chongqing, Henan, Hubei, S Shaanxi (Qin Ling), Sichuan, and Zhejiang.

The following species, *Saussurea oligantha*, also belongs to this species group and is not well separated from *S. cordifolia*.

214. Saussurea oligantha Franchet, J. Bot. (Morot) 10: 421. 1896.

少花风毛菊 shao hua feng mao ju

Saussurea oligantha var. *oligolepis* (Y. Ling) X. Y. Wu; *S. oligantha* var. *parvifolia* Y. Ling; *S. oligolepis* Y. Ling.

Herbs 40–70 cm tall, perennial. Stem solitary, erect, simple or apically few branched, with sparse multicellular articulate hairs or glabrescent. Leaves green, sparsely strigose to subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 9–15 cm, covered with brown articulate hairs or glabrous; leaf blade broadly ovate-cordate, 5–11 × 5–11 cm, base cordate to hastate, margin coarsely dentate, apex acuminate. Upper stem leaves sessile, narrowly ovate to narrowly elliptic, gradually smaller upward on stem, apex long acuminate. Capitula 2–8, in a lax paniculiform or corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre obconic to campanulate, 1.2–1.5 cm in diam. Phyllaries in 4–6 rows, apical part green, herbaceous, and reflexed to erect, apex acuminate; outer phyllaries ovate, ca. 6 × 2 mm; middle phyllaries oblong to elliptic, 8–10 × 3–3.5 mm; inner phyllaries linear, ca. 10 × 2 mm. Corolla purple, 1.1–1.4 cm, tube 6–7 mm, limb 5–7 mm, lobes 3–3.5 mm. Achene oblong, 3–4 mm, glabrous. Pappus dirty white; outer bristles 3–4 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep.

• Mountain slopes, forest margins, forests; 1300–3800 m. Chongqing, Gansu, Henan, Hubei, Shaanxi, Sichuan, SE Xizang, NW Yunnan.

215. Saussurea stricta Franchet, J. Bot. (Morot) 8: 342. 1894.

喜林风毛菊 xi lin feng mao ju

Saussurea subcordata F. H. Chen.

Herbs 75–120 cm tall, perennial. Stem solitary, erect, api-

cally branched. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; petiole 2–13(–18) cm; leaf blade ovate-triangular, 6–12 × 4–7(–13) cm, both surfaces green and subglabrous with a few brown articulate hairs, base cordate, margin dentate, apex acuminate. Upper stem leaves subsessile; leaf blade ovate to narrowly ovate-elliptic, base cuneate, margin denticulate or entire, apex acuminate. Capitula numerous, in a paniculate or corymbiform synflorescence, pedunculate. Involucre narrowly campanulate, 0.8–1.2 cm in diam. Phyllaries in 4 or 5 rows, apically purple, conspicuously 3–5-veined, glabrous or sparsely arachnoid; outer phyllaries broadly ovate, 3–4 × 2–3 mm, patent to recurved, apex rounded and very shortly acuminate; middle phyllaries oblong, 4–8 × 2–3 mm, apex acuminate; inner phyllaries linear, 10–11 × 1–2 mm, apex obtuse and mucronate. Receptacle bristles 7–9 mm. Corolla dark purple, 1–1.2 cm, tube 4–5 mm, limb 6–7 mm, lobes 2–2.5 mm. Achene straw-colored, tinged purple, cylindric, 6–6.5 mm, glabrous. Pappus pale brown; outer bristles 2.5–5 mm, scabrid or almost smooth; inner bristles 8–10 mm. Fl. and fr. Aug–Oct.

• Montane forests; 1400–2200 m. N Chongqing, SE Gansu, N Sichuan.

Saussurea stricta is very close to *S. cordifolia*. Specimens determined as *S. stricta* from W Henan match typical *S. cordifolia*, whereas those from SE Xizang and NW Yunnan must be referable to *S. hylophila*.

216. Saussurea hylophila Handel-Mazzetti, Symb. Sin. 7: 1148. 1936.

林地风毛菊 lin di feng mao ju

Herbs 60–100 cm tall, perennial. Stem solitary, erect, simple or apically branched, subglabrous. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; petiole 2–11 cm; leaf blade cordate to ovate-cordate, 5–11 × 3–7 cm, papery, abaxially pale green and strigose, adaxially green and sparsely strigose but glabrescent, base deeply cordate, margin dentate, apex acuminate. Upper stem leaves subsessile; leaf blade narrowly ovate-elliptic, base rounded to attenuate, margin entire or denticulate, apex acuminate. Capitula 2 or 3, in a corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in 4 or 5 rows, straw-colored, sometimes apically tinged purple, ± villous and glabrescent; outer phyllaries ovate, 3–6 × 2–3 mm, apex acuminate; middle phyllaries narrowly ovate, 8–12 × 2–3 mm, apex long acuminate and 3–6 mm; inner phyllaries narrowly elliptic to linear, 14–16 × 1.5–2 mm, apex acute. Corolla purple, 1.2–1.4 cm, tube 5–6 mm, limb 7–8 mm, lobes 3–4 mm. Achene straw-colored with dark spots, cylindric, 5–6 mm, glabrous, apex with a short crown. Pappus dirty white; outer bristles 4–7 mm, scabrid to shortly plumose; inner bristles 1.2–1.3 cm. Fl. and fr. Aug–Oct.

• Montane forests; 3000–3200 m. S and SE Xizang (Cona, Zayü), NW Yunnan (Gongshan).

Saussurea hylophila has been treated under *S. stricta* by S. W. Liu (Fl. Yunnan. 13: 557. 2004). However, all specimens seen from Yunnan and Xizang clearly differ from that species occurring in N Sichuan.

217. Saussurea manshurica Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 424. 1901.

东北风毛菊 dong bei feng mao ju

Saussurea manshurica var. *pinnatifida* Nakai; *S. triangulata* Trautvetter & C. A. Meyer subsp. *manshurica* (Komarov) Kitamura; *S. triangulata* var. *pinnatifida* (Nakai) Kitamura.

Herbs (25–)50–100 cm tall, perennial. Stem solitary, erect, apically branched, subglabrous. Basal leaves petiolate; petiole 4–14 cm, sparsely strigose; leaf blade triangular-hastate to rarely ovate or oblong, 6.5–16 × 2–5(–8) cm, thin, papery, both surfaces green, abaxially glabrous, adaxially subglabrous to sparsely strigose, base cordate, cuneate, or rarely truncate, margin sinuate-dentate, apex acute to acuminate. Lower and middle stem leaves ovate to narrowly ovate, smaller. Upper stem leaves sessile, narrowly ovate-elliptic, oblong, or linear, margin entire. Capitula numerous, in a paniculiform synflorescence, long pedunculate. Involucre narrowly campanulate, 5–8(–12) mm in diam. Phyllaries in 5–7 rows, straw-colored, apically flushed purple, ± arachnoid, glabrescent, apex obtuse; outer phyllaries broadly ovate, 2–2.5 × 1–1.5 mm; middle phyllaries ovate to narrowly ovate, 3–10 × 1–1.5 mm; inner phyllaries linear, 13–14 × 0.8–1.1 mm. Receptacle bristles to 7 mm. Corolla purple, 1–1.3 cm, tube 5–6 mm, limb 6–7 mm, lobes 3–4 mm. Achene brown, cylindric, 3–5 mm, glabrous. Pappus pale brown; outer bristles 2–4 mm; inner bristles 0.9–1.2 cm. Fl. and fr. Jul–Sep. $2n = 26$.

Mixed or coniferous forests, stony slopes, rock crevices; 900–1500 m. Heilongjiang, Jilin, Liaoning [Korea, Russia (Far East)].

218. Saussurea triangulata Trautvetter & C. A. Meyer in Middendorff, Reise Sibir. 1(2): 58. 1856.

毛苞风毛菊 mao bao feng mao ju

Saussurea lanatocephala F. H. Chen; *S. triangulata* var. *alpina* Nakai.

Herbs 30–40[–70] cm tall, perennial. Stem solitary, erect, simple or apically branched. Basal leaves often withered at anthesis. Basal and lower stem leaves petiolate; petiole to 14 cm; leaf blade ovate-triangular, triangular-hastate, or narrowly ovate-triangular, 4–10[–12] × 2.5–6 cm, abaxially pale green and pubescent or glabrous, adaxially green, base truncate, cuneate, or cordate, margin sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile or subsessile, gradually smaller upward on stem; leaf blade elliptic to narrowly ovate, base truncate, cuneate, or rounded, margin dentate to entire, apex acuminate. Capitula 3–5[–20], in a ± clustered corymbiform synflorescence, shortly pedunculate. Involucre tubular-campanulate, 5–10 mm in diam. Phyllaries in 4 or 5 rows, dark or green with dark apical part and margin, to 1.5 cm, sparsely arachnoid to almost glabrous, apex subobtuse; outer and middle phyllaries ovate; inner phyllaries oblong-linear. Receptacle bristles ca. 7 mm. Corolla pale purple, 1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes 2.5–3 mm. Achene dark brown, cylindric, 4–6 mm, glabrous. Pappus brownish; outer bristles to 3 mm; inner bristles 9–10 mm. Fl. and fr. Jul–Oct.

Alpine meadows, deciduous and coniferous forests. Jilin (Changbai Shan) [Korea, Russia (Far East)].

219. Saussurea bullockii Dunn, J. Linn. Soc., Bot. 35: 509. 1903.

庐山风毛菊 lu shan feng mao ju

Saussurea kwangtungensis F. H. Chen; *S. tienmoshanensis* F. H. Chen.

Herbs 30–100 cm tall, perennial. Stem solitary, 2–10 mm in diam., erect, apically branched, thinly arachnoid lanate, glabrescent. Lower stem leaves petiolate; petiole 5–17 cm; leaf blade triangular-cordate, 8–15(–25) × 4–14 cm, abaxially pale green and thinly arachnoid tomentose but glabrescent, adaxially green and sparsely strigose, base cordate, margin sharply sinuate-dentate, apex acuminate. Upper stem leaves shortly petiolate; leaf blade ovate to ovate-triangular, gradually smaller upward on stem. Capitula numerous, in a lax paniculiform to corymbiform synflorescence. Involucre campanulate to obconic, (0.8–)1–1.3(–1.5) cm in diam. Phyllaries in 5 or 6 rows, arachnoid or glabrescent, margin and apex usually slightly purple; outer phyllaries ovate, 2–3 × 1.5–2 mm, apex obtuse and mucronate; middle phyllaries oblong to narrowly elliptic, 4–10 × ca. 2 mm, apex obtuse; inner phyllaries narrowly oblong, 10–12 × 1–2 mm, apex obtuse. Corolla purple, 1.3–1.6 cm, minutely gland-dotted, tube 6–9 mm, limb ca. 8 mm, lobes ca. 4 mm. Achene pale brown, cylindric, 3–4 mm, ribbed, glabrous, apex with a short crown. Pappus apically white, basally pale brown; outer bristles 2–4 mm, scabrid; inner bristles 1.2–1.3 cm. Fl. and fr. Jul–Oct.

• Montane forests, meadows, near streams; 800–2100 m. Anhui, Fujian, Guangdong, Hubei, Hunan, Jiangxi, Shaanxi, Zhejiang.

220. Saussurea pseudobullockii Lipschitz, Novosti Sist. Vyssh. Rast. 1964: 321. 1964.

洮河风毛菊 tao he feng mao ju

Herbs 25–40 cm tall, perennial. Stems several, straw-colored, 3–5 mm in diam., erect, apically branched, sparsely arachnoid, glabrescent. Basal leaves almost withered at anthesis. Lower stem leaves petiolate; petiole 1–3 cm; leaf blade narrowly ovate-triangular, 7.5–9.5 × 2–4 cm, abaxially light green, gland-dotted, and tomentose but glabrescent, adaxially dark green and glabrous, base shallowly cordate, truncate, or cuneate, margin dentate, apex acute. Middle and upper stem leaves shortly petiolate, smaller, base truncate. Uppermost leaves subsessile; leaf blade narrowly ovate to linear, margin entire. Capitula numerous, in a clustered corymbiform or paniculiform synflorescence, shortly pedunculate. Involucre cylindric or obconic, 8–10 mm in diam. Phyllaries in 4 or 5 rows, arachnoid, apically purplish; outer phyllaries ovate-triangular, 3–4 × 1.5–2 mm; middle phyllaries ovate-triangular, 4–8 × 1.8–2.2 mm, apex acuminate and mucronate; inner phyllaries 8–10 × 1–1.5 mm, apex acute to obtuse. Receptacle bristles subulate, 3–5 mm. Corolla purple to pink, 1.2–1.3 cm, tube 6.5–7 mm, limb 5.5–6 mm, lobes 4–4.5 mm. Achene ca. 3 mm, glabrous, apex with a small crown. Pappus dirty white; outer bristles 2.5–4 mm, scabrid; inner bristles 8–10 mm. Fl. Jul.

• Montane meadows and grasslands; 2700–2800 m. Gansu (Jonê, Lintan).

221. Saussurea tenerifolia Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 5: 159. 1941.

长白山风毛菊 chang bai shan feng mao ju

Herbs 50–70 cm tall, perennial. Stem solitary, erect, simple or apically branched, glabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 7–17 cm; leaf blade ovate-cordate, 9–15 × 7–9 cm, abaxially pale green and pilose on veins, adaxially green and sparsely strigose but glabrescent, base cordate to hastate, margin dentate, apex acuminate. Upper stem leaves sessile or subsessile; leaf blade ovate to narrowly ovate-elliptic, gradually smaller upward on stem, base rounded to cuneate, margin denticulate or entire, apex acuminate. Capitula 5–14, in a dense corymbiform synflorescence, pedunculate. Involucre cylindric, ca. 5 mm in diam. Phyllaries in ca. 4 rows, straw-colored but purple apically, rigid, leathery, sparsely arachnoid, apex acute to rounded and mucronate; outer phyllaries broadly ovate, 2–3 × 2–3 mm; middle and inner phyllaries elliptic, ca. 5 × 3 mm. Corolla purple, ca. 8 mm, tube ca. 4 mm, limb ca. 4 mm. Achene cylindric, ca. 3 mm. Pappus dirty white; outer bristles 1–2 mm, scabrid; inner bristles 6–7 mm. Fl. Jul.

• Montane forests and forest margins; 1100–1700 m. Jilin (Changbai Shan).

222. Saussurea grandifolia Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 169. 1859.

大叶风毛菊 da ye feng mao ju

Saussurea coarctata (Herder) Kitamura; *S. grandifolia* var. *asperifolia* Herder; *S. grandifolia* var. *coarctata* Herder; *S. grandifolia* var. *tenuior* Herder.

Herbs 35–120 cm tall, perennial. Stem solitary, erect, apically branched, sparsely strigose to subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 3–9(–13) cm; leaf blade cordate-ovate to triangular-ovate, 7–20 × 4–13 cm, rigid, both surfaces green, scabrid, and sparsely strigose, base shallowly cordate to truncate, margin coarsely dentate, apex acuminate. Upper stem leaves shortly petiolate to subsessile; leaf blade ovate-triangular, ovate-rhombic, or narrowly ovate-elliptic, gradually smaller upward on stem, base cuneate, apex acuminate. Capitula 3–18, in a corymbiform or paniculiform synflorescence or rarely solitary, pedunculate. Involucre campanulate, 1.2–1.5 cm in diam. Phyllaries in 5 or 6(–9) rows, arachnoid, apex acute to obtuse and mucronate; outer phyllaries ovate-elliptic, 3–5 × 2–3 mm; middle phyllaries elliptic, 5–8 × 2–3 mm; inner phyllaries linear, 8–12 × 1.5–2 mm. Receptacle bristles 7–8 mm. Corolla dull red, 1.3–1.5 cm, tube 6–8 mm, limb 6–7 mm, lobes 4–5 mm. Achene straw-colored, cylindric, 4–5 mm, glabrous. Pappus dirty white; outer bristles 1–2 mm, scabrid; inner bristles 0.9–1.1 cm. Fl. and fr. Aug–Oct. $2n = 26$.

Forests, forest margins, meadows, mountain slopes; 200–1100 m. Heilongjiang, Jilin, Liaoning [Korea, Russia (Far East)].

223. Saussurea hwangshanensis Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 6: 79. 1949.

黄山风毛菊 huang shan feng mao ju

Saussurea sinuata Komarov var. *cordata* F. H. Chen.

Herbs to 50 cm tall, perennial. Stem solitary, erect, apically branched, glabrous. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 4–16 cm; leaf blade ovate-cordate, 8–17 × 6–12 cm, both surfaces green, abaxially glabrous, adaxially sparsely strigose, base cordate, margin coarsely dentate, apex acuminate. Upper stem leaves shortly petiolate to subsessile; leaf blade ovate, gradually smaller upward on stem. Capitula 4–8, in a corymbiform synflorescence, pedunculate. Involucre campanulate to globose, 1–1.5 cm in diam. Phyllaries in 4 or 5(–7) rows, straw-colored, basally leathery, apically herbaceous, purplish and densely white arachnoid, and patent to recurved, apex long acuminate; outer phyllaries narrowly triangular-ovate, 4–6 × ca. 2(–3) mm; middle phyllaries narrowly elliptic, 6–10 × ca. 2 mm; inner phyllaries narrowly linear-elliptic, 10–14 × 1.5–2 mm. Receptacle bristles to 5 mm. Corolla purplish red, 1.2–1.5 cm, tube 6–9 mm, limb 5–6 mm, lobes 3.5–4 mm. Achene purplish brown, cylindric, 3.5–4 mm, glabrous. Pappus pale brown to dirty white; outer bristles 2–3 mm, scabrid; inner bristles 9–10 mm. Fl. and fr. Aug–Sep.

• Forests, grasslands; 1000–1700 m. Anhui (Huang Shan), Zhejiang.

224. Saussurea ussuriensis Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savăns 9: 167. 1859.

乌苏里风毛菊 wu su li feng mao ju

Saussurea ussuriensis var. *incisa* Maximowicz; *S. ussuriensis* var. *laxiodontolepis* Q. Z. Han & Shu Y. Wang; *S. ussuriensis* var. *pinnatifida* Maximowicz.

Herbs 30–120 cm tall, perennial. Stem solitary, erect, apically branched. Basal and lower stem leaves petiolate; petiole 3.5–20 cm; leaf blade ovate or oblong, 6–18 × 2.5–6[–10] cm, pinnately lobed or undivided, both surfaces green, ± concolorous, usually gland-dotted, and sparsely strigose but glabrescent, base cordate to truncate, apex acuminate; lateral lobes 3–7 pairs, triangular-oblong, margin entire or coarsely dentate. Middle and upper stem leaves shortly petiolate; leaf blade oblong to linear, gradually smaller upward on stem. Capitula numerous, clustered at end of branches in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–8 mm in diam. Phyllaries in 5–7 rows, margin and apically usually purplish, arachnoid to glabrescent, apex acuminate to acute; outer phyllaries ovate, 2–3 × 0.5–1 mm; middle phyllaries oblong, 3–9 × 1.5–2 mm; inner phyllaries linear, 9–11(–14) × 1–1.5 mm. Receptacle bristles 5–6 mm. Corolla purplish red, 1–1.3 cm, tube 5–6 mm, limb 5–5.5 mm, lobes 3.5–4 mm. Achene pale brown with dark spots, 4–5 mm, glabrous, apex with a short crown. Pappus straw-colored; outer bristles 2–4 mm, scabrid; inner bristles 7–9 mm. Fl. and fr. Jul–Sep. $2n = 26$.

Montane forests, thickets, grasslands, by rivers, ravines; 1100–2900 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, ?Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [Japan, Korea, Mongolia, Russia (Far East)].

A single plant of *Saussurea ussuriensis* from Liaoning has been described as *S. ussuriensis* var. *laxiodontolepis*. The description matches the typical variety of *S. ussuriensis*, except for the dentate phyllaries, which may be the result of introgression from *S. odontolepis* or *S. pectinata*. Also, Lipschitz (Fl. URSS 27: 448. 1962) reported hybrids of *S. ussuriensis* with *S. odontolepis*.

225. Saussurea firma (Kitagawa) Kitamura, Acta Phytotax. Geobot. 9: 112. 1940.

硬叶风毛菊 ying ye feng mao ju

Saussurea ussuriensis Maximowicz var. *firma* Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 4: 97. 1936; *S. controversa* Candolle var. *firma* (Kitagawa) Kitagawa; *S. controversa* f. *sinuata* (Kitagawa) Kitagawa; *S. discolor* (Willdenow) Candolle var. *firma* (Kitagawa) Kitagawa; *S. discolor* f. *sinuata* (Kitagawa) Kitagawa; *S. ussuriensis* f. *sinuata* Kitagawa.

Herbs 30–80 cm tall, perennial. Stem solitary, erect or ascending, simple or apically branched. Basal and lower stem leaves petiolate; petiole 3–12 cm; leaf blade ovate to elliptic, 3–12 × 2–6 cm, leathery, abaxially grayish green to grayish white and sparsely arachnoid to densely tomentose, adaxially green, gland dotted, and subglabrous, base cordate to truncate, margin denticulate, apex acute to acuminate. Middle and upper stem leaves subsessile, gradually smaller upward on stem; leaf blade narrowly ovate-elliptic to linear. Capitula numerous, in a corymbiform synflorescence, pedunculate. Involucre narrowly campanulate, 4–7(–10) mm in diam. Phyllaries in 5–7 rows, straw-colored but apically usually purple, sparsely arachnoid, glabrescent, apex acute to subacute or shortly mucronate; outer phyllaries ovate, 2–3 × 1–2 mm; middle phyllaries narrowly oblong, 3–6 × 1–1.5 mm; inner phyllaries linear, 6–8 × 1–1.5 mm. Corolla purple, 1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes ca. 4 mm. Achene 4–9 mm, glabrous. Pappus white; outer bristles 1–2 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Sep. $2n = 26$.

Grasslands on mountain slopes, ravines; 1100–1800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Russia (Far East)].

For *Saussurea firma*, the name *S. discolor* was misapplied by C. Y. Li (Fl. Liaoning. 2: 593. 1992) and W. Wang and C. Y. Li (Fl. Pl. Herb. Chin. Bor.-Orient. 9: 339. 2004). *Saussurea discolor* is a distinct taxon from the mountains of C Europe and is not present in Asia.

226. Saussurea graciliformis Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 532. 1972.

纤细风毛菊 xian xi feng mao ju

Herbs 10–40 cm tall, perennial. Stem solitary, slender, erect, apically few branched, subglabrous. Basal and lower stem leaves petiolate; petiole 1.5–8 cm; leaf blade ovate to narrowly ovate-elliptic, 1–11 × 0.7–2.5 cm, thick, abaxially grayish white and densely tomentose, adaxially green and glabrous, base shallowly cordate to truncate, margin sinuate and denticulate, apex acute. Middle stem leaves gradually smaller upward on stem. Upper stem leaves narrowly elliptic to linear. Capitula 2–5, in a clustered corymbiform synflorescence, shortly pedunculate to subsessile. Involucre narrowly cylindric, 4–6(–10) mm in diam. Phyllaries in ca. 5 rows, thin, glabrous, apex acute; outer phyllaries ovate, 3–5 × ca. 1.5 mm, apex mucronate; middle phyl-

laries elliptic, ca. 7 × 1.8 mm, apex mucronate; inner phyllaries narrowly elliptic, ca. 8 × 1.6 mm. Corolla purplish red, 0.9–1.1 cm, tube 4–6 mm, limb ca. 5 mm. Achene cylindric, 3–5 mm, ribbed, glabrous. Pappus white; outer bristles ca. 2 mm, scabrid; inner bristles ca. 8 mm. Fl. and fr. Jul–Sep.

• Montane forests, among rocks, river edges; 2200–3400 m. Gansu, Qinghai.

227. Saussurea nivea Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 10(7): 153. 1837.

银背风毛菊 yin bei feng mao ju

Saussurea eriolepis Bunge ex Candolle.

Herbs 30–120 cm tall, perennial. Stem solitary, erect, apically branched, sparsely arachnoid or glabrescent. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; petiole 3–8 cm; leaf blade narrowly triangular-ovate, 9–12 × 4–6.5 cm, abaxially white and densely arachnoid lanate, adaxially green and glabrous, base cordate, hastate, or truncate, margin dentate, apex acuminate. Upper stem leaves petiolate to subsessile; leaf blade triangular-ovate to narrowly ovate-elliptic, gradually smaller upward on stem. Uppermost leaves linear, subtending synflorescence. Capitula in a corymbiform synflorescence, pedunculate. Involucre campanulate, (0.6–)1–1.2 cm in diam. Phyllaries in 6 or 7 rows, white lanate; outer phyllaries ovate, ca. 4 × 2 mm, apex acuminate and with a dark purple mucro; middle phyllaries elliptic to ovate-elliptic, ca. 7 × 3 mm, apex acute to subobtuse; inner phyllaries linear, ca. 10 × 1.5 mm, apex acute. Corolla purple, 1–1.2(–1.4) cm, tube 5–6 mm, limb 5–6 mm. Achene brown, cylindric, ca. 5 mm, glabrous. Pappus white; outer bristles ca. 4 mm, scabrid; inner bristles 9–10 mm. Fl. and fr. Jul–Sep. $2n = 26$*.

Forests, forest margins, thickets; 400–2200 m. Gansu, Hebei, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [Korea].

Saussurea komaroviana Lipschitz was described from the Korean side of the Yalu Jiang, opposite the Chinese province of Liaoning. According to W. Wang and C. Y. Li (Fl. Pl. Herb. Chin. Bor.-Orient. 9: 339. 2004), there are no known records from China, so the species is not being treated here. The species is very close to *S. nivea*, from which it differs by the smaller capitula and the less dense indumentum on the abaxial leaf surface (which therefore looks grayish green, not white) and on the phyllaries. *Saussurea komaroviana* occurs in shady and moist cliffs and rock fissures in mountains of the Korean peninsula.

Saussurea splendida Komarov, known from the Russian part of the Heilongjiang region, has apparently not yet been found in China. It also belongs to the group of *Saussurea* with cordate leaves and white, densely tomentose abaxial leaf surface. It is a large, ca. 1 m tall plant and differs from *S. nivea* by the very large, broadly ovate lower stem leaves (14–16 × 8–11 cm with up to 15 cm petiole) and the very diffuse, much-branched paniculiform-corymbiform synflorescence with 2–6 clustered, subsessile capitula at branch ends. *Saussurea splendida* may eventually be found in Heilongjiang or Jilin.

228. Saussurea dimorphaea Franchet, J. Bot. (Morot) 8: 340. 1894.

东川风毛菊 dong chuan feng mao ju

Herbs 25–35 cm tall, perennial. Stem solitary, erect, flexuous, apically few branched, conspicuously winged. Basal and lower stem leaves withered at anthesis. Middle stem leaves crowded, petiolate; petiole 1–4 cm, winged, sometimes with a pair of lobes; leaf blade broadly ovate, cordate, or ovate-triangular, 5–8 × 2–4 cm, abaxially grayish white and densely tomentose, adaxially green and scabrid, base cordate, truncate, or cuneate, margin dentate. Upper stem leaves sessile, ovate to narrowly ovate-elliptic, gradually smaller upward on stem. Capitula to 3–5 in a clustered corymbiform synflorescence at end of stem or branches, shortly pedunculate to subsessile. Involucre narrowly campanulate, 5–7 mm in diam. Phyllaries in ca. 5 rows, sparsely arachnoid; outer phyllaries ovate-triangular, 2–3 × 1.5–2 mm, apex shortly acuminate; middle phyllaries narrowly ovate-elliptic, 3–6 × 1–1.5 mm, apex obtuse; inner phyllaries narrowly elliptic to linear, 7–8 × 1–1.5 mm, apex obtuse. Corolla purple, 8–9 mm, tube 3.5–4 mm, limb 4–5 mm, lobes 2.5–3 mm. Achene obconic, ca. 2 mm, glabrous. Pappus straw-colored; outer bristles 2–3 mm, scabrid; inner bristles 6–7 mm.

• N Chongqing (Chengkou).

229. Saussurea vestitiformis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 643. 1937.

河谷风毛菊 he gu feng mao ju

Herbs 30–70 cm tall, perennial. Stem solitary, erect, apically branched, densely leafy, apically arachnoid tomentose. Basal and lower stem leaves petiolate; petiole 10–13 cm; leaf blade ovate, 6–13 × 3.5–8.5 cm, thick, abaxially grayish green to grayish white and densely tomentose, adaxially green and sparsely arachnoid but glabrescent, base deeply cordate, margin sinuate-denticulate, apex acute. Middle stem leaves petiolate; leaf blade base truncate, rounded, or cuneate. Upper stem leaves sessile, narrowly elliptic to ovate-elliptic, gradually smaller upward on stem. Capitula numerous, in a paniculiform or laxly corymbiform synflorescence, pedunculate. Involucre campanulate, 8–10 mm in diam. Phyllaries in 5 or 6 rows, pale yellow sericeous, apex obtuse to rounded and with a black mucro; outer phyllaries narrowly ovate, 2–3 × 1–1.5 mm; middle phyllaries narrowly ovate-elliptic, 5–7 × ca. 1 mm; inner phyllaries linear, 8–10 × ca. 1 mm. Corolla dark purple, ca. 1.2 cm. Achene obconic, glabrous. Pappus straw-colored; outer bristles simple, ca. 1/4 as long as inner ones. Fl. and fr. Aug–Sep.

• Montane forests and grasslands; ca. 2900 m. NW Yunnan (Lijiang, Zhongdian).

230. Saussurea baroniana Diels, Bot. Jahrb. Syst. 29: 625. 1901.

棕脉风毛菊 zong mai feng mao ju

Saussurea broussonetiifolia F. H. Chen; *S. rufotricha* Y. Ling.

Herbs 20–60 cm tall, perennial. Stem solitary, erect, apically branched, with brown multicellular articulate hairs. Lower and middle stem leaves petiolate; petiole 2–13 cm, with brown articulate hairs; leaf blade ovate to ovate-cordate, 8.5–14 × 4.5–9 cm, abaxially grayish white and densely arachnoid lanate, adaxially green, scabrid, and strigose, base cordate to rarely rounded, margin coarsely dentate, apex acuminate. Upper stem

leaves shortly petiolate to subsessile, gradually smaller upward on stem; leaf blade ovate, base cuneate. Capitula 2 or 3 clustered at end of branches, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate to ovoid, 6–10 mm in diam. Phyllaries in 6 or 7 rows, arachnoid; outer phyllaries ovate-triangular, leathery, apically black, apex mucronate; inner phyllaries oblong to narrowly ovate-elliptic, apically purple, apex obtuse. Corolla purple, ca. 1.1 cm. Achene ca. 5 mm, glabrous. Pappus grayish white to pale brown; outer bristles scabrid. Fl. and fr. Aug–Oct.

• Montane forests, forest margins; 2200–2800 m. S Shaanxi (Qin Ling).

231. Saussurea flaccida Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 165. 1935.

萎软风毛菊 wei ruan feng mao ju

Herbs 25–50 cm tall, perennial. Stem solitary, slender, erect, simple or apically few branched, sparsely arachnoid. Basal and lower stem leaves petiolate; petiole 6–13 cm; leaf blade ovate to broadly ovate, 2.5–6 × 2–5 cm, thinly papery, abaxially grayish white and densely white tomentose, adaxially green, scabrid, and densely strigose, base cordate, margin sinuate-dentate to denticulate, apex acute to acuminate. Upper stem leaves shortly petiolate to subsessile, gradually smaller upward on stem; leaf blade narrowly ovate-elliptic to oblong. Capitula 2–4, in a corymbiform synflorescence or sometimes solitary, pedunculate. Involucre obconic to oblong, 5–6 mm in diam. Phyllaries in ca. 4 rows, rigid, leathery, densely arachnoid, apex with a blackish purple mucro; outer phyllaries ovate-triangular, ca. 3 × 2 mm, apex acute; middle phyllaries elliptic, ca. 6 × 2 mm, apex obtuse; inner phyllaries broadly linear, ca. 7 × 1 mm, apex acute. Corolla pale yellowish brown, ca. 1 cm, tube ca. 5 mm, limb ca. 5 mm. Achene cylindric, ca. 5 mm, ribbed, glabrous. Pappus straw-colored; outer bristles 2–3 mm, scabrid; inner bristles ca. 8 mm. Fl. and fr. Aug–Sep.

• Montane grasslands, thickets; 2700–2800 m. S Shaanxi (Qin Ling).

232. Saussurea acromelaena Handel-Mazzetti, Symb. Sin. 7: 1151. 1936.

肾叶风毛菊 shen ye feng mao ju

?*Saussurea discolor* (Willdenow) Candolle var. *nana* F. H. Chen; ?*S. nivea* Turczaninow var. *nana* (F. H. Chen) Handel-Mazzetti; *S. reniformis* Y. Ling.

Herbs 40–50 cm tall, perennial. Stem solitary, stout, erect, apically branched, sparsely lanate. Basal and lower stem leaves petiolate; petiole 6–12 cm; leaf blade broadly ovate, cordate, or reniform, 3–11 × 7–10(–17) cm, abaxially grayish white and densely lanate, adaxially yellowish green and glabrous or sparsely pilose, base cordate, margin dentate, apex rounded to emarginate. Middle and upper stem leaves petiolate; petiole 0.5–5 cm; leaf blade ovate, triangular-ovate, or ovate-elliptic, gradually smaller upward on stem, base cordate, truncate, or cuneate, apex acute to acuminate. Capitula numerous, in a corymbiform synflorescence. Involucre campanulate, 6–10 mm in diam. Phyllaries in ca. 5 rows, leathery, densely white lanate, apex with a blackish purple mucro; outer phyllaries ovate, ca. 4 × 3 mm; middle phyllaries oblong, ca. 7 × 3 mm; inner phyllaries oblong to narrowly elliptic-linear, 8–10 × 1–2.5 mm. Corolla pale purple, 1–1.2 cm, tube 5–6 mm, limb 4–5 mm, lobes 3–4 mm. Achene brown, cylindric, 4–5 mm, glabrous. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles 8–9 mm. Fl. and fr. Sep–Oct.

• Montane forests; 1400–2500 m. Hebei, Henan, W Hubei, Shaanxi.

233. Saussurea pinetorum Handel-Mazzetti, Symb. Sin. 7: 1150. 1936.

松林风毛菊 song lin feng mao ju

Saussurea ionodasys Handel-Mazzetti.

Herbs 30–50 cm tall, perennial. Stem solitary, erect, branched, narrowly winged, with rusty multicellular articulate hairs. Basal and lower stem leaves petiolate; petiole 1.5–3 cm, winged, wing margin sparsely dentate or entire; leaf blade oblong to ovate, 3–10 × 2.5–6 cm, abaxially grayish white and densely tomentose, adaxially green, scabrid, and with rust-colored multicellular articulate hairs, base subcordate to truncate, margin dentate, apex rounded, obtuse, or acute. Middle stem leaves shortly petiolate to sessile; petiole if present winged, wings or leaf base decurrent on stem; leaf blade oblong, narrowly ovate-elliptic, or linear, smaller upward on stem. Capitula 2–12 at end of branches, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre cylindric, 7–9 mm in diam. Phyllaries in ca. 5 rows, subglabrous, apex subacute to rounded; outer phyllaries ovate, 2.8–3 × ca. 1.5 mm; middle phyllaries narrowly elliptic, 5–8 × 1.8–2 mm; inner phyllaries linear, ca. 9 × 1 mm. Corolla purple, ca. 1 cm, tube ca. 5 mm, limb ca. 5 mm. Achene pale brown, 2–3 mm, glabrous. Pappus white; outer bristles ca. 2 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep.

• *Pinus* forests, grassy slopes; 1900–3800 m. NE Chongqing, W Sichuan, NW Yunnan (Lijiang).

234. Saussurea paleata Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 168. 1859.

膜片风毛菊 mo pian feng mao ju

?*Saussurea corymbosa* F. H. Chen; *S. eriolepis* Bunge ex Candolle var. *paleata* (Maximowicz) Herder.

Herbs to 60 cm tall, perennial. Stem solitary, erect, apically branched, arachnoid or glabrescent. Basal and lower stem leaves petiolate; petiole 5–7 cm; leaf blade narrowly ovate-cordate to oblong-cordate, 6–8 × 4–5 cm, abaxially grayish green and thinly arachnoid tomentose, adaxially green and glabrous, base cordate, margin serrate to dentate, apex acuminate. Middle stem leaves petiolate; leaf blade ovate to narrowly ovate-elliptic, gradually smaller upward on stem. Upper stem leaves shortly petiolate to subsessile; leaf blade narrowly ovate-elliptic to linear, apex acute. Capitula several, in a paniculiform or corymbiform synflorescence, pedunculate. Involucre campanulate, 7–10 mm in diam. Phyllaries in 3 or 4 rows, apically purplish red, arachnoid near margin, apex acute; outer phyllaries triangular, ca. 3 × 1 mm; middle phyllaries oblong, 3–6 ×

1–1.5 mm; inner phyllaries linear-elliptic, 6–8 × ca. 1 mm. Corolla purplish red, ca. 8 mm, tube ca. 4 mm, limb ca. 4 mm. Achene brown, ca. 2 mm, glabrous. Pappus basally brownish but apically white; outer bristles 1–2 mm, scabrid; inner bristles ca. 7 mm. Fl. and fr. Jul–Sep. $2n = 26$*.

• Mountain slopes; 1700–2200 m. Hebei, ?Liaoning.

Saussurea paleata is a doubtful taxon, probably only a glabrescent form of *S. nivea*; it was already reduced to a variety of the latter (as *S. eriolepis*) by Herder (Bull. Soc. Imp. Naturalistes Moscou 41(3): 32. 1868). The type specimen of *S. corymbosa* has not been examined by the present authors; therefore, the identity of that taxon remains unclear.

235. Saussurea chetchozensis Franchet, J. Bot. (Morot) 2: 359. 1888.

大坪风毛菊 da ping feng mao ju

Herbs to 70 cm tall, perennial. Stem solitary, erect, apically few branched, usually narrowly winged in middle part, arachnoid. Basal and lower stem leaves petiolate; petiole 4–6 cm; leaf blade broadly ovate, 8–10 × 4–6 cm, abaxially grayish white or green and densely tomentose or glabrous, adaxially green and scabrid, base cordate to cuneate, margin denticulate, apex acute to obtuse. Middle stem leaves petiolate; petiole 1–2 cm, winged, base decurrent on stem; leaf blade ovate to narrowly elliptic, 5–7 × 1.5–2 cm. Upper stem leaves sessile, narrowly elliptic to linear, base decurrent, apex acute. Capitula 2–9, in a lax corymbiform synflorescence or sometimes solitary, pedunculate. Involucre campanulate-obconic, 1.2–1.5 cm in diam. Phyllaries in 5 or 6 rows, densely arachnoid tomentose; outer phyllaries triangular-ovate, 3–5 × 3–4 mm, apex acute and usually with a dark mucro; middle phyllaries ovate, 5–10 × 2–3 mm, apex acute to obtuse; inner phyllaries narrowly ovate, 12–14 × 1–1.5 mm, apex obtuse. Corolla bluish purple, 1.3–1.4 cm, tube 6–7 mm, limb 6.5–7 mm, lobes 3–3.5 mm. Achene brown, ca. 3 mm, glabrous. Pappus dirty white; outer bristles 1–2 mm, scabrid; inner bristles 1–1.2 cm. Fl. and fr. Aug–Oct.

• Montane forests and thickets, grasslands; 2000–3700 m. Guizhou, Sichuan, Yunnan.

1a. Leaf blade abaxially grayish white and densely tomentose ..... 235a. var. *chetchozensis*
1b. Leaf blade abaxially green and glabrous ..... 235b. var. *glabrescens*

235a. Saussurea chetchozensis var. **chetchozensis**

大坪风毛菊(原变种) da ping feng mao ju (yuan bian zhong)

Saussurea coeruleoviolacea H. Léveillé; *S. lanuginosa* Vaniot.

Leaf blade abaxially grayish white and densely tomentose.

• Montane forests, grasslands; 2000–3700 m. Guizhou, Sichuan, Yunnan.

235b. Saussurea chetchozensis var. **glabrescens** (Handel-Mazzetti) Lipschitz, Novosti Sist. Vyssh. Rast. 8: 248. 1971.

光叶风毛菊 guang ye feng mao ju

Saussurea lanuginosa var. *glabrescens* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 643. 1937.

Leaf blade abaxially green and glabrous.

• Montane thickets, grasslands; 3000–3600 m. SW Sichuan, NW Yunnan.

236. Saussurea lyratifolia Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 95. 1981.

大头羽裂风毛菊 da tou yu lie feng mao ju

Herbs to 60 cm tall, perennial. Stem solitary, erect, simple, basally covered with dark brown remains of old leaf sheaths. Lower stem leaves ca. 2, elliptic, lyrate-pinnately parted, abaxially pale green and sparsely arachnoid lanate, adaxially green and pilose, base auriculate-amplexicaul, margin irregularly sinuate-dentate; lateral lobes oblong, 2.5–3.5 × 1.2–1.5 cm; terminal lobe ca. 10 × 8 cm. Middle and upper stem leaves ca. 2, narrowly ovate-elliptic, 7–14 × 2.5–6 cm, base auriculate, margin irregularly dentate, apex acuminate and mucronate. Capitula ca. 5, clustered in a hemispheric synflorescence, subsessile. Involucre ovoid, 9–10 mm in diam. Phyllaries in ca. 4 rows, pale yellowish green, apically and near margin dark purple, pilose, apex long acuminate; outer phyllaries broadly ovate-elliptic; inner phyllaries narrowly oblong. Receptacle bristles ca. 4 mm. Corolla purplish red, 1.1–1.2 cm, tube 4.5–5 mm, limb 3.5–4 mm, lobes ca. 2 mm. Achene cylindric, ca. 2 mm, smooth, glabrous, apex with a denticulate crown. Pappus brown; outer bristles short, scabrid; inner bristles plumose. Fl. and fr. Jul–Aug.

• Forests; ca. 3800 m. SE Xizang (Bomi).

Saussurea lyratifolia was placed in *S.* subg. *Frolovia* by C. Shih and S. Y. Jin (FRPS 78(2): 58. 1999). As all other former members of this subgenus are now accommodated in different genera, *S. lyratifolia* is now placed in *S.* subg. *Saussurea*. The typical double pappus and the capitula and synflorescence structure leave no doubt that this species belongs to *Saussurea* s.s. and not to one of the segregates. It is very similar to *S. laneana* W. W. Smith from India (Sikkim). Further studies are needed to investigate if this is indeed the same species.

237. Saussurea neofranchetii Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 676. 1972.

耳叶风毛菊 er ye feng mao ju

Saussurea auriculata Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 40. 1887, not (Candolle) Schultz Bipontinus (1846).

Herbs 50–100 cm tall, perennial. Stem solitary, erect, simple or apically few branched, glabrous. Basal leaves petiolate, sometimes withered at anthesis; petiole to 12 cm; leaf blade ovate to narrowly ovate-elliptic, 5.5–15 × 1.5–5 cm, abaxially pale green, often tinged purple, and glabrous, adaxially dark green and glabrous, base cuneate-attenuate, margin serrulate, apex acuminate. Lower, middle, and upper stem leaves usually sessile, gradually smaller upward on stem; leaf blade narrowly ovate-elliptic to oblong, to 15 × 3 cm, basally slightly constricted, base auriculate and amplexicaul. Capitula 1–3, long pedunculate. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in 4 or 5 rows, dark purplish brown, leathery, glabrous or sparsely pilose, apex acute to acuminate and reflexed; outer phyllaries ovate, 8–10 × 4–5 mm; middle phyllaries 10–16 × 2–4 mm; inner phyllaries narrowly ovate-elliptic, 16–19 × ca. 2

mm. Corolla purplish red, 1.4–1.6 cm, tube 7–8 mm, limb 7–8 mm, lobes 4–5 mm. Achene blackish brown, cylindric, 4–5 mm, ribbed, glabrous, apex with a short crown. Pappus straw-colored to reddish; outer bristles scabrid. Fl. and fr. Jul–Aug.

• Forest margins, thickets, montane grasslands; 3000–3800 m. W Sichuan, NW Yunnan (Lijiang, Zhongdian).

Saussurea neofranchetii was described from a specimen without basal leaves. Whereas the lower stem leaves can either be sessile or petiolate, the basal leaves are always distinctly petiolate.

238. Saussurea caudata Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 147. 1891.

尾叶风毛菊 wei ye feng mao ju

Herbs 20–85 cm tall, perennial. Stem solitary, purple, erect, simple or apically few branched, glabrous. Basal leaves petiolate; petiole 7–9 cm; leaf blade narrowly ovate-elliptic to oblong, 8–15 × 1–1.5 cm, abaxially pale green, glabrous, adaxially green and glabrous or sparsely strigose on veins, base cuneate-attenuate, margin serrulate-denticulate, apex caudate-acuminate. Lower stem leaves broadly linear, base attenuate into a winged petiole, apex caudate-acuminate. Middle and upper stem leaves sessile, narrowly ovate-elliptic to oblong, basally slightly narrowed, base auriculate and amplexicaul, apex caudate-acuminate. Capitula 2–4, terminal on stem or branches in a lax corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre campanulate, 1.2–2 cm in diam. Phyllaries in 4 or 5 rows, leathery; outer phyllaries ovate, 8–9 × 4–7 mm, apex acuminate and reflexed; middle phyllaries oblong, ca. 12 × 4 mm; inner phyllaries linear, ca. 15 × 2 mm, apex acute. Corolla purple, ca. 1.6 cm, tube ca. 9 mm, limb ca. 6 mm. Achene cylindric, ca. 3 mm, ribbed, glabrous. Pappus dirty white; outer bristles ca. 3 mm; inner bristles ca. 1.3 cm. Fl. and fr. Jul–Sep.

• Forest margins, meadows, open rocky pastures; 3000–4000 m. W Sichuan, NW Yunnan (Zhongdian).

239. Saussurea leclerei H. Léveillé, Bull. Géogr. Bot. 25: 18. 1915.

利马川风毛菊 li ma chuan feng mao ju

Saussurea mollis Franchet (1894), not (Cavanilles) Sprengel (1826).

Herbs to 1 m tall, perennial. Stem solitary, erect, apically branched, narrowly winged, glabrous. Basal and lower stem leaves usually withered at anthesis. Middle and upper stem leaves shortly petiolate; petiole base inconspicuously small auriculate and decurrent on stem; leaf blade ovate to elliptic, 6–11 × 2.5–4.5 cm, abaxially grayish green and arachnoid tomentose, adaxially dark green and glabrous, base cuneate-attenuate and decurrent on petiole, margin sinuate-denticulate, apex caudate-acuminate. Uppermost stem leaves subsessile, narrowly ovate-elliptic, smaller, margin subsinuate or entire. Capitula numerous, in a clustered corymbiform synflorescence at end of stem and branches, shortly pedunculate. Involucre campanulate, 5–6 mm in diam. Phyllaries in ca. 5 rows, brown, glabrous; outer phyllaries ovate, 2–3 × 1–1.5 mm, apex acute; middle phyllaries ovate, 3–6 × 1.5–2 mm, apex obtuse; inner phyllaries linear, 6–8 × 1–1.5 mm, apex rounded. Corolla purple, 8–9(–12) mm, tube 3–5 mm, limb 4.5–5 mm, lobes ca. 3 mm. Achene cylindric, ca. 3 mm, glabrous. Pappus pale brown; inner bristles 7–8 mm. Fl. and fr. Aug–Oct.

• Montane grasslands; 2000–3300 m. Chongqing, Hubei, Sichuan, NC Yunnan.

240. Saussurea merinoi H. Léveillé, Bull. Géogr. Bot. 25: 19. 1915.

截叶风毛菊 jie ye feng mao ju

Herbs to 1 m tall, perennial. Stem solitary, erect, apically branched, not winged, glabrous. Basal and lower stem leaves usually withered at anthesis. Middle stem leaves shortly petiolate; leaf blade ovate, elliptic, or oblong, 6–10 × 2–3.5 cm, surfaces dark green and ± concolorous, abaxially puberulent on veins, adaxially glabrous, base truncate to cuneate, margin sinuate-denticulate, apex caudate-acuminate. Upper stem leaves sessile, ovate-elliptic to narrowly ovate-elliptic, smaller. Capitula numerous, in a clustered corymbiform synflorescence at end of stem and branches, shortly pedunculate. Involucre narrowly campanulate, 4–6 mm in diam. Phyllaries in ca. 5 rows, brown, glabrous; outer phyllaries ovate, 2–3 × 1–2 mm, apex acuminate; middle phyllaries ovate-elliptic, 3–6 × 1.5–2 mm, apex subacute; inner phyllaries linear, 7–10 × 1–1.5 mm, apex subacute. Corolla purple, 8–10 mm, tube 3.5–5 mm, limb 4.5–5 mm, lobes ca. 3 mm. Achene brown, cylindric, ca. 4 mm, glabrous. Pappus pale reddish brown; outer bristles 0.2–3 mm; inner bristles 7–8 mm. Fl. and fr. Aug–Oct.

• Montane grasslands; ca. 3200 m. NE Yunnan (Qiaojia).

Apparently, *Saussurea merinoi* is only known from the type specimens, which lack the basal and underground parts of the plants. This species is probably close to *S. leclerei*.

241. Saussurea macrota Franchet, J. Bot. (Morot) 8: 343. 1894.

大耳叶风毛菊 da er ye feng mao ju

Saussurea auriculata Hemsley (1892), not (Candolle) Schultz Bipontinus (1846), nor Franchet (1887); *S. hemsleyana* Handel-Mazzetti; *S. kitamurae* S. Y. Hu; *S. macrota* var. *papyracea* Lipschitz; *S. otophylla* Diels; *S. otophylla* var. *cinerea* Y. Ling.

Herbs 25–85 cm tall, perennial. Stem solitary, erect, apically branched, apically flexuous, wingless, subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves sessile, elliptic to ovate-elliptic, 8–23 × 2.5–6 cm, abaxially sparsely arachnoid or glabrous and sometimes gland-dotted, adaxially green and sparsely strigose or glabrous, base auriculate and amplexicaul, margin denticulate to coarsely serrate, apex acute to acuminate. Upper stem leaves narrowly ovate to narrowly elliptic, gradually smaller upward on stem. Capitula numerous, in a clustered corymbiform synflorescence at end of stem and branches, pedunculate. Involucre narrowly campanulate, 6–10 mm in diam. Phyllaries in 5 or 6 rows, brownish, apically and near margin purple, glabrous or sparsely arachnoid; outer phyllaries ovate, 3–4 × 2–2.5 mm, apex usually obtuse; middle phyllaries narrowly ovate, 5–11 × 1.5–3 mm, apex obtuse to acute; inner phyllaries linear, 11–13 × 1–1.5 mm, apex

subacute. Corolla dark purple, 1–1.2 cm, tube 5–6 mm, limb 5–7 mm, lobes 3–3.5 mm. Achene cylindric, 3–4.5 mm, ribbed, glabrous. Pappus pale brown; outer bristles 1.5–3 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Aug.

• Montane forests, thickets; 2200–3300 m. N Chongqing, Gansu, W Hubei, Ningxia, Shaanxi, Sichuan.

242. Saussurea semiamplexicaulis Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 528. 1972.

半抱茎风毛菊 ban bao jing feng mao ju

Herbs 50–70 cm tall, perennial. Stem solitary, erect, apically branched, wingless, apically with brown articulate hairs. Leaves green and golden gland-dotted, margin dentate-denticulate. Lower stem leaves petiolate; petiole 3–5 cm, winged, base enlarged, auriculate, and semiamplexicaul; leaf blade narrowly ovate-elliptic, 6–9 × 2.5–4 cm, both surfaces green, abaxially gland-dotted and sparsely arachnoid, adaxially ± sparsely gland-dotted and glabrous, base subcordate to truncate, apex acute. Middle and upper stem leaves sessile, gradually smaller upward on stem, base auriculate and semiamplexicaul. Capitula numerous, to 4–10 in a clustered corymbiform synflorescence at end of branches, shortly pedunculate or sessile. Involucre cylindric to narrowly campanulate, 5–7(–10) mm in diam. Phyllaries in 5 or 6 rows, brown, leathery, glabrous, apex obtuse to acuminate; outer phyllaries ovate, 3–4 × 2–2.5 mm; middle phyllaries narrowly ovate, 4–8 × 1.5–2 mm, apex acute to obtuse; inner phyllaries linear, 8–10 × 1–1.5 mm. Receptacle bristles 5–7 mm. Corolla purple, 1.2–1.3 cm, tube 6–7 mm, limb 5.5–6.5 mm, lobes 3–3.5 mm. Achene gray with dark black spots, 3–3.5 mm, glabrous. Pappus dirty white; outer bristles scabrid, 2–4 mm; inner bristles 9–10 mm. Fl. and fr. Sep.

• Montane grasslands; ca. 2700 m. NW Yunnan (Dêqên).

243. Saussurea peduncularis Franchet, J. Bot. (Morot) 2: 357. 1888.

显梗风毛菊 xian geng feng mao ju

Saussurea peduncularis var. *corymbosa* Franchet; *S. peduncularis* var. *diversifolia* Franchet; *S. peduncularis* var. *lobata* Franchet.

Herbs 25–90 cm tall, perennial. Stem erect, apically branched, winged, glabrous. Lower stem leaves petiolate; petiole to 4 cm, winged with 1 or 2 pairs of teeth; leaf blade narrowly ovate, elliptic, or ovate, 8–18 × 4–8 cm, lyrately pinnate, abaxially sparsely strigose on veins or glabrous, adaxially green and glabrous, base cuneate-attenuate into winged petiole, margin toothed, apex acute to obtuse. Middle and upper stem leaves sessile, narrowly elliptic, gradually smaller upward on stem, base decurrent on stem, margin dentate. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre ovoid to campanulate, 6–12(–15) mm in diam., apically usually constricted. Phyllaries in ca. 5 rows, margin sparsely arachnoid; outer phyllaries ovate, ca. 4 × 2 mm, apex acute to obtuse; middle phyllaries elliptic, ca. 7 × 3 mm, apex acute; inner phyllaries narrowly elliptic, ca. 9 × 2 mm, apex obtuse. Corolla dark bluish purple, 1–1.3 cm, tube ca. 7 mm, limb ca. 6 mm. Achene brown, cylindric, ca. 2.5 mm, glabrous. Pappus pale brown; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Aug–Oct.

• Montane forests, forest margins, thickets, open meadows; 2800–3500 m. NW Yunnan.

244. Saussurea frondosa Handel-Mazzetti, Acta Horti Gothob. 12: 312. 1938.

狭翼风毛菊 xia yi feng mao ju

Herbs 50–60 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, densely pubescent. Basal leaves withered at anthesis. Lower and middle stem leaves shortly petiolate or sessile; petiole winged if present; leaf blade ovate to elliptic, 10–17 × 3–8 cm, undivided or lyrately pinnately lobed, both surfaces green and glabrous, base cuneate-attenuate and decurrent, margin serrulate, apex acute to acuminate; lateral lobes inconspicuous, 1 pair, triangular to elliptic; terminal lobe ovate to elliptic. Upper stem leaves subsessile; leaf blade elliptic to narrowly elliptic, 7–10 × 3–3.5 cm, gradually smaller upward on stem, margin entire. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre ovoid-oblong, ca. 5 mm in diam. Phyllaries in ca. 5 rows, abaxially sparsely arachnoid; outer and middle phyllaries ovate to elliptic, 5–6 × 2–3 mm, apex with a 3–4 mm subulate awn; inner phyllaries oblong, 7–10 × 2–3 mm, apex obtuse and mucronate. Corolla purplish red or white, ca. (1–)1.6 cm, tube ca. 9.5 mm, limb ca. 6.5 mm. Achene brown, cylindric, ca. 5 mm, glabrous. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Jul–Sep(–Nov).

• Montane forests; 1400–2300 m. Fujian, Henan, ?Shaanxi, Shanxi, ?Sichuan, Yunnan.

245. Saussurea eriocephala Franchet, J. Bot. (Morot) 8: 339. 1894.

棉头风毛菊 mian tou feng mao ju

Saussurea pallidiceps Handel-Mazzetti.

Herbs 45–75 cm tall, perennial. Stem solitary, erect, apically branched, winged, arachnoid; wing entire. Lower stem leaves shortly petiolate; petiole to 3 cm, base widened, semiamplexicaul, and decurrent; leaf blade ovate, 5–10 × 3–7 cm, lyrately pinnatisect or pinnately lobed, abaxially grayish white and thinly arachnoid, adaxially green and glabrous; lateral segments 1–3 pairs, elliptic, broadly ovate, or suborbicular, 0.3–2 cm; terminal segment broadly ovate, 3.5–8 cm, base shallowly cordate, margin denticulate or subentire, apex acute to obtuse. Middle and upper stem leaves petiolate or sessile, gradually smaller upward on stem; leaf blade lyrately pinnate or undivided; lateral segments 1 pair and elliptic or absent; terminal segment ovate-cordate, 2.5–7 × 2–4.5 cm. Capitula numerous, in a corymbiform or paniculiform synflorescence, pedunculate. Involucre campanulate, 1–1.7 cm in diam. Phyllaries in ca. 5 rows, apically densely yellowish brown villous, apex acuminate and mucronate; outer phyllaries ca. 5 × 2–3 mm; middle and inner phyllaries narrowly elliptic to linear, 10–14 × 2–2.5 mm. Corolla purple, ca. 1 cm. Achene glabrous. Pappus brown; outer bristles ca. 4 mm, scabrid; inner bristles ca. 1 cm. Fl. Aug–Sep.

• Montane grasslands; 1900–2900 m. SW Sichuan (Muli), NW Yunnan (Lijiang).

246. Saussurea dzeurensis Franchet, J. Bot. (Morot) 8: 339. 1894.

川西风毛菊 chuan xi feng mao ju

Herbs 20–90 cm tall, perennial. Stem solitary, erect, apically branched, winged, sparsely lanate or glabrescent; wing sinuate-dentate. Basal and lower stem leaves long petiolate; petiole to 7 cm; leaf blade narrowly ovate-elliptic, 3–12 × 0.4–3 cm, runcinate-pinnately lobed or dentate, abaxially grayish white and arachnoid, adaxially green and sparsely strigose, base decurrent, apex acuminate; lateral lobes 3–6 pairs, triangular-ovate, margin dentate. Middle and upper stem leaves sessile, narrowly ovate-elliptic, gradually smaller upward on stem, base decurrent, margin coarsely dentate. Capitula numerous, in corymbiform synflorescence, pedunculate. Involucre ovoid, 5–8 mm in diam. Phyllaries in 5 or 6 rows, brown but black near margin, leathery, sericeous, apex acute to obtuse; outer phyllaries ovate, ca. 3 mm; middle phyllaries narrowly ovate-elliptic; inner phyllaries linear. Corolla purple, 8–10 mm. Achene ca. 3 mm, glabrous. Pappus pale yellowish brown; outer bristles scabrid. Fl. and fr. Jul–Oct.

• Alpine steppes and grasslands; 2600–4000 m. Gansu, Qinghai, W Sichuan.

247. Saussurea carduiformis Franchet, J. Bot. (Morot) 8: 343. 1894.

蓟状风毛菊 ji zhuang feng mao ju

Herbs 50–60 cm tall, perennial. Stem solitary, erect, apically branched, basally strigose. Basal and lower stem leaves sessile, obovate to elliptic, 8–15 × 4–6 cm, abaxially pale green and sparsely arachnoid or glabrous but sparsely strigose on veins, adaxially green and scabrid but glabrescent, base semiamplexicaul and decurrent, margin basally pinnately lobed and apically coarsely dentate, apex acuminate. Middle and upper stem leaves sessile, elliptic to narrowly elliptic, gradually smaller upward on stem, base cuneate and semiamplexicaul, margin coarsely sinuate-dentate to subentire, apex acuminate. Capitula 2–7, in a racemiform to corymbiform synflorescence or solitary, long pedunculate. Involucre hemispheric, 1.5–2.5 cm in diam. Phyllaries in 4–6 rows, brownish, leathery, sparsely arachnoid, apically usually patent or reflexed; outer phyllaries triangular-ovate, 4–5 × 2–2.5 mm, apex long acuminate; middle phyllaries narrowly triangular-ovate, 5–10 × 2–3 mm, apex long acuminate; inner phyllaries narrowly elliptic, 10–11 × 1.5–2 mm, apex shortly acuminate. Corolla bluish purple, 1.2–1.4 cm, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene cylindric, ca. 3 mm, glabrous. Pappus dirty white; outer bristles ca. 2 mm; inner bristles 8–10 mm. Fl. and fr. Sep–Oct.

• Open montane forests, mountain trails; 2600–2800 m. Chongqing, Gansu, Shaanxi, Sichuan.

248. Saussurea mutabilis Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 109. 1905.

变叶风毛菊 bian ye feng mao ju

Saussurea mutabilis var. *diplochaeta* Y. Ling.

Herbs 40–70(–100) cm tall, perennial. Stem solitary, erect, apically much branched, sparsely pubescent. Lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole 5–11 cm; leaf blade ovate to elliptic, 7–15 × 5–9 cm, thin, lyrately pinnately parted or undivided, both surfaces green and glabrous or subglabrous; lateral lobes 1 or 2 pairs, elliptic to triangular; terminal lobe ovate, margin sinuate-dentate, apex acute. Upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem; leaf blade lyrately pinnately parted or undivided; lateral lobes if present 1 pair, ovate-elliptic. Capitula numerous, in a paniculiform or corymbiform synflorescence. Involucre narrowly campanulate, 4–9 mm in diam. Phyllaries in 5 or 6 rows, arachnoid; outer phyllaries ovate, apex recurved; inner phyllaries narrowly ovate-elliptic, apex acute to subobtuse. Corolla white, 8–11 mm. Achene pale brown, ca. 5 mm, glabrous. Pappus white; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Aug–Sep.

• Montane forests; 1300–1800 m. Gansu, S Shaanxi (Qin Ling).

249. Saussurea morifolia F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 8: 123. 1938.

桑叶风毛菊 sang ye feng mao ju

Herbs 20–60 cm tall, perennial. Stem solitary, erect, simple or few branched, glabrous. Basal and lower stem leaves petiolate; petiole 8–11 cm; leaf blade obovate to elliptic, 7–11 × 3.5–6 cm, lyrately pinnatisect, both surfaces green and glabrous; lateral segments 2–4 pairs, elliptic to narrowly triangular, margin denticulate or subentire, apex obtuse to acute; terminal segment ovate to triangular-ovate, margin sparsely denticulate, apex acute to acuminate. Middle stem leaves shortly petiolate; leaf blade elliptic; lateral segments 1 or 2 pairs, elliptic; terminal segment triangular-hastate. Upper stem leaves small, with 1 pair of lobes or undivided; terminal lobe or leaf blade narrowly elliptic to broadly linear. Capitula solitary and terminal on stem or 2–4 in a corymbiform synflorescence, pedunculate. Involucre campanulate, 7–12 mm in diam. Phyllaries in 4–6 rows, subglabrous, apically reflexed; outer phyllaries ovate, ca. 5 × 3 mm; middle phyllaries elliptic, 6–8 × 1.5–2 mm, apex long acuminate; inner phyllaries linear, 9–10 × ca. 1 mm, apex acute. Corolla purple, ca. 1.5 cm, tube ca. 9 mm, limb ca. 6 mm, lobes ca. 4 mm. Achene brown, 4–5 mm, glabrous. Pappus dirty white; outer bristles ca. 2 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep.

• Montane forests, trailsides; 1800–2700 m. SE Gansu, S Shaanxi (Qin Ling).

250. Saussurea lampsanifolia Franchet, J. Bot. (Morot) 2: 357. 1888.

鹤庆风毛菊 he qing feng mao ju

Herbs 25–40 cm tall, perennial. Stems erect, simple or apically branched, narrowly winged, many leaved. Basal and lower stem leaves petiolate; petiole broadly winged, margin dentate; leaf blade ovate to elliptic, 7–10 × 3–4 cm, lyrately pinnatisect, abaxially whitish and densely tomentose, adaxially green and scabrid; lateral lobes 2 or 3 pairs, ovate to triangular, base truncate or shallowly cordate, margin entire or dentate; terminal lobe ovate-triangular, apex acute to shortly acuminate. Upper stem leaves gradually smaller upward on stem. Capitula

numerous, in 3–5 corymbiform synflorescences at end of axillary branches, subsessile. Involucre narrowly campanulate, 5–7 mm in diam. Phyllaries in 5 or 6 rows, straw-colored, subglabrous, apex long acuminate and patent or reflexed; outer phyllaries ovate, 2–3 × 1–1.5 mm; middle phyllaries narrowly ovate-elliptic, 3–6 × ca. 1.5 mm; inner phyllaries linear, 6–8 × ca. 1 mm. Corolla and achene unknown. Pappus pale white; outer bristles scabrid; inner bristles ca. 7 mm. Fl. and fr. Sep–Oct.

• Forests, thickets. Yunnan (Heqing).

Saussurea lampsanifolia is apparently only known from the single type specimen with not yet developed florets.

251. Saussurea hieracioides J. D. Hooker, Fl. Brit. India 3: 371. 1881.

长毛风毛菊 chang mao feng mao ju

Saussurea leveilleana Maire; *S. villosa* Franchet.

Herbs 5–20(–35) cm tall, perennial. Stem solitary, well developed, erect, simple, densely white villous. Basal leaves distinctly petiolate; petiole to 8 cm; leaf blade elliptic to narrowly elliptic-oblanceolate, 2–16 × 0.8–4 cm, abaxially pale green and sparsely villous, adaxially dark green and sparsely villous, base oblique and rounded to cuneate, margin entire and ciliate, apex acute to obtuse. Stem leaves few, sessile, narrowly ovate-elliptic to linear, gradually smaller upward on stem. Capitulum solitary, terminal on stem. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, densely villous, apex long acuminate; outer phyllaries narrowly ovate-triangular, ca. 10 × 3 mm; middle phyllaries narrowly ovate-elliptic, ca. 13 × 2.5 mm; inner phyllaries narrowly lanceolate to linear, ca. 2 × 0.2 cm. Corolla purple, 1.8–2.4 cm, tube 1–1.6 cm, limb ca. 8 mm, lobes 5–6 mm. Achene brown, cylindric, 2–4 mm, glabrous. Pappus pale brown; outer bristles 2–7 mm, scabrid; inner bristles ca. 1.4 cm. Fl. and fr. Jun–Sep. $2n = 64$.

Alpine scree slopes, grasslands, rocky slopes; 4400–5200 m. W Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

252. Saussurea superba J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 212. 1934.

横断山风毛菊 heng duan shan feng mao ju

Saussurea superba f. *pygmaea* J. Anthony; *S. tatsienensis* Franchet var. *monocephala* Diels.

Herbs 3–25(–35) cm tall, perennial, stemless or cauliferous. Stem solitary, erect, simple, densely villous. Rosette leaves sessile or shortly petiolate; petiole winged if present; leaf blade elliptic to narrowly obovate-elliptic, 3–10 × 1–3.5 cm, both surfaces green and subglabrous, base attenuate, margin entire or inconspicuously denticulate, apex obtuse to subacute. Stem leaves sessile, narrowly elliptic to linear, smaller. Capitulum solitary, sessile in center of leaf rosette or terminal on stem. Involucre broadly campanulate, 1.5–4 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, subglabrous, apex long acuminate; outer phyllaries narrowly ovate-triangular, 10–15 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 12–18 × 2–3 mm; inner phyllaries narrowly ovate-elliptic to linear, 15–25 × 1–2 mm. Corolla bluish purple, 1.8–2.6 cm, tube 1–1.8 cm, limb 8–11 mm, lobes 5–6 mm. Achene brown, cylindric, 3–4 mm, glabrous. Pappus pale brown; outer bristles 2–5 mm, scabrid; inner bristles 1.3–2 cm. Fl. and fr. Jun–Sep.

• Alpine grasslands, rocky slopes; 2800–5200 m. Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan (Dêqên, Zhongdian).

253. Saussurea tatsienensis Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 146. 1891.

打箭风毛菊 da jian feng mao ju

Herbs 10–60 cm tall, perennial. Stem solitary, erect, simple or apically few branched, villous. Lower stem leaves petiolate; petiole to 7 cm; leaf blade narrowly ovate-elliptic to narrowly elliptic, 4–15(–20) × 1–3(–5) cm, both surfaces green and pubescent, base attenuate, margin entire or denticulate and ciliate, apex acute to acuminate. Middle stem leaves sessile, gradually smaller upward on stem, base semiamplexicaul. Uppermost stem leaves linear-subulate, subtending synflorescence. Capitula 2–8, in a corymbiform synflorescence or sometimes solitary, pedunculate. Involucre campanulate to obconic, 1–2 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, glabrous or sparsely villous, apex acuminate; outer phyllaries narrowly triangular-ovate, 8–10 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, 10–12 × 1.5–2 mm; inner phyllaries linear, 12–15 × 1–1.5 mm. Corolla bluish purple, 1.2–1.4 cm, tube 6–8 mm, limb 5–6 mm, lobes 3–3.5 mm. Achene glabrous. Pappus dirty white; outer bristles 2–3.5 mm, scabrid; inner bristles 9–10 mm. Fl. Jul–Sep.

• Alpine meadows, montane grasslands; 3000–4600 m. Qinghai, W Sichuan, NW Yunnan.

In Qinghai, several specimens have been found that are morphologically intermediate between *Saussurea nigrescens* and *S. tatsienensis*. Both species are very common in the high montane grasslands in the NE part of the Qinghai-Xizang Plateau and probably hybridize where they occur together.

254. Saussurea acutisquama Raab-Straube, Willdenowia 41: 83. 2011.

尖苞风毛菊 jian bao feng mao ju

Herbs 5–45 cm tall, perennial. Stems solitary or several, erect, simple or apically few branched, sparsely villous. Basal and lower stem leaves petiolate; petiole to 12 cm; leaf blade narrowly elliptic, 2–13 × 0.5–1.5(–2) cm, both surfaces green and sparsely villous, base attenuate, margin denticulate and ciliate, apex acute to acuminate. Middle stem leaves sessile, narrowly elliptic to linear, smaller, base semiamplexicaul. Upper stem leaves linear. Capitula 2 or 3(–6), in corymbiform synflorescence or sometimes solitary, pedunculate. Involucre obconic, 1–1.5 cm in diam. Phyllaries in 4 or 5 rows, blackish purple, glabrous or subglabrous, apex acute to acuminate; outer phyllaries narrowly ovate-elliptic, 10–13 × 2–3 mm; middle phyllaries narrowly triangular, 13–17 × 2–2.5 mm; inner phyllaries narrowly elliptic to linear, 17–20 × 1–2 mm. Receptacle bristles 5–7 mm. Corolla blackish to bluish purple, 1.4–1.5 cm, tube 6–7 mm, limb 7–8 mm, lobes 3.5–4 mm. Achene brown or gray with black spots, ellipsoid, 3–3.5 mm, glabrous. Pappus apically white, basally straw-colored to pale brown; outer bris-

tles 3–5 mm, scabrid; inner bristles 13–15 mm. Fl. and fr. Jul–Oct.

• Alpine meadows, montane grasslands; 3400–4900 m. Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan.

Saussurea acutisquama is a taxon that has been recognized as *S. polycolea* var. *acutisquama* (e.g., Lipschitz, Rod *Saussurea*, 64. 1979; S. W. Liu, Fl. Qinghai. 3: 451. 1996) or as *S. nigrescens* var. *acutisquama* (e.g., S. Y. Liang, Fl. Xizang. 4: 871. 1985). Both names are based on a type that represents an entirely different taxon, *S. erubescens*. *Saussurea acutisquama* is widespread in the grasslands of the NE part of the Qinghai-Xizang Plateau and is a good species, quite different from both *S. polycolea* and *S. nigrescens*.

255. Saussurea euodonta Diels, Notes Roy. Bot. Gard. Edinburgh 5: 198. 1912.

锐齿风毛菊 rui chi feng mao ju

Herbs 30–150 cm tall, perennial. Stem solitary, erect, 5–6 mm in diam., apically few branched, apically flexuous, basally glabrous, apically strigose with brown articulate hairs. Lower and middle stem leaves petiolate; petiole 1–3 cm; leaf blade ovate, elliptic, or narrowly ovate-elliptic, 6–20 × (2–)3.5–7 cm, both surfaces green, abaxially sparsely pubescent on veins or glabrous, adaxially scabrid and sparsely strigose, base slightly cordate, truncate, or cuneate-attenuate, margin coarsely dentate-serrate, apex acuminate. Upper stem leaves shortly petiolate to subsessile, smaller; leaf blade narrowly ovate-elliptic. Capitula 2 or 3(–6), in a lax corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre campanulate, (0.8–)1.3–2 cm in diam. Phyllaries in 4–6 rows, brown but dark purple apically, sparsely pilose, apex acute to acuminate and patent to reflexed; outer phyllaries narrowly ovate-triangular, 8–11 × 3–3.5 mm; middle phyllaries narrowly ovate-elliptic, 8–16 × 2–3 mm; inner phyllaries narrowly elliptic to linear, 16–20 × 1.5–2 mm. Receptacle bristles 0.8–1.2 cm. Corolla purple, 1.2–1.4 cm, tube 6–7 mm, limb 6–7 mm, lobes 4–5 mm. Achene brown, cylindric, ca. 4 mm, glabrous. Pappus dirty white; outer bristles few or sometimes lacking, 1.5–5 mm, scabrid; inner bristles 1–1.1 cm. Fl. and fr. Aug–Oct.

• Montane grasslands, *Pinus* forest margins; 2300–3700 m. Sichuan, NW Yunnan.

256. Saussurea hultenii Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 57: 528. 1972.

雅龙风毛菊 ya long feng mao ju

Herbs 65–70 cm tall, perennial. Stem solitary, 5–6 mm in diam., erect, apically few branched, apically flexuous, sparsely arachnoid and with brown articulate hairs. Lower and middle stem leaves petiolate; petiole 1.5–2.5 cm; leaf blade ovate-elliptic to narrowly ovate-elliptic, 11–16 × 3–6 cm, abaxially light green and sparsely pubescent or glabrous, adaxially dark green and glabrous, base cuneate, margin coarsely dentate-serrate, apex acuminate. Upper stem leaves shortly petiolate to subsessile; leaf blade narrowly ovate to narrowly elliptic, 9–13 × 2.5–4 cm. Capitula 3–6, in a lax corymbiform synflorescence, long pedunculate. Involucre campanulate, 1.5–2 cm in diam. Phyllaries in 4–6 rows, straw-colored, apically and near margin dark brown or purplish, sparsely pilose, apex acute to acuminate and usually patent to reflexed; outer phyllaries triangular-ovate, 7–9 × 2–4 mm; middle phyllaries narrowly ovate-elliptic, 8–13 × 2.5–3 mm; inner phyllaries narrowly ovate-elliptic, 13–14 × 2–3 mm. Receptacle bristles straw-colored, 5–7 mm. Corolla purple, 1.2–1.4 cm, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene brown, cylindric, ca. 4 mm. Pappus dirty white; outer bristles usually lacking; inner bristles 1–1.1 cm. Fl. and fr. Aug.

• Mountain slopes, thickets; ca. 2300 m. Yunnan (Gongshan).

257. Saussurea micradenia Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 16. 1925.

滇风毛菊 dian feng mao ju

Herbs to 60 cm tall, perennial. Stem solitary, erect, simple, sparsely arachnoid. Basal and lower stem leaves petiolate; petiole 3–10 cm; leaf blade narrowly oblong, elliptic, or linear, 8–30 × 1–1.5 cm, abaxially pale green, gland-dotted, and glabrescent, adaxially dark green, base attenuate, margin subentire to sparsely denticulate, apex acute to acuminate. Middle and upper stem leaves few, sessile, linear, gradually smaller upward on stem, base semiamplexicaul. Capitula 1 or 2, long pedunculate. Involucre campanulate, ca. 2 cm in diam. Phyllaries in 5 or 6 rows, sparsely villous, apex long acuminate; outer phyllaries narrowly ovate-triangular, 5–6 × 1–1.5 mm, apically herbaceous and reflexed; inner phyllaries narrowly ovate-elliptic to linear, 10–12 × ca. 1 mm. Receptacle bristles 5–6 mm. Corolla blackish purple, ca. 1.5 cm, tube ca. 7 mm. Achene gland-dotted. Pappus in 1 row, pale yellowish brown, 1–1.1 cm. Fl. and fr. Aug.

• Montane forests; 2300–3100 m. NW Yunnan (Gongshan).

258. Saussurea retroserrata Y. L. Chen & S. Yun Liang, Acta Phytotax. Sin. 19: 97. 1981.

倒齿风毛菊 dao chi feng mao ju

Herbs 30–40 cm tall, perennial. Stem solitary, erect, apically few branched, with reddish brown hairs. Basal and lower stem leaves petiolate; petiole 2–3 cm; leaf blade narrowly elliptic, 12–16 × 1–1.6 cm, both surfaces green, adaxially with reddish brown hairs, base attenuate, margin retrorsely serrate, apex acuminate. Middle and upper stem leaves few, shortly petiolate or sessile, gradually smaller upward on stem. Capitula 3 or 4, in a lax racemiform or corymbiform synflorescence, long pedunculate. Involucre ovoid to narrowly campanulate, 1.2–1.5 cm in diam. Phyllaries in 5 or 6 rows, straw-colored to brown but purplish apically and near margin, sparsely villous or glabrescent, apex acuminate; outer phyllaries narrowly triangular-ovate, 8–10 × ca. 3 mm, apically reflexed; inner phyllaries narrowly ovate-elliptic, 10–12 × 2–3 mm. Receptacle bristles linear, 2–3 mm. Corolla purplish red, 1.8–1.9 cm, tube 6–7 mm, limb 6–7 mm, lobes 3.5–4 mm. Achene cylindric, 2.5–3 mm, glabrous. Pappus brownish; outer bristles scabrid. Fl. and fr. Aug–Oct.

• *Picea* forest margins; ca. 3500 m. SE Xizang (Zayü).

259. Saussurea acuminata Turczaninow ex Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 37. 1835.

渐尖风毛菊 jian jian feng mao ju

Herbs 30–60 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, subglabrous. Basal leaves petiolate; leaf blade narrowly ovate-elliptic to oblong, both surfaces green and glabrous, usually withered at anthesis. Lower and middle stem leaves petiolate; petiole winged; leaf blade narrowly elliptic to linear, 10–18 × 2–2.5 cm, base attenuate, margin revolute and entire or denticulate, apex long acuminate. Upper stem leaves sessile, smaller ones linear. Capitula numerous, in a clustered hemispheric-corymbiform synflorescence at end of stem and branches, shortly pedunculate or sessile. Involucre narrowly campanulate, 5–6 mm in diam. Phyllaries in ca. 4 rows, sparsely pubescent; outer phyllaries ovate, apex long acuminate to caudate and usually reflexed; middle phyllaries oblong, apex acute; inner phyllaries linear, apex subacute. Corolla pale purplish red, 1.2–1.5 cm, tube ca. 8 mm, limb ca. 7 mm. Achene cylindric, 1.5–2 mm. Pappus white; outer bristles 2–3 mm, scabrid; inner bristles ca. 1.4 cm. Fl. and fr. Jul–Sep.

Moist meadows, forests, steppes. Heilongjiang, Nei Mongol [Mongolia, Russia (Siberia)].

260. Saussurea glandulosa Kitamura, Acta Phytotax. Geobot. 3: 137. 1934.

腺点风毛菊 xian dian feng mao ju

Saussurea yatagaiana Mori.

Herbs 10–75 cm tall, perennial. Stem solitary, erect, apically branched, flexuous, distinctly winged. Basal leaves usually withered at anthesis. Lower and middle stem leaves petiolate; petiole winged; leaf blade ovate, elliptic, or narrowly ovate-elliptic, (3–)6–20 × (1–)2–4.5 cm, abaxially pale green, gland-dotted, and sparsely pubescent, adaxially green and scabrid, base cuneate and decurrent, margin sinuate-dentate, apex acute. Upper stem leaves sessile, narrowly ovate-elliptic, gradually smaller upward on stem, base cuneate and decurrent, apex acuminate. Capitula several, in a clustered corymbiform synflorescence at end of branches, shortly pedunculate. Involucre cylindric, ca. 3 mm in diam. Phyllaries in 3 or 4 rows, purplish, apically tomentose, apex acuminate; outer phyllaries narrowly triangular-ovate; middle phyllaries narrowly ovate-elliptic; inner phyllaries narrowly elliptic to linear. Receptacle with bristles. Corolla purple, 1–1.1 cm, tube 4–6 mm, limb 4–5 mm. Pappus outer bristles scabrid; inner bristles 7–8 mm. Fl. and fr. Aug.

• Montane forests; 2000–3700 m. Taiwan.

261. Saussurea kiraisiensis Masamune, J. Soc. Trop. Agric. 2: 241. 1930.

台岛风毛菊 tai dao feng mao ju

Herbs 5–15 cm tall, perennial. Stem solitary, slender, erect, simple, puberulent. Lower stem leaves petiolate; petiole 1.5–4 cm, sometimes winged; leaf blade oblong, ovate, or broadly ovate, 2–5 cm, pinnately lobed, abaxially whitish and lanate, adaxially green and puberulent, base truncate to cuneate and decurrent into petiole, margin denticulate, apex acuminate, acute, or obtuse; lateral lobes oblong, small. Upper stem leaves petiolate or sessile, gradually smaller upward on stem; leaf blade oblong, ovate, or narrowly ovate-elliptic, base cuneate to truncate, apex acute to acuminate. Capitula 2–4, clustered in a corymbiform synflorescence or sometimes solitary, shortly pedunculate. Involucre campanulate, 4–6 mm in diam. Phyllaries in ca. 4 rows; outer phyllaries narrowly ovate-elliptic, apex acuminate; middle phyllaries oblong, apex acute; inner phyllaries linear, apex acute. Corolla pink, 7–9 mm. Achene unknown by authors. Pappus dirty white; inner bristles ca. 8 mm.

• Alpine rocky areas or scree slopes; 2900–3500 m. Taiwan.

The misspelling *"Saussurea kiraisanensis,"* established by Kitamura, has been widely used in the literature, including in Fl. Taiwan, ed. 2 (4: 1051. 1998).

262. Saussurea epilobioides Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 495. 1882.

柳叶菜风毛菊 liu ye cai feng mao ju

Saussurea epilobioides var. *cana* Handel-Mazzetti; *S. karlongensis* Handel-Mazzetti.

Herbs 25–60 cm tall, perennial. Stems solitary or few, erect, simple, subglabrous. Basal leaves withered at anthesis. Lower and middle stem leaves sessile, narrowly elliptic to linear, 7–12 × 0.9–2 cm, abaxially grayish green, usually gland-dotted, densely to sparsely tomentose or glabrescent, adaxially green and subglabrous, base auriculate and semiamplexicaul, margin denticulate, apex long acuminate. Upper stem leaves gradually smaller upward on stem, base cuneate. Capitula numerous, in a clustered corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 6–8 mm in diam. Phyllaries in 4 or 5 rows, apically usually arachnoid; outer phyllaries ovate-triangular, 9–13 × 1.5–3 mm, apical part blackish green, saber-shaped, 5–9 mm, and reflexed, apex acuminate; middle phyllaries narrowly ovate-elliptic, 7–9 × 2–3 mm, apical part blackish purple and 1–4 mm; inner phyllaries linear, 8–10 × 1–1.5 mm, apex acute to subobtuse. Corolla purple, 8–10 mm, tube 4–5 mm, limb 4–5 mm, lobes 3–3.5 mm. Achene cylindric, 3–4 mm, glabrous. Pappus dirty white; outer bristles 1.5–3.5 mm, scabrid; inner bristles 7–8 mm. Fl. and fr. Jul–Sep.

• Mountain slopes, alpine meadows; 2600–4200 m. Gansu, Ningxia, Qinghai, W Sichuan.

263. Saussurea umbrosa Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 423. 1901.

湿地风毛菊 shi di feng mao ju

Herbs 50–100 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, pubescent. Basal leaves petiolate; petiole narrowly winged; leaf blade elliptic to narrowly ovate-elliptic, 10–25 × 2–4(–6) cm, abaxially grayish green, gland-dotted, and sparsely arachnoid, adaxially green and sparsely brown pubescent, base truncate to rounded, margin dentate, apex acute. Lower and middle stem leaves sessile, narrowly elliptic to narrowly oblong, 9–18 × 1–3 cm, base cuneate, margin dentate, apex acute to acuminate. Upper stem leaves narrowly elliptic to linear, margin entire. Capitula several, in a paniculiform or corymbiform synflorescence. Involucre campanulate, ca. 1 cm in diam. Phyllaries in ca. 5 rows, gland-dotted and puberulent; outer and middle phyllaries ovate, apical

part saber-shaped and reflexed, apex acuminate-caudate; inner phyllaries narrowly elliptic to linear, apex acuminate. Corolla pale purple, 1.2–1.5 cm, tube 6–8 mm, limb 6–7 mm. Achene cylindric, 3–4 mm. Pappus pale brown; outer bristles 2–3 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Jul–Aug.

Forests, forest meadows. Heilongjiang, Jilin, Nei Mongol [Korea, Russia (Far East, E Siberia)].

264. Saussurea hemsleyi Lipschitz, Bot. Zhurn. (Moscow & Leningrad) 51: 1947. 1966.

湖北风毛菊 hu bei feng mao ju

Saussurea decurrens Hemsley, J. Linn. Soc., Bot. 29: 310. 1892, not Hemsley (1888).

Herbs 30–60(–75) cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, sparsely arachnoid and glandular hairy. Lower and middle stem leaves petiolate; petiole 0.5–5.5 cm, winged, base decurrent; leaf blade ovate, oblong, or narrowly ovate-elliptic, 5–10(–15) × 2–3.5 cm, abaxially green, gland-dotted, and sparsely tomentose, adaxially dark green and glabrescent, base cuneate and abruptly narrowed into petiole, margin crenate to dentate, apex acuminate to caudate. Upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem; leaf blade narrowly ovate-elliptic, base decurrent. Capitula numerous, to 3–5 in a clustered corymbiform synflorescence at end of branches, shortly pedunculate. Involucre narrowly campanulate, 5–7(–10) mm in diam. Phyllaries in 5 or 6 rows, basally yellowish green, apically sometimes purplish, glabrous or arachnoid, apex obtuse; outer phyllaries ovate, 1.5–2 × 1–1.5 mm; middle phyllaries narrowly ovate, 2–6 × 1.5–2 mm; inner phyllaries linear, 7–8(–10) × 0.8–1.5 mm. Receptacle bristles subulate, 4–5 mm. Corolla purple, 8–9(–12) mm, tube 4–5 mm, limb 4–4.5 mm, lobes 2.5–3 mm. Achene cylindric, 3–4 mm, glabrous. Pappus dirty white; outer bristles 1–3 mm, scabrid; inner bristles 6–9 mm. Fl. and fr. Jul–Sep.

• Montane forests, moist places; 2200–3800 m. ?Guizhou, Hubei, ?Sichuan, NW Yunnan.

Saussurea hemsleyi was mistakenly treated by Handel-Mazzetti as *S. parviflora* var. *atriplicifolia* (Acta Horti Gothob. 12: 317. 1938).

265. Saussurea parviflora (Poiret) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 200. 1810.

小花风毛菊 xiao hua feng mao ju

Serratula parviflora Poiret in Lamarck, Encycl. 6: 554. 1805; *Saussurea atriplicifolia* Fischer ex Herder; *S. chowana* F. H. Chen; *S. parviflora* var. *atriplicifolia* (Fischer ex Herder) Handel-Mazzetti; *S. parviflora* var. *cinerascens* Handel-Mazzetti; *S. parviflora* var. *cuspidata* Handel-Mazzetti.

Herbs 30–110 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, sparsely pubescent or glabrous. Basal leaves withered at anthesis. Lower stem leaves petiolate to subsessile; petiole 5–10(–20) mm, narrowly winged, base decurrent; leaf blade elliptic or narrowly ovate, 7–18(–30) × 1.5–4.5 cm, abaxially grayish green or glaucous, usually gland-dotted, and glabrous or puberulent, adaxially green and scabrid but glabrescent, base attenuate, margin dentate to denticulate, apex acuminate. Middle and upper stem leaves sessile, narrowly ovate-elliptic to narrowly elliptic, 4–15 × 1–3.5 cm, gradually smaller upward on stem. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–8 mm in diam. Phyllaries in 4 or 5 rows, yellowish green, apically or entirely dark purple, glabrous or sparsely pubescent, apex subacute to obtuse; outer phyllaries ovate, 2–3 × 1.5–2 mm; middle phyllaries narrowly ovate-elliptic, 3–7 × 2–2.5 mm; inner phyllaries narrowly elliptic, 9–10 × 0.8–1.5 mm. Receptacle bristles subulate, 5–6 mm. Corolla purple, 1.1–1.3 cm, tube 5–7 mm, limb 5–6 mm, lobes 2.5–4 mm. Achene cylindric, 3–4 mm. Pappus dirty white; outer bristles 2–4 mm, scabrid; inner bristles (6–)8–9 mm. Fl. and fr. Jul–Sep. $2n = 26$.

Forest margins, thickets, montane meadows and grasslands; 1600–3800 m. Gansu, Hebei, ?Nei Mongol, Ningxia, Qinghai, ?Shanxi, Sichuan, Xinjiang, ?Yunnan [Kazakhstan, Mongolia, Russia].

266. Saussurea candolleana (Candolle) Wallich ex Schultz Bipontinus, Linnaea 19: 331. 1846.

宽翅风毛菊 kuan chi feng mao ju

Aplotaxis candolleana Candolle, Prodr. 6: 541. 1838; *Saussurea candolleana* var. *glabrata* Lipschitz; *S. candolleana* subsp. *platyptera* Lipschitz; *S. pterocaulon* Decaisne.

Herbs 50–100 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged. Lower stem leaves sessile, ovate-elliptic, obovate, or narrowly elliptic-oblong, 12–18 × 4–6 cm, abaxially pale green, gland-dotted, and sparsely arachnoid, adaxially dark green, scabrid, and sparsely pubescent to subglabrous, base attenuate, semiamplexicaul, and decurrent, margin denticulate, apex acuminate. Middle and upper stem leaves 6–16 × 0.8–4 cm, gradually smaller upward on stem. Capitula 10–20, in a clustered corymbiform synflorescence. Involucre narrowly campanulate, 5–8 mm in diam. Phyllaries in 5 or 6 rows, yellowish green but dark purple apically; outer phyllaries ovate, 3–6 × 1–2.5 mm, apex acuminate; middle phyllaries narrowly ovate-elliptic, 5–8 × 1.5–2 mm, apex acuminate to subacute; inner phyllaries narrowly elliptic to linear, 8–10 × 1–1.5 mm, apex obtuse. Receptacle bristles light brown, 5–8 mm. Corolla 1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes 3.5–4 mm. Achene obconic to cylindric, ca. 5 mm, glabrous. Pappus light brown; outer bristles 2–4 mm; inner bristles 8–9 mm. Fl. and fr. Aug–Sep. $2n = 26$.

Tall forb communities on scree slopes, *Juniperus* woodlands; 2800–3900 m. S Xizang (Tingri, Yadong) [Bhutan, NE and NW India, Kashmir, Nepal].

The report of *Saussurea parviflora* from S Xizang (S. Y. Liang, Fl. Xizang. 4: 893. 1985) is in fact referable to *S. candolleana*, which has recently also been found in a second locality in S Xizang, in Tingri Xian.

267. Saussurea latifolia Ledebour, Icon. Pl. 1: 17. 1829.

宽叶风毛菊 kuan ye feng mao ju

Herbs 35–100 cm tall, perennial. Stem solitary, erect, apically few branched, winged, densely leafy. Basal and lower stem leaves petiolate; leaf blade ovate to elliptic, 6–15 × 4–9

cm, both surfaces green, abaxially pubescent or glabrous, adaxially scabrid, base ± cordate, margin serrate and ciliate, apex acuminate. Middle and upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem, base decurrent. Uppermost stem leaves narrowly ovate-elliptic to narrowly elliptic. Capitula numerous, in a clustered corymbiform synflorescence. Involucre campanulate, 5–6(–8) mm in diam. Phyllaries in 4 or 5 rows, often dark violet, pubescent; outer phyllaries ovate, apex obtuse to subacute; middle and inner phyllaries oblong to narrowly ovate-elliptic, apex subobtuse to acuminate. Receptacle sparsely bristly. Corolla purplish violet, 1–1.1 cm, tube 5–6 mm, limb 5–6 mm, lobes ca. 3.5 mm. Achene pale brown, cylindric, ca. 3.5 mm. Pappus dirty white; outer bristles 3–4 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Sep. $2n$ = 24, 26.

Forests, subalpine and alpine meadows; below 2500 m. N Xinjiang (Altay Shan) [SE Kazakhstan, Mongolia, Russia (Siberia)].

268. Saussurea dielsiana Koidzumi, Fl. Symb. Orient.-Asiat. 50. 1930.

狭头风毛菊 xia tou feng mao ju

Saussurea microcephala Diels, Bot. Jahrb. Syst. 29: 624. 1901, not Franchet (1888); *S. stenocephala* Y. Ling.

Herbs 50–80 cm tall, perennial. Stems solitary or several, erect, simple or apically branched, wingless. Lower stem leaves petiolate; petiole 3–6 cm; leaf blade oblong-triangular to ovate, 8–10 × 4–5(–8) cm, undivided or pinnately lobed, both surfaces green, scabridulous, and subglabrous, base truncate to rarely cordate, margin sinuate-dentate, apex acuminate; lateral lobes 2 or 3 pairs. Upper stem leaves petiolate; petiole 0.5–4 cm; leaf blade narrowly ovate-elliptic to narrowly triangular, gradually smaller upward on stem, usually undivided, base cuneate, truncate, or slightly rounded, apex long acuminate. Capitula numerous, in a corymbiform synflorescence or solitary at leaf axils, pedunculate. Involucre narrowly campanulate to cylindric, 4–6 mm in diam. Phyllaries in 5 or 6 rows, leathery, apically purple, arachnoid at margin; outer phyllaries ovate, small, apex acute and patent to recurved; inner phyllaries linear, apex acute to slightly obtuse. Corolla purplish red, ca. 1.1 cm. Achene brown, cylindric, ca. 5 mm. Pappus white; outer bristles ca. 2 mm, scabrid; inner bristles ca. 9 mm. Fl. and fr. Oct. $2n$ = 26*.

• Montane grasslands; 800–1800 m. Nei Mongol, Shaanxi, Shanxi, Sichuan.

269. Saussurea neoserrata Nakai, Bot. Mag. (Tokyo) 45: 519. 1931.

齿叶风毛菊 chi ye feng mao ju

Saussurea serrata Candolle var. *amurensis* Herder; *S. parviflora* (Poiret) Candolle var. *amurensis* (Herder) S. Y. Hu.

Herbs 30–100 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, glabrescent. Basal leaves withered at anthesis. Lower and middle stem leaves petiolate; petiole 3–10 cm, winged; leaf blade ovate-elliptic to elliptic, 10–21 × 3–6[–8.5] cm, abaxially glaucous and subglabrous, adaxially green and glabrous, base attenuate, margin dentate to serrate, apex long acuminate. Upper stem leaves narrowly elliptic to linear, gradually smaller upward on stem. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate-obconic, 3–6 mm in diam. Phyllaries in 4–6 rows, yellowish green but blackish purple apically and near margin, conspicuously 3-veined, subglabrous, apex obtuse; outer phyllaries ovate, 1.5–2.5 × 1–1.5 mm; middle phyllaries narrowly ovate, 2–8 × 1.5–1.8 mm; inner phyllaries linear, 8–10 × 1–1.5 mm. Receptacle bristles subulate, 3–4 mm. Corolla purple, 9–10 mm, tube 5–6 mm, limb 4–5 mm, lobes 3–4 mm. Achene brown, cylindric, 3–4(–6) mm. Pappus dirty white; outer bristles 1.5–3 mm, scabrid; inner bristles 6–8 mm. Fl. and fr. Jul–Aug. $2n$ = 26, 52.

Larix forest margins, forest meadows. Heilongjiang, Jilin, Nei Mongol [Korea, Mongolia, Russia (Far East, E Siberia)].

270. Saussurea iodoleuca Handel-Mazzetti, Symb. Sin. 7: 1151. 1936.

浅堇色风毛菊 qian jin se feng mao ju

Herbs 40–65 cm tall, perennial. Stem solitary, erect, simple, unwinged, arachnoid. Basal leaves petiolate; petiole 1–3 cm; leaf blade ovate to elliptic, 3–10 × 1.5–5 cm, abaxially grayish white or grayish green and densely tomentose, adaxially green and strigose, base rounded to cuneate, margin denticulate, apex obtuse to acute and mucronate. Lower stem leaves petiolate; leaf blade narrowly elliptic to elliptic, base cuneate-attenuate. Middle and upper stem leaves shortly petiolate or sessile, gradually smaller upward on stem; leaf blade narrowly elliptic to linear. Capitula 3–6, clustered in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 5–7 mm in diam. Phyllaries in 4–6 rows, straw-colored or pale green, tomentose, apex subobtuse and mucronate; outer phyllaries ovate, ca. 3 × 2–3 mm; middle phyllaries narrowly elliptic, ca. 7 × 3 mm; inner phyllaries linear, ca. 10 × 1 mm. Corolla white, ca. 1 cm. Pappus pale brown; outer bristles ca. 2 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Oct.

• Montane forests, thickets; 2000–2300 m. NW Yunnan (Dali, Yongsheng).

271. Saussurea smithiana Handel-Mazzetti, Acta Horti Gothob. 12: 310. 1938.

西康风毛菊 xi kang feng mao ju

Herbs 30–40 cm tall, perennial. Stem solitary, erect, simple or apically few branched, narrowly winged. Basal leaves petiolate; petiole 4–6 cm, narrowly winged; leaf blade ovate to elliptic, 6–10 × 3–5 cm, abaxially white, densely tomentose, and with brown hairs on veins, adaxially green, scabridulous, and densely strigose, base cuneate-attenuate and decurrent, margin shallowly crenate, denticulate, or subentire, apex obtuse and mucronate. Lower stem leaves petiolate; petiole 1–1.5 cm, winged, base widened, semiamplexicaul, and decurrent on stem; leaf blade ovate, 4.5–6 × 1.8–2.5 cm. Middle and upper stem leaves petiolate or sessile, gradually smaller upward on stem; leaf blade narrowly elliptic to linear. Capitula 2–4, in a racemiform or corymbiform synflorescence or sometimes solitary, long pedunculate. Involucre ovoid, (5–)8–10 mm in diam. Phyllaries in 5 or 6 rows, straw-colored but apically purple, sparsely arachnoid, apex obtuse and mucronate; outer phyllaries

ovate, 3–4 × 1–2 mm; middle phyllaries narrowly ovate-elliptic, 4–10 × 2–2.5 mm; inner phyllaries linear, 12–13 × 1–1.5 mm. Receptacle bristles subulate-filiform, 7–9 mm. Corolla purple, 1.4–1.5 cm, tube 7–8 mm, limb 7–7.5 mm, lobes 3.5–4 mm. Pappus dirty white; outer bristles 1.5–2 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Aug–Oct.

• Montane thickets, meadows; 3000–3500 m. W Sichuan (Kangding).

272. Saussurea woodiana Hemsley, J. Linn. Soc., Bot. 29: 312. 1892.

牛耳风毛菊 niu er feng mao ju

Saussurea nobilis Franchet; *S. woodiana* f. *caulescens* Lipschitz; *S. woodiana* f. *subacaulis* Lipschitz.

Herbs 3–8(–25) cm tall, perennial, stemless or cauliferous. Stem solitary, erect, simple. Rosette leaves subsessile or petiolate; petiole winged; leaf blade elliptic to obovate, 5–20 × 1.5–7 cm, abaxially grayish green or brownish and densely tomentose, adaxially green and glandular hairy, base attenuate, margin subentire, apex obtuse to subacute. Stem leaves 1–3, similar to basal leaves. Capitulum solitary, in center of leaf rosette or terminal on stem. Involucre campanulate, 2–2.5(–3) cm in diam. Phyllaries in 5 or 6 rows, straw-colored but purplish apically and near margin, densely yellowish villous, apex long acuminate; outer phyllaries narrowly triangular-ovate, 8–20 × 3–5 mm; middle phyllaries narrowly ovate-elliptic, 1.9–2.3 × 0.4–0.6 cm; inner phyllaries narrowly elliptic, 2.8–3 × 0.2–0.3 cm. Corolla purple, 2.8–3.2 cm, tube (1.4–)1.8–2.2 cm, limb 1–1.2 cm, lobes 6–8 mm. Achene cylindric, ca. 4 mm, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 2.2 cm. Fl. and fr. Jul–Sep.

• Montane grasslands; 3000–4200 m. Qinghai, Sichuan.

273. Saussurea komarnitzkii Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 59(6): 81. 1954.

腋头风毛菊 ye tou feng mao ju

Herbs 20–35 cm tall, perennial. Stem solitary, erect, simple, ± flexuous, narrowly winged, apically densely leafy, glabrous. Basal and lower stem leaves withered at anthesis. Middle stem leaves shortly petiolate to subsessile; petiole winged, base semiamplexicaul and decurrent; leaf blade broadly ovate, suborbicular, or orbicular, 3–6 × 2.5–5 cm, leathery, abaxially white, densely tomentose, and with conspicuous veins, adaxially dark green and subglabrous to sparsely strigose, base semiamplexicaul and decurrent on stem, margin crenate-dentate, apex shortly acuminate. Upper stem leaves sessile, somewhat smaller. Capitula 2–6, in a corymbiform synflorescence or sometimes solitary, shortly pedunculate. Involucre cylindric to narrowly campanulate, 5–7(–10) mm in diam. Phyllaries in ca. 4 rows, straw-colored, densely arachnoid tomentose; outer phyllaries ovate, 2–3 × 1.5–2.5 mm, apex acuminate and with a purplish mucro; middle phyllaries narrowly ovate-elliptic, 3–6 × 1.5–2.5 mm, apex acuminate to obtuse; inner phyllaries linear, 6–7 × 1–1.5 mm, apex obtuse. Corolla purplish red, 8–9 mm, tube 4–4.5 mm, limb 4–4.5 mm, lobes 3–3.5 mm. Achene brown, ca. 4 mm, glabrous. Pappus dirty white to light brown; outer bristles 1–4 mm, scabrid; inner bristles 6–7 mm. Fl. and fr. Aug–Oct.

• Montane grasslands, rocky slopes; 2000–2300 m. Guizhou (Fanjing Shan, Jiangkou, Qingshan).

274. Saussurea rotundifolia F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 6: 98. 1935.

圆叶风毛菊 yuan ye feng mao ju

Saussurea tenella Y. Ling.

Herbs 10–30 cm tall, perennial. Stem solitary, erect, simple, apically very narrowly winged or wingless, sparsely arachnoid. Basal leaves withered at anthesis. Middle stem leaves petiolate; petiole 1–1.5 cm, narrowly winged, base enlarged and amplexicaul; leaf blade broadly ovate to orbicular or triangular, 0.5–5.5 × 0.5–4 cm, abaxially arachnoid tomentose, adaxially green and scabrid or glabrous, base truncate to cuneate and decurrent, margin serrulate, apex acute. Upper stem leaves subsessile, slightly smaller. Capitula 1–3, pedunculate. Involucre ovoid-campanulate, ca. 1.3 cm in diam. Phyllaries in ca. 4 rows, pubescent; outer phyllaries narrowly ovate to triangular, apex acuminate; middle phyllaries narrowly ovate-elliptic, apex acute to obtuse; inner phyllaries narrowly elliptic to linear, apex acuminate. Corolla purple, 9–10 mm. Achene cylindric, ca. 4 mm. Pappus dirty white; outer bristles scabrid. Fl. and fr. Aug–Sep.

• Trailsides on mountain slopes; 3100–3300 m. S Shaanxi (Qin Ling), Sichuan.

275. Saussurea alaschanica Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 492. 1882.

阿拉善风毛菊 a la shan feng mao ju

Herbs 10–30 cm tall, perennial. Stem solitary, erect, simple, sparsely arachnoid. Basal and lower stem leaves petiolate; petiole 1–5 cm; leaf blade elliptic to ovate-elliptic, 2.5–13 × 1.5–5 cm, abaxially grayish green and densely tomentose, adaxially green and glabrous, base cuneate to rounded, margin denticulate to sinuate-dentate, apex acuminate. Middle stem leaves few, shortly petiolate, gradually smaller upward on stem. Upper stem leaves sessile, narrowly ovate-elliptic to narrowly elliptic. Capitula 2 or 3, in a clustered corymbiform synflorescence or sometimes solitary, shortly pedunculate to subsessile. Involucre campanulate, 1–1.2 cm in diam. Phyllaries in 4 or 5 rows, straw-colored but purple apically and near margin, villous, apex acuminate; outer phyllaries triangular-ovate; inner phyllaries linear. Corolla purplish red, 1.2–1.5 cm, tube ca. 6 mm, limb 6–9 mm. Achene blackish brown, cylindric, ca. 4 mm. Pappus dirty white; outer bristles 2–3 mm, scabrid; inner bristles ca. 1.2 cm. Fl. and fr. Jul–Sep.

Thickets, mountain slopes, rock fissures. Nei Mongol, Ningxia [Mongolia].

276. Saussurea polygonifolia F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 8: 125. 1938.

蓼叶风毛菊 liao ye feng mao ju

Herbs ca. 70 cm tall, perennial. Stem solitary, erect, api-

cally few branched, narrowly winged, sparsely arachnoid or glabrous. Basal and lower stem leaves withered at anthesis, long petiolate. Middle stem leaves sessile, narrowly ovate-elliptic to narrowly elliptic, 5–8 × 1–2 cm, abaxially grayish green or white and densely tomentose, adaxially light green and scabrid, base decurrent, margin subentire to denticulate, apex acuminate. Upper stem leaves sessile, narrowly elliptic to linear, gradually smaller upward on stem. Capitula 4–10, in a lax racemiform synflorescence, long pedunculate. Involucre narrowly campanulate, (5–)7–9 mm in diam. Phyllaries in 4 or 5 rows, straw-colored to reddish brown, glabrous or sparsely villous, apex acuminate; outer phyllaries triangular-ovate, ca. 3 × 2 mm; middle phyllaries narrowly ovate-elliptic, 3–5 × 1–2 mm; inner phyllaries narrowly elliptic, ca. 5 × 1 mm. Corolla white, ca. 1.2 cm. Achene ca. 2 mm. Pappus straw-colored; outer bristles scabrid. Fl. Sep.

• Forests. NW Yunnan.

277. Saussurea vestita Franchet, J. Bot. (Morot) 2: 358. 1888.

绒背风毛菊 rong bei feng mao ju

Herbs 20–60 cm tall, perennial. Stem erect, simple or apically few branched, winged, arachnoid and brown floccose. Basal and lower stem leaves petiolate; petiole 3–6 cm; leaf blade ovate-elliptic to elliptic, (3–)6–12 × 3–7.5 cm, thick, abaxially grayish white and densely tomentose, adaxially green to yellowish green and sparsely white or pale brown floccose, base attenuate and decurrent, margin dentate, apex obtuse. Middle and upper stem leaves elliptic to narrowly elliptic, gradually smaller upward on stem. Capitula several, in a paniculiform or corymbiform synflorescence. Involucre narrowly campanulate to obconic, 6–10 mm in diam. Phyllaries in 5 or 6 rows, yellowish green but usually purple apically, arachnoid, apex long acuminate; outer phyllaries triangular-ovate, ca. 6 × 1 mm; middle phyllaries narrowly elliptic, 8–9 × ca. 3 mm; inner phyllaries linear, ca. 10 × 1.5 mm. Corolla blackish purple, ca. 1.5 cm, tube ca. 5 mm, limb ca. 1 cm. Achene cylindric, ca. 4 mm, glabrous. Pappus pale brown; outer bristles ca. 3 mm, scabrid; inner bristles ca. 1.1 cm. Fl. and fr. Aug–Oct.

• Montane meadows, trailsides; 3000–3900 m. NW Yunnan (Binchuan, Eryuan, Lijiang).

278. Saussurea platypoda Handel-Mazzetti, Symb. Sin. 7: 1152. 1936.

川南风毛菊 chuan nan feng mao ju

Herbs to 1.1 m tall, perennial. Stem solitary, stout, erect, much branched, winged, densely leafy, with articulate hairs. Basal and lower stem leaves withered at anthesis. Middle and upper stem leaves sessile, narrowly oblong to narrowly elliptic, 3–9 × 1–2 cm, abaxially grayish green and densely tomentose, adaxially green and scabrid, base attenuate and decurrent, margin crenate, apex acute. Capitula numerous, in a clustered corymbiform synflorescence at end of branches, shortly pedunculate. Involucre campanulate, 8–10 mm in diam. Phyllaries in ca. 5 rows, arachnoid; outer phyllaries ovate, 3–4 × ca. 2 mm, apex acuminate; middle phyllaries narrowly ovate, 5–8 × 1–2 mm; inner phyllaries linear, ca. 10 × 1 mm, apex obtuse. Receptacle bristles subulate, 4–6 mm. Corolla bluish purple, tube ca. 4 mm. Pappus brown; outer bristles 2–4 mm, scabrid; inner bristles ca. 8 mm. Fl. and fr. Sep–Oct.

• Montane thickets; 2900–3300 m. SW Sichuan (Yanyuan).

279. Saussurea cauloptera Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 645. 1937.

翅茎风毛菊 chi jing feng mao ju

Saussurea rosthornii Diels var. *sessilifolia* Diels.

Herbs 50–60 cm tall, perennial. Stem solitary, erect, simple, narrowly winged or wingless. Basal and lower stem leaves withered at anthesis. Middle stem leaves petiolate; petiole winged; leaf blade ovate to elliptic, 7–11 × 3.5–6 cm, abaxially grayish white and densely tomentose, adaxially green and slightly scabrid, base cuneate-attenuate to truncate, margin denticulate, apex acute. Capitula 4–10, in a clustered corymbiform synflorescence, shortly pedunculate or sessile. Involucre ovoid, ca. 6 mm in diam. Phyllaries in 4 or 5 rows, brownish, pubescent or arachnoid; outer phyllaries ovate, apex with black mucro; middle phyllaries narrowly ovate-elliptic; inner phyllaries linear. Corolla red, 9–10 mm. Achene ca. 3 mm, glabrous. Pappus pale brown; outer bristles scabrid. Fl. and fr. Sep–Oct.

• Open forests; 1700–3000 m. Chongqing (Nanchuan), Henan, S Shaanxi (Qin Ling).

280. Saussurea amurensis Turczaninow ex Candolle, Prodr. 6: 534. 1838.

龙江风毛菊 long jiang feng mao ju

Saussurea amurensis subsp. *stenophylla* (Freyn) Kitamura; *S. stenophylla* Freyn.

Herbs 40–100 cm tall, perennial. Stem solitary, erect, apically branched, narrowly winged, arachnoid or glabrous. Basal leaves long petiolate; leaf blade ovate-elliptic to narrowly ovate-elliptic, 10–30 × 2–5 cm, abaxially grayish white or grayish green and densely arachnoid tomentose, adaxially green and glabrous, base cuneate-attenuate, margin denticulate, apex acuminate. Lower and middle stem leaves shortly petiolate or sessile; leaf blade narrowly elliptic to linear, base cuneate-attenuate and decurrent, margin denticulate, apex acuminate. Upper stem leaves sessile, linear, gradually smaller upward on stem, margin entire. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 6–8 mm in diam. Phyllaries in 4 or 5 rows, villous; outer phyllaries purple, ovate, ca. 3 × 2 mm, apex acuminate to acute; middle phyllaries narrowly elliptic, ca. 7 × 2 mm, apex acute to subobtuse; inner phyllaries lanceolate to oblong-lanceolate, ca. 10 × 1.5 mm, apex subobtuse. Corolla pale purple, 1–1.2 cm, tube 5–6 mm, limb 5–7 mm. Achene brown, cylindric, 3–4 mm, glabrous. Pappus dirty white; outer bristles ca. 1 mm, scabrid; inner bristles 8–10 mm. Fl. and fr. Jul–Sep. $2n = 26, 48, 52, 54$.

Marshy meadows, meadows, forest margins; 900–1300 m. Heilongjiang, Jilin, Liaoning, Nei Mongol [Korea, Russia (Far East, E Siberia)].

281. Saussurea bullata W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 206. 1914.

泡叶风毛菊 pao ye feng mao ju

Herbs 5–16 cm tall, perennial, stemless or shortly stemmed. Stem solitary, purple, erect, apically few branched, densely covered with brown articulate hairs. Leaves usually in basal rosette. Rosette and lower stem leaves petiolate; petiole 1–3 cm, densely covered with brown articulate hairs; leaf blade broadly ovate or elliptic to suborbicular, 4–7 × 2–5 cm, abaxially white, densely tomentose, and with brown hairs on veins, adaxially green and with hairs on veins, base rounded, truncate, or slightly cordate, margin dentate, apex rounded. Middle stem leaves sessile, smaller. Capitula 2–8, clustered in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, (5–)8–10 mm in diam. Phyllaries in 4–7 rows, blackish purple, villous, apex acuminate; outer phyllaries ovate, 3–5 × 2–3 mm; middle phyllaries narrowly ovate-elliptic, ca. 6 × 3 mm; inner phyllaries narrowly elliptic, ca. 9 × 1.5 mm. Corolla purplish red, 1.2–1.5 cm, glabrous, tube 6–9 mm, limb 5–6 mm, lobes 3–4 mm. Achene grayish, cylindric, transversely rugose, ca. 2 mm, apex with a short crown. Pappus basally brown, apically dirty white; outer bristles scabrid, 1–2 mm, inner bristles 9–10 mm. Fl. and fr. Sep.

• Alpine grasslands, consolidated scree slopes; 3600–4300 m. NW Yunnan (Dêqên, Lijiang, Zhongdian).

282. Saussurea alpina (Linnaeus) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 198. 1810.

高山风毛菊 gao shan feng mao ju

Serratula alpina Linnaeus, Sp. Pl. 2: 816. 1753.

Herbs 20–70 cm tall, perennial. Stem solitary, straw-colored to purplish red, erect, apically branched, wingless, sparsely pubescent or subglabrous. Lower and middle stem leaves petiolate; petiole 1–4 cm; leaf blade narrowly elliptic to ovate-elliptic, 8–12(–20) × 0.7–3 cm, abaxially grayish white or grayish green and densely arachnoid tomentose, adaxially green and glabrous, base cuneate-attenuate, margin denticulate, apex acuminate. Upper stem leaves sessile, narrowly elliptic to linear, 1–5 × 0.1–0.5 cm, gradually smaller upward on stem, base slightly amplexicaul, margin entire, apex acuminate. Capitula numerous, in a corymbiform synflorescence, shortly pedunculate. Involucre narrowly campanulate, 6–12 mm in diam. Phyllaries in 4 or 5 rows, greenish but purple apically, glabrous to sparsely villous, apex acute to subobtuse; outer phyllaries ovate-elliptic, ca. 3 × 2 mm; middle phyllaries oblong, ca. 6 × 2 mm; inner phyllaries narrowly ovate-elliptic, ca. 9 × 1.5 mm. Corolla purplish red, 1–1.2 cm, tube ca. 5 mm, limb ca. 7 mm. Achene pale brown, cylindric, 2–3 mm. Pappus basally pale brown, apically white; outer bristles 1–3 mm, scabrid; inner bristles 7–9 mm. Fl. and fr. Aug–Sep. $2n = 26, 52, 54$.

Alpine steppes, rocky slopes, scree slopes; ca. 3000 m. N and W Xinjiang (Altay Shan, Tian Shan) [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; C and N Europe].

283. Saussurea elliptica C. B. Clarke ex J. D. Hooker, Fl. Brit. India 3: 372. 1881.

藏新风毛菊 zang xin feng mao ju

Saussurea kuschakewiczii C. Winkler.

Herbs 2–8[–20] cm tall, perennial, almost stemless or shortly stemmed. Caudex 2–4(–6) mm in diam., long creeping, few branched. Stem solitary, simple, erect to ascending, 1.5–3 mm in diam. Lower and middle stem leaves petiolate; petiole 0.8–4.5 cm; leaf blade ovate to elliptic, 1.5–7 × 0.5–3 cm, both surfaces grayish green, gland-dotted, and arachnoid, base cuneate, attenuate, or subtruncate, margin denticulate, apex acute to acuminate. Uppermost stem leaves linear, subtending synflorescence. Capitula 2–10[–20], in a dense to lax clustered corymbiform synflorescence, subsessile to shortly pedunculate. Involucre obconical to narrowly campanulate, 5–13 mm in diam. Phyllaries in 3 or 4 rows, straw-colored and sometimes tinged with purple, arachnoid tomentose to glabrescent, apex acuminate to subacute; outer phyllaries triangular-ovate, ca. 3 mm wide; middle phyllaries narrowly ovate-elliptic; inner phyllaries narrowly elliptic-linear. Receptacle naked or with few subulate bristles. Corolla pale reddish purple, 1.1–1.6 cm, glandular, tube 5–8 mm, limb 5–8 mm, lobes to 5 mm. Achene brown, 3–5 mm, usually gland-dotted. Pappus white to brownish; outer bristles 1–3 mm; inner bristles 1.1–1.4 cm. Fl. and fr. Aug–Sep.

Alpine grasslands and meadows, moraines, rocky slopes, scree slopes, among rocks; 2500–3700[–4600] m. W Xinjiang (Wuqia) [Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan].

284. Saussurea pseudoalpina N. D. Simpson, J. Linn. Soc., Bot. 41: 427. 1913.

假高山风毛菊 jia gao shan feng mao ju

Saussurea ambigua Krylov ex Sergievskaya.

Herbs (4–)10–20 cm tall, perennial. Stems solitary or few, erect, simple. Basal and lower stem leaves shortly petiolate; leaf blade ovate-elliptic, 5–20 × 1–3 cm, abaxially grayish green, gland-dotted, and arachnoid, adaxially pale green and subglabrous, base attenuate, margin sparsely denticulate, apex acuminate. Middle and upper stem leaves sessile, elliptic to linear, base not decurrent, margin entire. Capitula 4–12, in a clustered corymbiform synflorescence, shortly pedunculate. Involucre campanulate, (3–)5–8 mm in diam. Phyllaries in 3 or 4 rows, pale or violet-blackish; outer phyllaries ovate to ovate-oblong, pubescent, apex acuminate; inner phyllaries oblong, villous, apex subobtuse. Receptacle bristles ca. 4 mm. Corolla purple, 1.1–1.2 cm, tube 5–6 mm, limb 5–6 mm, lobes ca. 3.5 mm. Achene pale brown with dark brown spots, cylindric, 2–4 mm, glabrous. Pappus dirty white; outer bristles 1.5–4 mm; inner bristles 8–9 mm. Fl. and fr. Jul–Sep.

Stony and saline steppes, saline meadows; below 2900 m. N Xinjiang (Altay Shan) [SE Kazakhstan, Mongolia, Russia (Siberia)].

285. Saussurea undulata Handel-Mazzetti, Symb. Sin. 7: 1147. 1936.

波缘风毛菊 bo yuan feng mao ju

Herbs to 1.2 m tall, perennial. Stem solitary, erect, apically branched, wingless, arachnoid and with yellowish brown hairs. Lower stem leaves sessile, oblong to narrowly elliptic, 7–12 × 1.5–4 cm, pinnately lobed, lyrate, or undivided, abaxially grayish green and arachnoid tomentose, adaxially dark green and sparsely strigose, base auriculate and amplexicaul, apex acute; lobes 1–4 pairs, margin denticulate. Middle and upper

stem leaves narrowly elliptic, 5–8 × 1–2 cm, gradually smaller upward on stem, undivided, base rounded, margin subentire, apex acute. Capitula numerous, in a paniculiform or lax corymbiform synflorescence, pedunculate. Involucre narrowly ovoid, 8–10 mm in diam. Phyllaries in 4 or 5 rows, straw-colored but blackish brown apically and near margin, sparsely arachnoid; outer phyllaries ovate, ca. 2 × 1 mm, apex dark mucronate; inner phyllaries narrowly elliptic, to 10 × 1 mm, apex acute to obtuse. Corolla bluish purple, ca. 1 cm, tube 4–5 mm, limb ca. 5 mm, lobes ca. 2 mm. Achene glabrous. Pappus brown; outer bristles ca. 3 mm, scabridulous; inner bristles 9–10 mm. Fl. and fr. Oct.

• Montane thickets and grasslands; 2800–3300 m. SW Sichuan (Yanyuan), NW Yunnan (Lijiang).

286. Saussurea grosseserrata Franchet, J. Bot. (Morot) 2: 354. 1888.

粗裂风毛菊 cu lie feng mao ju

Herbs 12–35 cm tall, perennial, sometimes laxly caespitose. Stems solitary or several, erect, simple, arachnoid. Basal and lower stem leaves petiolate; petiole 2–10 cm; leaf blade obovate, narrowly obovate, or narrowly elliptic, (1.5–)4.5–11 × 0.9–5 cm, both surfaces pale green and sparsely arachnoid, base cuneate to attenuate, margin coarsely dentate to pinnately lobed, apex rounded, obtuse, or subacute and mucronate. Middle and upper stem leaves few, petiolate; leaf blade narrowly elliptic to linear, gradually smaller upward on stem, margin triangular-dentate to entire. Capitulum solitary, terminal on stem. Involucre campanulate, 1–1.5(–2) cm in diam. Phyllaries in 4–6 rows, blackish purple, arachnoid; outer phyllaries elliptic, ca. 12 × 4–6 mm, apex long acuminate; middle phyllaries narrowly elliptic, ca. 1.8 × 0.4–0.5 cm, apex obtuse; inner phyllaries narrowly elliptic to linear, ca. 1.8 × 0.2 cm, apex caudate-acuminate. Corolla blackish purple to bluish purple, 1.2–1.5 cm, tube 3–6 mm, limb ca. 9 mm. Achene brown, cylindric, ca. 5 mm, glabrous. Pappus pale brown; outer bristles ca. 1 mm, scabrid; inner bristles ca. 1.2 cm. Fl. and fr. Aug–Oct.

• *Rhododendron* thickets, alpine grasslands, consolidated scree slopes; 2300–4000 m. NW Yunnan (Dali, Lijiang, Zhongdian).

287. Saussurea pratensis J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 210. 1934.

草原雪莲 cao yuan xue lian

Herbs to 30 cm tall, perennial. Stem solitary, erect, simple, densely yellowish white villous, covered at base with brown residue of petioles. Lower stem leaves petiolate; petiole 3–6 cm; leaf blade oblong, broadly linear, or narrowly elliptic, 15–18 × 1–1.2 cm, sparsely yellowish white villous, base attenuate, margin sinuate and sparsely denticulate, apex obtuse. Middle stem leaves sessile, narrowly ovate-elliptic, to 11 × 0.5 cm, margin entire. Upper stem leaves sessile, narrowly ovate-elliptic to linear, 1.3–6 × ca. 0.2 cm, base amplexicaul, apex acuminate. Capitulum solitary, terminal on stem. Involucre hemispheric, ca. 1.3 cm in diam. Phyllaries in 4 rows, purplish red, densely yellowish white villous, apex acuminate; outer phyllaries narrowly oblong-elliptic, ca. 14 × 4 mm; middle phyllaries narrowly ovate-elliptic, ca. 1.7 × 0.3 cm; inner phyllaries narrowly triangular-linear, ca. 18 × 1–2 mm. Corolla purplish red, ca. 1.7 cm, tube ca. 1 cm, limb ca. 7 mm. Achene pale brown, oblong, ca. 3.5 mm. Pappus pale brown; outer bristles ca. 3 mm; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep.

• Forest margins, montane meadows; 2000–3100 m. NW Yunnan (Dali, Lijiang).

Saussurea pratensis was erroneously placed in *S.* subg. *Amphilaena* by Lipschitz (Rod *Saussurea*, 64. 1979) and by C. Shih and S. Y. Jin (FRPS 78(2): 30. 1999), but it does not show the colored bracts typical for that subgenus.

288. Saussurea tunglingensis F. H. Chĕn, Bull. Fan Mem. Inst. Biol., Bot. 5: 85. 1934.

卷苞风毛菊 juan bao feng mao ju

Saussurea sclerolepis Nakai & Kitagawa; *S. sclerolepis* f. *pinnatipartita* Nakai & Kitagawa.

Herbs 10–60 cm tall, perennial. Stems solitary or few, erect, simple or few branched, sparsely strigose or glabrous. Basal and lower stem leaves petiolate; petiole 5–14 cm, winged; leaf blade ovate to narrowly ovate-elliptic, 5–15 × 2–5 cm, both surfaces green and glabrous, base cuneate, subtruncate, or cordate, margin sinuate-dentate, apex acuminate. Middle and upper stem leaves sessile or with a narrowly winged short petiole; leaf blade narrowly elliptic, base truncate to cordate-sagittate, apex acuminate. Capitulum solitary, terminal on stem or few in a lax corymbiform synflorescence, pedunculate. Involucre broadly campanulate, (1–)1.5–2(–2.5) cm in diam. Phyllaries in 6 or 7 rows, apically purple, apex acuminate and reflexed; outer phyllaries ovate to ovate-triangular, ca. 4 × 4 mm; middle phyllaries narrowly ovate-elliptic, ca. 1.7 × 0.4 cm; inner phyllaries narrowly elliptic to linear, ca. 1.8 × 0.3 cm, apex obtuse. Corolla purplish red, 1.5–1.8 cm, tube ca. 8 mm, limb ca. 1 cm. Achene pale brown, obconic, 5–5.5 mm, ribbed, glabrous. Pappus dirty white; outer bristles to 6 mm, scabrid; inner bristles ca. 1.5 cm. Fl. and fr. Jul–Sep.

• Montane grasslands, forest margins, ravines; 1700–1900 m. Hebei, Liaoning, Nei Mongol.

Saussurea sclerolepis was published in November 1934, whereas *S. tunglingensis* was published in May of the same year.

289. Saussurea recurvata (Maximowicz) Lipschitz, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 374. 1961.

折苞风毛菊 zhe bao feng mao ju

Saussurea elongata Candolle var. *recurvata* Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 167. 1859; *S. parasclerolepis* A. I. Baranov & Skvortsov; *S. recurvata* var. *angustata* H. C. Fu; *S. sclerolepis* Nakai & Kitagawa var. *parasclerolepis* (A. I. Baranov & Skvortsov) C. Y. Li.

Herbs 40–100 cm tall, perennial. Stems solitary or several, erect, simple, glabrous. Basal and lower stem leaves petiolate; petiole 3–7 cm; leaf blade narrowly triangular-ovate to narrowly triangular-hastate, (3–)10–15 × (2–)2.5–6 cm, thick, pinnately lobed, both surfaces green to grayish green, thick, abaxially sparsely pubescent, adaxially sparsely strigose, base hastate to truncate, apex acute to acuminate; lateral lobes unequally

incised, dentate, or denticulate, rarely entire. Middle stem leaves shortly petiolate, smaller; leaf blade pinnately divided or dentate. Upper stem leaves sessile, narrowly elliptic to linear, smaller, undivided. Capitula 3–5, in a clustered corymbiform synflorescence, shortly pedunculate. Involucre campanulate, 1–1.5 cm in diam. Phyllaries in 5–7 rows; outer phyllaries ovate, apex long acuminate and usually reflexed; middle phyllaries narrowly ovate-elliptic, apex acute and mucronate; inner phyllaries usually purple, linear, apex acute to obtuse. Corolla purple, 1.2–1.5 cm, tube 6–8 mm, limb 6–7 mm. Achene cylindric, 4–5 mm, glabrous. Pappus dirty white; outer bristles 2–3 mm, scabrid; inner bristles ca. 1 cm. Fl. and fr. Jul–Sep. $2n = 26$.

Forest margins, thickets, grasslands; 1000–2900 m. Gansu, Heilongjiang, Jilin, ?Liaoning, Nei Mongol, Ningxia, ?Qinghai, Shaanxi [Korea, Mongolia, Russia (Far East)].

2. ARCTIUM group

牛蒡群 niu bang qun

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Capitula homogamous, bisexual. Phyllaries ending in a straight, recurved, or hooked spine. Receptacle densely covered with long bristles. Florets bisexual. Corolla ± actinomorphic. Stamen filaments distinct, glabrous or papillose. Style branches distinct and divergent. Achene glabrous; apical rim ± inconspicuous, sometimes denticulate, not forming a crown; apical plate flat. Pappus of scabrid bristles not basally connate into a ring, falling off singly, or sometimes lacking.

About four genera and ca. 700 species: NW Africa, Asia, Europe; three genera and 14 species (two endemic) in China.

1a. Outer and middle phyllaries ending in a hooked spine ..... 25. *Arctium*
1b. Outer and middle phyllaries ending in a straight or recurved spine.
2a. Capitula glabrous to cobwebby, when in clusters not surrounded by leaflike lanate bracts ..... 23. *Cousinia*
2b. Capitula densely lanate, in clusters surrounded by leaflike lanate bracts ..... 24. *Schmalhausenia*

23. COUSINIA Cassini in F. Cuvier, Dict. Sci. Nat. 47: 503. 1827.

刺头菊属 ci tou ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Leaves divided or undivided, margin spiny or spinulose. Capitula 1 to many, forming a racemose, paniculate, or corymbose synflorescence, or solitary, glabrous to cobwebby. Involucre spherical to cylindric. Phyllaries imbricate, leathery, ending in a spine. Stamen filaments glabrous; anther with ± lacerate basal appendages. Style branches short to long, apex acute. Achene obovoid to obconic, laterally compressed, with (2–)4 or 5 raised ribs, rugose, apex ± rimmed; rim sometimes denticulate. Pappus rarely absent, when present bristles in ca. 3 rows, outer ones much shorter than inner.

About 600 species: C, S, and SW Asia; 11 species (two endemic) in China.

1a. Stems winged.
2a. Corolla yellow.
3a. Involucre 1.2–1.5 cm in diam.; leaves ± leathery ..... 1. *C. dissecta*
3b. Involucre 0.6–0.9 cm in diam.; leaves thinly papery ..... 2. *C. alata*
2b. Corolla red to purple.
4a. Involucre 1.2–1.5 cm in diam., glabrous; phyllaries green; leaves undivided ..... 3. *C. leiocephala*
4b. Involucre 1.5–2 cm in diam., densely cobwebby; phyllaries grayish white; basal and lower cauline leaves pinnately lobed ..... 4. *C. platylepis*
1b. Stems unwinged.
5a. Corolla white or yellow.
6a. Involucre spherical to ovoid, 1.5–2 cm in diam.; corolla white ..... 5. *C. affinis*
6b. Involucre narrowly ellipsoid to cylindric, 0.6–0.8 cm in diam.; corolla yellow ..... 6. *C. polycephala*
5b. Corolla purplish red.
7a. Stems unbranched; capitulum solitary.
8a. Involucre 4–4.5 cm in diam.; leaf segments broadly ovate ..... 8. *C. sclerolepis*
8b. Involucre 1.5–2 cm in diam.; leaf segments triangular to triangular-lanceolate ..... 9. *C. caespitosa*
7b. Stems branched; capitula several.
9a. Leaves undivided ..... 7. *C. lasiophylla*
9b. Basal and lower cauline leaves pectinately divided into needle-shaped segments.
10a. Capitula 4 or 5; terminal spine of leaf segments 5–10 mm ..... 10. *C. falconeri*
10b. Capitula numerous; terminal spine of leaf segments ca. 4 mm ..... 11. *C. thomsonii*

1. Cousinia dissecta Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 391. 1842.

深裂刺头菊 shen lie ci tou ju

Arctium dissectum (Karelin & Kirilov) Kuntze.

Herbs 25–35 cm tall, biennial. Stems erect, apically branched, densely cobwebby; wings 2–4(–10) mm wide, with spiny teeth. Leaves ± leathery, abaxially grayish white and densely cobwebby-felted, adaxially grayish green and densely cobwebby. Basal and lower cauline leaves shortly petiolate, bipinnatisect. Middle cauline leaves sessile, bipinnatisect or pinnatisect; uppermost cauline leaves narrowly lanceolate, less divided. Capitula broadly ovoid. Involucre 1.2–1.5 cm in diam. Outer and middle phyllaries falcately recurved in distal half, apex narrowed into a spine to 3 mm; inner phyllaries narrowly lanceolate, margin ciliate, apex long acuminate. Corolla yellow. Achene ca. 5 × 1.5–2 mm, 4-ribbed, ribs apically prolonged into a tooth. Fl. and fr. May–Aug.

Sandy areas adjacent to sand dunes. NW Xinjiang [Kazakhstan].

No material of *Cousinia dissecta* was seen by the present authors. The description here is based on the original publication and the treatments by Tscherneva (Fl. URSS 27: 160. 1962) and G. M. Shen (Fl. Xinjiang. 5: 300. 1999).

2. Cousinia alata Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 40. 1841.

翼茎刺头菊 yi jing ci tou ju

Herbs 50–90 cm tall, perennial. Stems erect, freely branched, glabrous; wings with spiny teeth. Leaves thinly papery, sparsely cobwebby. Basal and lower cauline leaves sessile, lanceolate to elliptic, ca. 12 × 4 cm, bipinnatipartite; ultimate lobes triangular to narrowly ovate, margin entire, apex with a 1–1.5 mm spine. Middle cauline leaves similar or pinnatipartite; upper cauline leaves gradually smaller upward, pinnately lobed or toothed. Capitula many, corymbose to paniculate. Involucre ovoid, 6–9 mm in diam., sparsely cobwebby. Phyllaries in ca. 9 rows; outer and middle phyllaries ± narrowly lanceolate, 4–7 × ca. 1 mm, apex narrowed into a patent or ± recurved 1.5–3 mm spine; inner phyllaries lanceolate-elliptic, 8–10 × 1–1.5 mm, apex narrowed into a spine ca. 3 mm. Corolla yellow, ca. 8 mm. Mature achene unknown. Pappus short. Fl. Jul.

Slopes, sandy places; 500–700 m. Xinjiang (Tian Shan part of Junggar Pendi) [Kazakhstan, Uzbekistan].

3. Cousinia leiocephala (Regel) Juzepczuk, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 314. 1937.

光苞刺头菊 guang bao ci tou ju

Cousinia sewertzowii Regel var. *leiocephala* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 314. 1880.

Herbs 30–60 cm tall, biennial. Stems solitary, grayish white, erect, apically or sometimes basally branched, densely cobwebby; wings 4–6 mm wide, teeth with 0.5–1.5 mm terminal spines. Leaves thinly papery, concolorous, green to grayish green, sparsely cobwebby. Basal leaves sessile, undivided, lanceolate to broadly lanceolate, margin with spiny teeth. Middle and upper cauline leaves sessile, lanceolate, 2.5–3.5 × 0.7–1.5 cm, margin spinulose and toothed, teeth with apical spines. Capitula 9–12. Involucre campanulate, 1.2–1.5 cm in diam., glabrous. Phyllaries in ca. 12 rows, green; outer and middle phyllaries triangular-subulate to linear-subulate, 5–10 × ca. 1 mm, apex narrowed into a recurved spine 0.5–2 cm; inner phyllaries linear, ca. 12 × 1 mm, abaxially strigose, margin with short cilia, apex expanded and scarious. Corolla purplish red, ca. 1.2 cm, tube 4–4.5 mm. Achene pale grayish brown variegated with dark brown, obovoid, ca. 3 mm, multistriate. Fl. and fr. Jun–Aug.

Slopes; 1100–1800 m. Xinjiang (Tian Shan) [Uzbekistan].

4. Cousinia platylepis Fischer, C. A. Meyer & Avé-Lallemant, Index Sem. Hort. Petrop. 9(Suppl.): 10. 1844.

宽苞刺头菊 kuan bao ci tou ju

Arctium platylepis (Fischer, C. A. Meyer & Avé-Lallemant) Kuntze.

Herbs 30–80 cm tall, biennial. Stems erect, grayish white cobwebby-felted; wings 3–4 mm wide, with spiny teeth. Leaves concolorous, grayish white, densely cobwebby-felted. Basal and lower cauline leaves sessile, lanceolate, pinnately lobed. Upper cauline leaves sessile, lanceolate, 2–2.5 × 1–1.5 cm, margin spiny or toothed, teeth spiny laterally and narrowed into a 0.5–3 mm spine; uppermost cauline leaves elliptic to ovate, ca. 10 × 4–5 mm, margin entire. Capitula several. Involucre broadly campanulate, 1.5–2 cm in diam., densely cobwebby. Phyllaries in ca. 7 rows, grayish white; outer and middle phyllaries triangular, triangular-lanceolate, or elliptic, 3–10 × 1–3 mm, apex narrowed into a ca. 2 mm spine; inner phyllaries elliptic, ca. 11 × 3 mm, apex rigid, expanded, scarious, and mucronulate; innermost phyllaries broadly linear, ca. 14 × 2 mm, apex obtuse to rounded. Corolla red, ca. 1.2 cm, tube ca. 5 mm. Achene yellowish, ellipsoid, ca. 1.8 mm, multistriate. Fl. and fr. May–Aug.

Slopes; 1200–2000 m. NW Xinjiang [Kazakhstan, Uzbekistan].

5. Cousinia affinis Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 41. 1841.

刺头菊 ci tou ju

Arctium affine (Schrenk ex Fischer & C. A. Meyer) Kuntze; *Cousinia wolgensis* (M. Bieberstein ex Willdenow) C. A. Meyer ex Candolle var. *affinis* (Schrenk ex Fischer & C. A. Meyer) Regel.

Herbs 15–40 cm tall, perennial. Rootstock thick, densely cottony and covered with petiole remains. Stems erect, unbranched or apically branched, unwinged, thickly grayish white felted to glabrescent or glabrous. Leaves abaxially grayish white and thickly felted, adaxially green and sparsely cobwebby. Basal leaves with a brown winged petiole; leaf blade elliptic to oblanceolate, 8–12 × 2–4 cm, margin toothed or lobed; teeth or lobes ± broadly ovate to semiorbicular, margin with 0.5–1 mm spinules, apex with 2.5–5 mm spine. Lower and middle cauline leaves sessile, gradually smaller, base auriculate

and semiamplexicaul, otherwise similar to basal leaves or ± narrowly ovate, smallest uppermost ones ovate. Capitula several. Involucre globose to ovoid, 1.5–2 cm in diam., glabrous or sparsely cobwebby. Phyllaries in ca. 9 rows; outer and middle phyllaries subulate, ovate-elliptic or ovate, 8–12 × 2–3 mm, margin ciliate, apex abruptly constricted into a recurved 4–5 mm spine; inner phyllaries elliptic to broadly linear, ca. 15 × 2–2.5 mm, apex narrowed into a short spine; innermost phyllaries oblanceolate, ca. 18 × 2 mm, abaxially strigose, margin with short cilia, apex with a short spine. Corolla white, ca. 2.3 cm, tube ca. 5 mm. Achene narrowly obovoid, ca. 4 mm, 4-ribbed, ribs apically prolonged into a tooth. Fl. and fr. Jun–Sep.

Deserts, dunes; 400–800 m. Xinjiang (Junggar Pendi) [Kazakhstan, Mongolia].

6. Cousinia polycephala Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 54. 1869.

多花刺头菊 duo hua ci tou ju

Arctium polycephalum (Ruprecht) Kuntze.

Herbs to 1 m tall, perennial. Stems erect, branched from middle or apically, unwinged, cobwebby. Leaves leathery, abaxially grayish white and sparsely to thickly felted, adaxially green and sparsely cobwebby. Basal leaves petiolate; leaf blade elliptic-lanceolate, 15–50 × 5–11 cm, pinnatisect; segments triangular, margin with spiny teeth. Lower cauline leaves similar to basal leaves but sessile and smaller. Capitula many, corymbose. Involucre narrowly ellipsoid to cylindric, 6–8 mm in diam., cobwebby. Phyllaries in 3 or 4 rows; outer phyllaries 4–5 mm, apex narrowed into a short spine; middle phyllaries narrowly ovate to narrowly lanceolate, ca. 3 × as long as outer ones, apex narrowed into a long spine; inner phyllaries linear. Corolla yellow. Achene obconic, 4–5 mm, 3- or 4-ribbed, ribs apically prolonged into a tooth. Fl. and fr. Jul–Aug. $2n = 24$.

Rocky slopes in mountains. Xinjiang (W Tian Shan) [Tajikistan].

No material of *Cousinia polycephala* from China was seen by the present authors, and the description here is based on the treatment by Tscherneva (Fl. URSS 27: 206. 1962).

7. Cousinia lasiophylla C. Shih, Bull. Bot. Res., Harbin 4(2): 59. 1984.

丝毛刺头菊 si mao ci tou ju

Herbs to 40 cm tall, biennial. Stems erect, unwinged; branches purplish red, long, striate, sparsely felted to glabrescent. Leaves abaxially grayish green and sparsely cobwebby-felted, adaxially green and sparsely cobwebby. Middle cauline leaves sessile, oblong-elliptic, 9.5–14.5 cm, undivided, margin with 0.5–1.5 mm spines or teeth with curved 2.5–5 mm spines, apex narrowed into a rigid spine. Upper cauline leaves ovate, ovate-lanceolate, or elliptic, 4.5–6 × 3.5–4 cm, margin spiny or with laterally and apically spiny teeth; uppermost leaves oblanceolate, ca. 4 × 1 cm, margin entire and unarmed. Capitula several. Involucre broadly campanulate, 4.5–5 cm in diam., fluffily cobwebby. Phyllaries in ca. 7 rows; outer and middle phyllaries triangular-lanceolate, 2.6–3.2 × 0.5–0.6 cm, leathery, with a medial abaxial ridge, apex with a triquetrous rigid 3–5 mm spine; inner and innermost phyllaries elliptic-lanceolate, linear, or narrowly linear, 2.5–2.8 × 0.1–0.3 cm, rigid, apex scarious and acuminate to acute. Corolla purplish red, ca. 2.2 cm, tube ca. 1 cm. Achene variegated with brown, obovoid, ca. 5 mm. Fl. and fr. Jul.

• Grasslands on mountain slopes; 3000–3200 m. W Xinjiang (Wuqia).

8. Cousinia sclerolepis C. Shih, Bull. Bot. Res., Harbin 4(2): 60. 1984.

硬苞刺头菊 ying bao ci tou ju

Herbs to 30 cm tall, biennial. Stems purplish red, tufted, erect, unbranched, unwinged, densely fluffily cobwebby. Leaves papery, ± concolorous, grayish green, sparsely cobwebby. Basal leaves with petiole ca. 6 cm; leaf blade elliptic, ca. 12 × 6 cm, pinnatifid or pinnatipartite; segments 5 or 6 pairs, broadly ovate, margin with 3–7 unequal teeth with 3–6 mm lateral spines, apical spine to 1 cm. Cauline leaves similar to basal leaves but sessile; upper cauline leaves lanceolate, smaller. Capitulum 1. Involucre broadly campanulate, 4–4.5 cm in diam., fluffily cobwebby. Phyllaries in 6 or 7 rows; outer and middle phyllaries elliptic-subulate to lanceolate-subulate, 1.8–3.3 × 0.3–0.4 cm, rigid, leathery, with a medial abaxial ridge, apex narrowed into a rigid triquetrous spine; inner and innermost phyllaries oblanceolate to broadly linear, ca. 2.3 × 0.2–0.3 cm, rigid, apex scarious, yellowish, and slightly expanded. Corolla purplish red, ca. 2 cm, tube ca. 1.2 cm. Achene pale, obliquely obovoid, ca. 5 mm, darkly striate. Pappus absent. Fl. and fr. Jul.

• Mountain slopes; ca. 3200 m. W Xinjiang (Wuqia).

9. Cousinia caespitosa C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 93. 1887.

丛生刺头菊 cong sheng ci tou ju

Herbs 8–14 cm tall, perennial. Rootstock well developed. Stems many, tufted, unbranched, unwinged, cobwebby. Leaves ± concolorous, grayish white, sparsely cobwebby. Basal leaves with winged petiole 1–2 cm; leaf blade elliptic, 1–2 × 0.8–1.3 cm, pinnatisect; segments 4–6 ± opposite pairs, triangular to triangular-lanceolate, patent at right angle, margin revolute, apical spine 1–2 mm. Cauline leaves few, similar to basal leaves but smaller, sessile. Capitulum 1. Involucre bowl-shaped, 1.5–2 cm in diam., sparsely cobwebby. Phyllaries in ca. 5 rows, abaxially purplish red; outer and middle phyllaries triangular, 5–12 × 1.5–2 mm, apex narrowed into a 1.5–2 mm spine; inner phyllaries broadly linear, ca. 15 × 1 mm, apex acuminate. Corolla purplish red, ca. 1.2 cm, tube ca. 9 mm. Achene brown, ca. 5.5 mm, ribs apically prolonged into a tooth. Fl. and fr. Jul–Sep.

Rocky mountain slopes; ca. 3200 m. W Xinjiang (Wuqia) [Kazakhstan].

10. Cousinia falconeri J. D. Hooker, Fl. Brit. India 3: 360. 1881.

穗花刺头菊 sui hua ci tou ju

Herbs 30–100 cm tall, biennial. Stems grayish white, erect, apically branched, unwinged, felted. Leaves leathery, abaxially grayish white and densely felted, adaxially green to yellowish

green and glabrous. Basal leaves with petiole ca. 3 cm; leaf blade ca. 10 × 5 cm, ± pinnatisect; segments needle-shaped, patent at right angle, margin entire and revolute, midvein thick and abaxially raised, apex narrowed into a yellow rigid 5–10 mm spine. Cauline leaves similar to basal leaves but sessile; upper cauline leaves lanceolate, smaller, semiamplexicaul. Capitula spicate by 4 or 5 near apex of stem and branches. Involucre subglobose, 3–5 cm in diam., densely and fluffily cobwebby Phyllaries in ca. 9 rows, rigid, leathery; outer and middle phyllaries lanceolate, 1.9–2.2 cm × ca. 0.4 mm, apex narrowed into a straight 2–4 mm spine; inner phyllaries narrowly lanceolate, 1.8–2 × ca. 0.3 cm, apex narrowed into a ca. 2.5 mm spine. Corolla purplish red. Mature achene unknown. Fl. Jun.

Slopes, gravelly places in flooded lands; 4100–4400 m. W Xizang [India, Pakistan].

11. Cousinia thomsonii C. B. Clarke, Compos. Ind. 213. 1876.

毛苞刺头菊 mao bao ci tou ju

Herbs 30–80 cm tall, biennial. Rootstock covered with petiole remains. Stems grayish white, erect, apically branched, unwinged, thickly cobwebby-felted. Leaves leathery, abaxially grayish white and thickly felted, adaxially green and glabrous. Basal and lower cauline leaves with a brown winged petiole; leaf blade elliptic to oblanceolate, 12–13 × 3–3.5 cm, pinnatisect; segments 6–11 pairs, needle-shaped to triangular-subulate, patent at right angle, margin entire and revolute, midvein thick and abaxially raised, apex narrowed into a rigid ca. 4 mm spine. Middle cauline leaves sessile, similar to lower ones or lanceolate to elliptic-lanceolate, semiamplexicaul. Capitula many. Involucre subspherical, 3–4 cm in diam., densely and fluffily cobwebby. Phyllaries in ca. 9 rows, rigid, leathery, abaxially purplish red; outer phyllaries triangular, 1.8–2.3 × 0.4–0.5 cm, apex narrowed into a rigid 3–4 mm spine; middle and inner phyllaries lanceolate, ca. 2.3 × 0.2–0.4 cm, apex narrowed into a 1.5–2.5 mm spine. Corolla purple to pink, ca. 1.4 cm, tube ca. 7 mm. Achene brown, obovoid, ca. 5 mm, 1-ribbed on each side. Fl. and fr. Jul–Sep.

Grasslands, gravelly places in flooded lands; 3700–4300 m. S Xizang [India, Nepal, Pakistan].

24. SCHMALHAUSENIA C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 281. 1892.

虎头蓟属 hu tou ji shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial. Leaves bipinnatisect, with spiny lobes. Capitula many, clustered at apex of stem, surrounded by leaflike densely lanate bracts. Involucre campanulate, densely and fluffily lanate. Phyllaries imbricate, apex a long spine. Stamen filaments minutely papillose; anther with short, lacerate basal appendages. Achene obovoid, laterally compressed, with 4–6 ribs each ending in a small tooth, rugose, apex with a denticulate rim. Pappus of ca. 3 rows of bristles, outer ones much shorter than inner.

One species: China, Kazakhstan.

1. Schmalhausenia nidulans (Regel) Petrak, Allg. Bot. Z. Syst. 20: 117. 1914.

虎头蓟 hu tou ji

Cirsium nidulans Regel, Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 160. 1867; *Arctium eriophorum* (Regel & Schmalhausen) Kuntze; *Carduus horridus* (Ruprecht) B. Fedtschenko (1912), not Adams (1805); *Cousinia eriophora* Regel & Schmalhausen; *Jurinea horrida* Ruprecht; *Schmalhausenia eriophora* (Regel & Schmalhausen) C. Winkler.

Herbs to 25 cm tall. Stem solitary, erect, thick, hollow, unbranched, densely and fluffily cobwebby-felted, base covered with petiole remains. Leaves concolorous, grayish white or grayish green, densely and fluffily villous. Basal leaves petiolate; leaf blade elliptic-oblanceolate, 35–40 × 10–14 cm; ultimate lobes lanceolate, apex narrowed into a long spine. Cauline leaves similar but sessile, smaller, sometimes narrowly elliptic. Capitula 5–10. Involucre 2.2–4 cm in diam. Phyllaries in 3 or 4 rows, narrowly lanceolate, apex narrowed into a long subulate spine; outer and middle phyllaries abaxially brown villous. Corolla purple. Achene ca. 5 mm, wrinkled, ribs prolonged into a small tooth. Pappus bristles brown, to 1.3 cm, unequal. Fl. and fr. Jul–Sep.

Meadows; ca. 3600 m. NW Xinjiang [Kazakhstan].

25. ARCTIUM Linnaeus, Sp. Pl. 2: 816. 1753.

牛蒡属 niu bang shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Bardana Hill; *Lappa* Scopoli.

Herbs, biennial [or perennial]. Leaves simple, margin sparsely denticulate to subentire. Capitula many, glabrous or cobwebby, forming a corymbose [or racemose] synflorescence. Phyllaries (except sometimes innermost) narrowed into a slender hooked spine. Stamen filaments papillose; anther with subentire to lacerate basal appendages. Style branches linear. Achene obovoid to narrowly ellipsoid, laterally compressed, rugose, striate or ribbed, apex inconspicuously rimmed. Pappus of ca. 3 rows of bristles, outer ones very short.

Eleven species: N Africa, Asia, Europe; two species in China.

1a. All phyllaries narrowed into a slender hooked spine; involucre minutely glandular pubescent but not cobwebby ..... 1. *A. lappa*
1b. Inner phyllaries apically expanded into a dark purple ± truncate appendage; involucre ± densely cobwebby ..... 2. *A. tomentosum*

1. Arctium lappa Linnaeus, Sp. Pl. 2: 816. 1753.

牛蒡 niu bang

Arctium leiospermum Juzepczuk & Ye. V. Sergievskaja; *A. majus* Bernhardi, nom. illeg. superfl.; *Lappa major* Gaertner, nom. illeg. superfl.; *L. vulgaris* Hill.

Herbs to 2 m tall, biennial. Stem purplish, erect, stout, apically branched, sparsely cobwebby; branches ascending. Leaves abaxially grayish white or pale green and thinly felted, adaxially green, sparsely strigose, and yellow gland-dotted. Basal leaves with petiole ca. 32 cm; leaf blade broadly heart-shaped, ca. 30 × 21 cm, margin entire and repand to mucronulate denticulate. Cauline leaves similar to basal leaves or ovate; uppermost cauline leaves ovate to shallowly cordate, smaller. Capitula few to many, ± corymbose. Involucre ovoid, 1.5–2 cm in diam., glabrous except for minute glandular hairs. Phyllaries all with a hooked apex; outer phyllaries triangular to lanceolate-subulate, ca. 15 × 1 mm; middle and inner phyllaries lanceolate to linear-subulate, ca. 15 × 1.5–3 mm. Corolla purplish red, ca. 1.4 cm, tube ca. 8 mm. Achene pale brown variegated with dark brown or concolorous, narrowly sometimes obliquely obovoid, 5–7 mm, multistriate. Pappus bristles to 3.5 mm. Fl. and fr. Jun–Sep. $2n = 18, 34, 36$.

Near villages, roadsides, near rivers, wet and waste places, forest margins, thickets, valleys, slopes; 700–3500 m. Throughout China except for Hainan, Taiwan, and Xizang [Afghanistan, Bhutan, India, Japan, Nepal, Pakistan; SW Asia, Europe].

Arctium lappa is cultivated almost throughout China. The achenes and roots are used medicinally.

2. Arctium tomentosum Miller, Gard. Dict., ed. 8, *Arctium* no. 3. 1768.

毛头牛蒡 mao tou niu bang

Lappa tomentosa (Miller) Lamarck.

Herbs to 2 m tall, biennial. Stem erect, branched, sparsely cobwebby; branches ascending. Leaves abaxially grayish white and densely felted, adaxially green and glabrous. Basal leaves petiolate; leaf blade heart-shaped, 25–50 × 10–30 cm, margin sparsely denticulate, teeth spinulose or mucronulate, apex acute to obtuse and mucronulate. Cauline leaves similar to basal leaves; uppermost cauline leaves sessile, ovate to ovate-elliptic. Capitula few to many, ± corymbose. Involucre ovoid, 1.5–2 cm in diam., ± densely cobwebby. Outer phyllaries subulate, triangular-subulate, or lanceolate, ca. 6 × 1 mm; middle phyllaries linear-subulate, 10–14 × ca. 2 mm, all with a hooked apex; inner phyllaries lanceolate to linear-lanceolate, apex acuminate. Corolla purplish red, 0.9–1.2 cm, tube 4.5–6 mm. Achene pale brown variegated with dark brown, narrowly obovoid, ca. 5.6 mm, multistriate. Pappus bristles pale brown, ca. 3 mm. Fl. and fr. Jul–Sep.

Grasslands; 1200–2100 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Uzbekistan; Europe].

The above description of Chinese plants does not match typical *Arctium tomentosum*, which, as mentioned in the key, is characterized by inner phyllaries with a dark purple, expanded, truncate apical portion. The identity of the plant in Xinjiang requires confirmation.

3. ONOPORDUM group

大翅蓟群 da chi ji qun

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Capitula homogamous, bisexual. Phyllaries pointed, often ending in a straight or recurved spine. Receptacle densely covered with bristles or naked and alveolate. Florets bisexual. Corolla ± actinomorphic. Stamen filaments distinct, glabrous or papillose. Style branches coherent for most of their length. Achene glabrous; apical rim sometimes inconspicuous but usually forming a low to prominent ± denticulate (rarely entire) crown; apical plate flat or with a conic to rarely cylindric sclerenchymatous non-oleaginous body. Pappus of scabrid, barbellate, or plumose bristles basally connate into a ring, falling off together, rarely with an inner row of narrow scales.

Nine genera and ca. 90 species: N Africa, Asia, Europe; seven genera (one endemic) and 17 species (five endemic) in China.

1a. Receptacle naked and alveolate ..... 31. *Onopordum*
1b. Receptacle covered with bristles.
2a. Outer pappus of filiform bristles and inner pappus of narrow scales ending in a barbellate subulate tip ..... 30. *Syreitschikovia*
2b. Pappus (when present) of bristles only.
3a. Pappus bristles plumose ..... 32. *Ancathia*
3b. Pappus bristles scabrid or barbellate.
4a. Corolla yellow.
5a. Plants stemless; capitula basal, shortly pedunculate, in center of leaf rosette ..... 29. *Xanthopappus*
5b. Plants caulescent; capitula terminal on stem and branches ..... 27. *Alfredia*
4b. Corolla purple, red, blue, or rarely white.
6a. Basal and lower cauline leaves heart-shaped to triangular-sagittate, undivided ..... 26. *Synurus*
6b. Basal and lower cauline leaves linear to elliptic, ± deeply pinnately divided ..... 28. *Olgaea*

26. SYNURUS Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada S.S.S.R. 6: 35. 1926.

山牛蒡属 shan niu bang shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial. Leaves heart-shaped to triangular-sagittate, undivided or sometimes pinnately divided, margin toothed or merely spinulose denticulate. Capitula large, nodding. Involucre globose. Phyllaries imbricate, lanceolate to linear-lanceolate, rigid, apex long acuminate. Receptacle with long bristles. Corolla purple. Stamen filaments glabrous; anther with long, strongly lacerate basal appendages laterally fused into a tubular sheath enclosing distal part of filament. Style branches short. Achene obovoid, laterally compressed, longitudinally striate but otherwise smooth; apical rim forming a crenulate crown; apical plate with a low central pyramidal non-oleaginous body crowned by a cupular disk. Pappus of 3 or 4 rows of scabrid bristles, outer ones less than 1/2 as long as inner ones.

One species: China, Japan, Korea, Mongolia, Russia.

1. Synurus deltoides (Aiton) Nakai in Tozawa & Nakai, Kôryô Sikenrin Ippan, 64. 1932.

山牛蒡 shan niu bang

Onopordum deltoides Aiton, Hort. Kew. 3: 146. 1789; *Carduus atriplicifolius* Fischer ex Hornemann; *Centaurea atriplicifolia* (Fischer ex Hornemann) Matsumura; *Cirsium ficifolium* Fischer; *Rhaponticum atriplicifolium* (Fischer ex Hornemann) Candolle; *Serratula atriplicifolia* (Fischer ex Hornemann) Schultz Bipontinus; *S. atriplicifolia* var. *excelsa* Makino; *S. deltoides* (Aiton) Makino; *S. deltoides* var. *palmatopinnatifida* Makino; *S. pungens* Franchet & Savatier (1878), not Poiret (1805); *Synurus atriplicifolius* (Fischer ex Hornemann) Iljin; *S. excelsus* (Makino) Kitamura; *S. hondae* Kitagawa; *S. palmatopinnatifidus* (Makino) Kitamura; *S. pungens* Kitamura; *S. pungens* var. *giganteus* Kitamura.

Herbs 0.7–1.5 m tall. Rootstock stout. Stem solitary, stout, erect, ribbed, branched or unbranched, basally densely felted to glabrescent or glabrous. Leaves abaxially grayish white and densely felted, adaxially green, asperous, and setulose. Basal and lower cauline leaves with narrowly winged petiole to 34 cm; leaf blade cordate, ovate, broadly ovate, ovate-triangular, or hastate, 10–26 × 12–20 cm, base cordate, sagittate, or truncate. Upper cauline leaves gradually smaller upward, sessile or shortly petiolate, ovate, elliptic, or elliptic-lanceolate, margin toothed to spiny. Capitula several. Involucre 3–6 cm in diam., densely and fluffily cobwebby to glabrous. Phyllaries in 13–15 rows; outer and middle phyllaries lanceolate, 7–23 × 3–4 mm, patent to reflexed; inner phyllaries longest, linear-lanceolate, 2.3–2.5 × ca. 0.2 cm, sometimes purple. Corolla ca. 2.5 cm, tube ca. 9 mm. Achene brown, narrowly ellipsoid, ca. 7 mm, apex truncate. Pappus bristles brown, 1.5–2 cm. Fl. and fr. Jun–Oct. $2n = 26$.

Forest margins, forests, meadows; 500–2200 m. Anhui, Chongqing, S Gansu, Hebei, Heilongjiang, Henan, Hubei, N Hunan, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, E Shandong, S Shanxi, NE Yunnan, Zhejiang [Japan, Korea, Mongolia, Russia].

27. ALFREDIA Cassini in F. Cuvier, Dict. Sci. Nat. 1(Suppl.): 115. 1816.

翅膜菊属 chi mo ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial, caulescent. Stem solitary, erect, sulcate, unwinged. Leaves subentire to pinnatipartite, with spiny or spinulose teeth or segments. Capitula large, few (sometimes only 1), terminal on stem and branches. Involucre campanulate. Phyllaries numerous, abaxially with appressed tortuous blackish hairs and often white cobwebby, with membranous wings or appendage. Receptacle flat, with dense long bristles. Corolla yellow [or purple]. Stamen filaments glabrous or papillose; anther tails long, subentire to lacerate. Style branches short, apex rounded. Achene narrowly obovoid to narrowly ellipsoid, laterally compressed, often with 12–20 thin inconspicuous ribs, otherwise smooth; apical rim forming a low crown; apical plate with a central pyramidal body of sclerenchyma crowned by a stout disk. Pappus of 3–5 rows of barbellate bristles, outer ones ca. 1/2 as long as inner ones, inner ones gradually wider and flattened.

Six species: C Asia; five species (two endemic) in China.

1a. Outer and middle phyllaries distally with a scarious denticulate to lacerate appendage, apically narrowed into a 1–4 mm spine.
  2a. Leaves papery, undivided ..... 4. *A. cernua*
  2b. Leaves leathery, pinnately divided ..... 5. *A. fetissowii*
1b. Outer and middle phyllaries laterally expanded into membranous fimbriate-lacerate wings, apically narrowed into a ca. 10 mm spine.
  3a. Leaves leathery, with slender 5–10 mm spines ..... 1. *A. nivea*
  3b. Leaves papery, with 1–4 mm spinules.
    4a. Basal and lower cauline leaves pinnately divided, terminal lobe cuneate at base; capitula nodding ..... 2. *A. aspera*
    4b. Basal and lower cauline leaves with lobed petiole and large undivided blade truncate to cordate at base; capitula erect ..... 3. *A. acantholepis*

1. Alfredia nivea Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 395. 1842.

厚叶翅膜菊 hou ye chi mo ju

Alfredia suaveolens Ruprecht; *Arctium niveum* (Karelin & Kirilov) Kuntze; *Carduus karelinii* B. Fedtschenko; *Cousinia trautvetteri* Regel.

Herbs 35–60 cm tall. Stem purplish red, unbranched or with 1 branch, stout, many ribbed, sparsely cobwebby-felted. Leaves leathery, abaxially grayish white and densely thickly felted, adaxially green and ± glabrous, margin with teeth ending in straw-colored needle-shaped 5–10 mm spines. Basal and lower cauline leaves with winged petiole; leaf blade elliptic to elliptic-lanceolate, 15–30 × 4–7 cm, pinnately lobed or subpinnatifid; segments 6–8 pairs, elliptic to semiorbicular, margin toothed, terminal segment triangular. Middle cauline leaves similar but sessile or with a short winged petiole; uppermost cauline leaves lanceolate to linear-lanceolate, to 8 × 1 cm, margin with sparse spinulose teeth. Capitula 1 or 2, nodding. Involucre 5–6 cm in diam. Outer and middle phyllaries 2.5–3 cm, middle portion laterally expanded into scarious fimbriate-lacerate wings, apex narrowed into a ca. 1 cm spine; innermost phyllaries linear to linear-lanceolate, to 3 cm, rigid, scarious, margin entire, apex acuminate. Corolla yellow, ca. 2.2 cm, tube ca. 7 mm. Achene pale yellowish white variegated with brown, narrowly ellipsoid, ca. 6 mm, inconspicuously multistriate. Pappus bristles to 2 cm, fragile. Fl. and fr. Jul–Sep.

Grasslands in river valleys, trailsides, *Picea* forests; 1400–2400 m. Xinjiang (Borohoro Shan, Tarbagatay Shan, Tian Shan) [Kazakhstan].

2. Alfredia aspera C. Shih, Acta Phytotax. Sin. 22: 454. 1984.

糙毛翅膜菊 cao mao chi mo ju

Herbs to 72 cm tall. Stem purplish red, apically once branched, ribbed, sparsely floccose. Leaves papery, abaxially grayish white and densely thickly felted, adaxially green, asperulous, and strigose, margin ciliate with yellowish 1–4 mm spinules. Basal and lower cauline leaves with winged petiole 7–15 cm; leaf blade elliptic, 18–24 × 8–10 cm, pinnatipartite; segments 5 or 6 pairs, elliptic or obliquely triangular to obovate, terminal segment largest, base cuneate. Middle cauline leaves similar but sessile; uppermost cauline leaves undivided, narrowly elliptic to lanceolate, semiamplexicaul. Capitula 2, nodding. Involucre ca. 5 cm in diam. Outer and middle phyllaries ovate-lanceolate to needle-shaped, 1.5–1.8 × 0.5–0.7 cm, middle portion laterally expanded into scarious fimbriate-lacerate wings, apex narrowed into a ca. 1 cm spine; inner phyllaries lanceolate, ca. 2.5 × 0.5 cm, rigid, distally with a small scarious lacerate appendage narrowed into a short spine. Corolla yellow, ca. 2.2 cm, tube ca. 7 mm. Mature achene unknown. Pappus bristles brown, to 1.8 cm. Fl. Jul–Sep.

● Open places in forests; 1700–3100 m. Xinjiang (Tian Shan).

3. Alfredia acantholepis Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 394. 1842.

薄叶翅膜菊 bao ye chi mo ju

Alfredia karelinii Ledebour, nom. illeg. superfl.; *A. tianschanica* Ruprecht; *Carduus tianschanicus* (Ruprecht) B. Fedtschenko.

Herbs 40–120 cm tall. Stem purplish red, stout, unbranched or rarely with 1 branch, with sparse appressed long white hairs. Leaves papery, abaxially grayish white and thickly felted, adaxially green, asperulous, and strigose, margin densely ciliate with 1–2 mm spinules. Basal and lower cauline leaves petiolate; petiole 8–10 cm, winged, distally lobed, lobes in 2 or 3 pairs, elliptic to ovate, and small; leaf blade otherwise undivided, ovate, 11–13 × 5–8 cm, base cordate to truncate. Middle cauline leaves similar but sessile; upper cauline leaves narrowly ovate, small, semiamplexicaul. Capitula 1 or 2, erect. Involucre broadly campanulate, 4–6 cm in diam. Outer and middle phyllaries lanceolate to needle-shaped, 1.2–2.4 × 0.3–0.5 cm, middle portion laterally expanded into scarious fimbriate-lacerate wings, apex narrowed into a ca. 1 cm spine; inner phyllaries linear-lanceolate, ca. 3 × 0.3 cm, rigid, scarious, margin sometimes expanded into small fimbriate-lacerate scarious wings. Corolla yellow, ca. 2.2 cm, tube ca. 8 mm. Achene cream-colored variegated with brown, obliquely narrowly obovoid, ca. 7 mm, compressed, inconspicuously multistriate. Pappus bristles to 2 cm, fragile. Fl. and fr. Jul–Oct.

Meadows, steppes, open forests, moist places; 1600–3300 m. Xinjiang (Tian Shan) [Kazakhstan].

4. Alfredia cernua (Linnaeus) Cassini in F. Cuvier, Dict. Sci. Nat. 1(Suppl.): 115. 1816.

翅膜菊 chi mo ju

Cnicus cernuus Linnaeus, Sp. Pl. 2: 826. 1753; *Alfredia stenolepis* Karelin & Kirilov; *Carduus cernuus* (Linnaeus) Steudel; *Silybum cernuum* (Linnaeus) Gaertner; *S. squarrosum* Tausch.

Herbs 1–3 m tall. Stem purplish red, apically long branched, sparsely cobwebby. Leaves papery, abaxially grayish white and densely felted, adaxially green and sparsely strigillose, margin spinulose denticulate. Basal and lower cauline leaves petiolate; petiole long, spinulose, winged, base auriculate and semiamplexicaul; leaf blade undivided, ovate to heart-shaped, 25–50 × 15–30 cm. Middle cauline leaves similar but shortly petiolate or sessile, cordate amplexicaul; upper cauline leaves sessile, smaller. Capitula several, nodding. Involucre 4–5 cm in diam. Outer and middle phyllaries lanceolate to oblanceolate, 8–20 × 3–4 mm, distally with a roundish scarious denticulate appendage apically narrowed into a 1–5 mm spine; inner phyllaries oblanceolate, ca. 3 × 0.3 cm, with a small scarious entire to ± lacerate usually blunt apical appendage. Corolla yellow, ca. 1.6 cm, tube ca. 6 mm. Achene brown, narrowly ovoid to obovoid, ca. 5.5 mm, multistriate. Pappus bristles to 1.5 cm, fragile. Fl. and fr. Jul–Sep. $2n = 26$.

Sunny slopes in forests, wet grasslands, rocky crevices; 1400–2000 m. Xinjiang (Altay Shan) [Kazakhstan, Russia].

5. Alfredia fetissowii Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 4: 38. 1923.

长叶翅膜菊 chang ye chi mo ju

Herbs to 1 m tall. Stem purplish red, sparsely cobwebby.

Leaves leathery, abaxially grayish white and densely felted, adaxially green and glabrous, margin with acicular spines to 5 mm. Lower cauline leaves with petiole 7–14 cm; leaf blade elliptic, 17–30 × 4–8 cm, pinnately divided; segments 4–6 pairs, elliptic to ovate. Middle and upper leaves similar but sessile, sometimes lanceolate to oblanceolate. Capitula 1 or 2, nodding. Involucre 5–7 cm in diam. Outer and middle phyllaries lanceolate to broadly linear, 0.8–3 × 0.2–0.4 cm, distally expanded into a scarious lacerate appendage apically narrowed into a 1–1.5 mm spine; inner phyllaries linear, ca. 3 × 0.3 cm, lacking an appendage. Corolla yellow, ca. 2.7 cm, tube ca. 9 mm. Achene brown, narrowly obovoid, ca. 5 mm, multistriate and with numerous ribs. Pappus bristles to 2.8 cm, serrulate. Fl. and fr. Jul–Aug.

• Mountain slopes, ravines; 2100–2800 m. Xinjiang (Tian Shan).

28. OLGAEA Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 141. 1922.

蝟菊属 wei ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Takeikadzuchia Kitagawa & Kitamura.

Herbs, perennial. Leaves linear to elliptic, pinnately divided, with spiny teeth or segments. Capitula few to many, solitary or glomerate. Involucre campanulate, semiglobose, or ovoid. Phyllaries rigid, leathery, straight or apically recurved. Receptacle flat, with dense long bristles. Corolla purple to blue. Stamen filaments glabrous or subglabrous; anther with long ± entire basal appendages. Style branches slender, apex obtuse to rounded. Achene narrowly ellipsoid to obovoid, laterally compressed, often with 12–15 ribs but otherwise smooth; apical rim forming a crenulate crown; apical plate with central pyramidal body of sclerenchyma crowned by a stout disk. Pappus bristles 3–5 rows, barbellate, outer ones somewhat shorter than inner.

About 16 species: mostly in C Asia; six species (two endemic) in China.

1a. Stem winged.
2a. Basal leaves papery and soft in texture, with elliptic to ovate segments; involucre sparsely cobwebby ..... 1. *O. lomonossowii*
2b. Basal leaves ± leathery, with triangular segments or teeth; involucre glabrous or subglabrous.
3a. Leaves subconcolorous, adaxially ± densely cobwebby; basal leaves ± narrowly elliptic, 3–5 cm wide; leaves and stem wings parchmentlike; phyllaries 2–3 mm wide ..... 2. *O. leucophylla*
3b. Leaves strongly discolorous, adaxially green and glabrous; basal leaves ± broadly linear, ca. 3 cm wide; leaves and stem wings leathery; phyllaries 1–1.5 mm wide ..... 3. *O. tangutica*
1b. Stem unwinged.
4a. Capitula solitary at end of stem and branches; involucre sparsely cobwebby ..... 4. *O. pectinata*
4b. Capitula clustered at end of unbranched stem; involucre densely lanate.
5a. Involucre 2.5–3.5 cm in diam.; outer and middle phyllaries with a 1–1.5 cm pungent apical spine; small capitula usually present in leaf axils below main capitula cluster ..... 5. *O. roborowskyi*
5b. Involucre ca. 4.5 cm in diam.; outer and middle phyllaries apically with a short weak spine; small capitula not present in leaf axils below main capitula cluster ..... 6. *O. laniceps*

1. Olgaea lomonossowii (Trautvetter) Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 144. 1922.

蝟菊 wei ju

Carduus lomonossowii Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 1: 183. 1872; *C. hsiaowutaishanensis* F. H. Chen; *C. sinensis* S. Moore; *Olgaea hsiaowutaishanensis* (F. H. Chen) Y. Ling; *O. sinensis* (S. Moore) Iljin; *Serratula diabolica* Kitamura; *Synurus diabolicus* (Kitamura) Kitamura; *Takeikadzuchia lomonossowii* (Trautvetter) Kitagawa & Kitamura.

Herbs 15–60 cm tall. Stem solitary, grayish white, erect, usually branched from near base, rarely unbranched, densely and thickly felted, eventually glabrescent, base covered with petiole remains; wings 1–2 mm wide, margin entire and spinulose. Leaves papery, strongly discolorous, abaxially grayish white and thickly felted, adaxially green and glabrous. Basal leaves with brown petiole; leaf blade elliptic, 8–20 × 4–7 cm, pinnately lobed or pinnatipartite; segments 4–7 pairs, elliptic, ± narrowly ovate, or ovate-lanceolate, margin and apex with 0.5–2 mm spines; terminal segment ± narrowly ovate or lanceolate. Lower cauline leaves similar but sessile; upper cauline leaves gradually smaller upward, ± narrowly elliptic, lanceolate, or narrowly triangular, less divided to entire. Capitula (1 or) few to many. Involucre campanulate to hemispheric, 5–7 cm in diam., sparsely cobwebby. Phyllaries narrowed into long spines; outer and middle phyllaries linear-triangular, 8–24 × 1–2 mm; inner phyllaries similar but longer, ca. 3.5 × 0.2 cm. Corolla purple, ca. 3 cm, tube ca. 1.2 cm. Achene cuneate-obovoid, ca. 6 mm, with a repand apical rim. Pappus bristles brown, to 2 cm, slender. Fl. and fr. Jul–Oct.

Valleys, slopes, sandy areas, riverbeds; 800–2300 m. C Gansu, Hebei, N Jilin, Nei Mongol, N Ningxia, Shaanxi, Shanxi [Mongolia].

2. Olgaea leucophylla (Turczaninow) Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 145. 1922.

火媒草 huo mei cao

Carduus leucophyllus Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 194. 1832; *Olgaea leucophylla* var. *aggregata* Y. Ling; *O. leucophylla* var. *albiflora* Y. B. Chang; *O. leucophylla* var. *jucunda* Iljin.

Herbs 15–80 cm tall. Stems grayish white, erect, branched from base or unbranched, stout, densely cobwebby-felted; wings wide, parchmentlike, spiny, toothed, or lobed. Leaves grayish white, subconcolorous, abaxially cobwebby-felted, adaxially ± densely cobwebby. Basal leaves with thick densely felted petiole; leaf blade ± narrowly elliptic, 12–20 × 3–5 cm, parchmentlike, shallowly pinnately lobed or toothed; segments or teeth 7–10 pairs, triangular to semiorbicular, with lateral spines and a brown to yellowish 5–6(–10) mm apical spine. Middle cauline leaves similar or elliptic to elliptic-lanceolate, sometimes undivided; upper cauline leaves elliptic, lanceolate, or narrowly triangular, smaller. Capitula few to many. Involucre campanulate, 3–4 cm in diam., glabrous or subglabrous. Phyllaries distally narrowed into a spine; outer phyllaries triangular, 10–15 × 2.5–3 mm, recurved; middle phyllaries lanceolate to elliptic-lanceolate, 1.8–2.5 × ca. 0.3 cm; inner phyllaries linear-elliptic to broadly linear, 3.2–3.6 × ca. 0.2 cm. Corolla purple or white, ca. 3.3 cm, tube ca. 8 mm. Achene yellowish variegated with brown, narrowly ellipsoid, ca. 1 cm, 10-ribbed. Pappus bristles pale brown, to 2.5 cm. Fl. and fr. May–Oct.

Grasslands, farmlands, by ditches; 700–1800 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Nei Mongol, Ningxia, N Shaanxi, Shanxi [Mongolia].

3. Olgaea tangutica Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 144. 1922.

刺疙瘩 ci ge da

Olgaea echinantha Y. Ling.

Herbs 20–100 cm tall. Stems solitary or up to 3, erect, usually long branched, sparsely cobwebby, base covered with petiole remains; wings wide, leathery, unequally spiny toothed. Leaves leathery, discolorous, abaxially grayish white and densely thickly felted, adaxially green and glabrous. Basal leaves with a brown fibrous basally thickened petiole; leaf blade ± broadly linear, ca. 33 × 3 cm, pinnately lobed or pinnatipartite; segments ca. 10 pairs, triangular, with 2 or 3 unequal teeth each with 2 or 3 lateral spines and a brown to yellowish 3–4 mm apical spine. Cauline leaves similar but sometimes undivided, narrowly triangular, smaller, with spiny teeth. Capitula several, in a lax corymb. Involucre campanulate, 3–4 cm in diam., glabrous. Outer phyllaries triangular, 5–10 × 1–1.5 mm, apex recurved to patent and spiniform; middle phyllaries lanceolate to linear-lanceolate, 10–17 × 1–1.5 mm, apex similar to outer ones; inner phyllaries linear, ca. 2.3 × 0.1 cm, apex narrowed into a long spine. Corolla purple to bluish purple, ca. 2.7 cm, tube ca. 1.7 cm. Achene pale yellowish variegated with brown, long cuneate-ellipsoid, ca. 6 mm. Pappus bristles brown to pale brick colored, to 1.5 cm. Fl. and fr. Jun–Sep.

• Slopes, thickets in valleys, farmlands, flooded lands, wastelands; 1200–2000 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi.

4. Olgaea pectinata Iljin, Izv. Glavn. Bot. Sada R.S.F.S.R. 23: 146. 1924.

新疆蝟菊 xin jiang wei ju

Herbs 30–70 cm tall. Stem solitary, grayish white, erect, apically branched, unwinged, densely lanate. Leaves leathery, discolorous, abaxially grayish white and densely felted, adaxially green and glabrous. Basal and lower cauline leaves with a spinose or unarmed petiole; leaf blade elliptic, 10–15 × 3–3.5 cm, pinnately lobed or pinnatipartite; segments numerous pairs, ovate-triangular, 3–5-toothed, each tooth with basal ca. 1.5 mm spines and a 3–3.5 mm apical spine. Middle and upper cauline leaves similar but shortly petiolate or sessile and smaller; uppermost cauline leaves smallest, elliptic to lanceolate, pectinately spiny. Capitula several, solitary at end of stem and branches. Involucre broadly campanulate, ca. 5 cm in diam., sparsely cobwebby. Outer phyllaries elliptic to lanceolate, 2–2.5 × 0.5–1 cm, middle portion of margin spinulose to spiny toothed, apex with a 2–5 mm spine; middle phyllaries lanceolate-subulate to elliptic-subulate, 2–3 × ca. 0.3 cm, apex acuminate-subulate; inner phyllaries linear-lanceolate, 2–3 × ca. 0.2 cm, apex acuminate. Corolla pale purple, ca. 2.6 cm, tube ca. 9 mm. Achene (immature) ca. 6 mm. Pappus bristles yellowish to dirty white, to 2.5 cm. Fl. Jul–Sep.

Rocky mountain slopes; ca. 2900 m. W Xinjiang (Wuqia) [Kazakhstan].

5. Olgaea roborowskyi Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 142. 1922.

假九眼菊 jia jiu yan ju

Herbs 20–25 cm tall. Stem solitary, grayish white, erect, unbranched, unwinged, lanate. Leaves leathery, discolorous, abaxially grayish white and thickly lanate, adaxially green, glabrous, and shiny. Middle cauline leaves sessile, elliptic, 10–20 × 2.5–4 cm, pinnatifid or pinnatipartite; segments 7–10 pairs, broadly ovate to broadly triangular, with 3–5 teeth tipped with 3–10 mm spines; upper cauline leaves toothed, with unequal triangular spine-tipped and pectinately spiny teeth. Capitula 3–8, clustered at end of stem; small capitula usually present in leaf axils below main cluster. Involucre ovoid to campanulate, 2.5–3.5 cm in diam., densely lanate. Outer phyllaries lanceolate-subulate, ca. 2 × 0.3 cm, apex narrowed into a pungent ca. 1.1 cm spine; middle phyllaries ± narrowly elliptic to linear-subulate, 2.5–3 × 0.2–0.3 cm, with a 1.2–1.5 cm apical spine; inner phyllaries lanceolate to linear-lanceolate, 2.5–3 × 0.1–0.3 cm, apex acuminate and softly spiny. Corolla purple, ca. 2.2 cm, tube ca. 1.4 cm. Achene gray and dark variegated, long cuneate-ellipsoid, ca. 7 mm. Pappus bristles brownish, to 2 cm. Fl. and fr. Jul.

• Rocky mountain slopes; 2700–2800 m. W Xinjiang (Wuqia).

6. Olgaea laniceps (C. Winkler) Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 143. 1922.

九眼菊 jiu yan ju

Carduus laniceps C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 519. 1886.

Herbs to 40 cm tall. Stem solitary, erect, unbranched, unwinged, densely lanate. Leaves leathery, discolorous, abaxially grayish white and densely cobwebby-felted, adaxially green, glabrous, and shiny. Basal leaves with spiny petiole ca. 5

cm; leaf blade linear-elliptic to lanceolate-elliptic, 10–20 × 3.5–5.5 cm, pinnately lobed or pinnatipartite; segments 9–11 pairs, semiorbicular to broadly triangular, with marginal spinules of to 1 mm and 3–5 teeth with a yellowish 4–6 mm apical spine. Middle and upper cauline leaves similar but shortly petiolate or sessile. Capitula 5–9, clustered at end of stem, without small capitula present in leaf axils below main cluster. Involucre broadly campanulate, ca. 4.5 cm in diam., densely lanate; outer and middle phyllaries lanceolate-subulate, ca. 2 cm × 3.5 mm, apex narrowed into a short weak spine; inner phyllaries ± broadly linear, 2.5–3 × ca. 0.2 cm, apex acuminate. Corolla purplish red, ca. 2.9 cm, tube ca. 1.2 cm. Achene obconic, 6–7 mm. Pappus bristles yellowish, to 2.5 cm. Fl. and fr. Jul–Aug.

River valleys, gravelly places along rivers; 1800–2100 m. Xinjiang (Tian Shan) [Kazakhstan].

29. XANTHOPAPPUS C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 10. 1893.

黄缨菊属 huang ying ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial, stemless. Leaves all basal, rosulate, pinnatipartite, with spiny lobes. Capitula basal, large, shortly pedunculate, clustered in center of leaf rosette. Phyllaries ending in a straight or ± falcate keeled spine. Receptacle concave, covered with bristles. Corolla yellow. Stamen filaments glabrous; anther with long, subentire basal appendages. Style branches short, apex truncate. Achene (immature) narrowly obovoid, inconspicuously striate but otherwise smooth; apical rim forming an entire conspicuous crown; apical plate with shortly cylindric cup-shaped disk surmounted by a cylindric hardened style base. Pappus of ca. 5 rows of scabrid bristles of almost equal length.

• One species: China.

1. Xanthopappus subacaulis C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 11. 1893.

黄缨菊 huang ying ju

Carduus euosmus Forrest; *Xanthopappus multicephalus* Y. Ling.

Rootstock very short, with dense fibrous remains of old petioles. Leaves with a spiny rigid 2–10 cm petiole; leaf blade ± narrowly elliptic, 20–30 × 5–8 cm, abaxially grayish white and thickly cobwebby-felted, adaxially green and glabrous, midvein abaxially raised; segments 8–12 pairs, narrowly elliptic to ovate-triangular, with triangular teeth or toothed lobes, margin with patent spinules, apex of segments, lobes, and teeth with a rigid yellow spine. Capitula to 20. Involucre broadly campanulate, ca. 6 cm in diam. Phyllaries in 8 or 9 rows, rigid, abaxially scabrid; outer phyllaries lanceolate, 2–2.5 × 0.3–0.4 cm, leathery; middle phyllaries ± narrowly lanceolate, 3–3.5 × 0.4–0.5 cm, leathery; inner phyllaries ± broadly linear, 3.5–4 × 0.3–0.4 cm, scarious. Corolla yellow, ca. 3.5 cm. Achene (immature) ca. 7 mm. Pappus bristles yellowish, 2.5–3.5 cm, brittle. Fl. and fr. Jul–Sep.

• Meadows, steppes, dry slopes; 2400–4000 m. Gansu, W Nei Mongol, Ningxia, Qinghai, Sichuan, NW Yunnan.

30. SYREITSCHIKOVIA Pavlov, Repert. Spec. Nov. Regni Veg. 31: 192. 1933.

疆菊属 jiang ju shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial, caespitose. Leaves linear to linear-lanceolate, margin ± spinulose near base. Capitulum small, solitary, upright, pedunculate. Involucre cylindric to campanulate. Phyllaries imbricate, ending in a patent to reflexed but not hooked spine. Receptacle covered with bristles. Stamen filaments glabrous; anther with setaceous bifid basal appendages. Style branches short. Achene narrowly oblong, laterally compressed, longitudinally striate but otherwise smooth; apical rim forming a membranous toothed crown; apical plate with central cylindric body crowned by a disk. Pappus elements in 2 dissimilar series, outer of thin scabrid bristles, inner of narrowly lanceolate scales ending in a barbellate subulate tip.

Two species: C Asia; one species in China.

1. Syreitschikovia tenuifolia (Bongard) Pavlov, Repert. Spec. Nov. Regni Veg. 31: 192. 1933.

疆菊 jiang ju

Serratula tenuifolia Bongard, Bull. Sci. Acad. Imp. Sci. Saint-Pétersbourg 8: 340. 1841; *Jurinea tenuis* Bunge.

Herbs 15–50 cm tall. Rootstock branched, densely covered with dark scales. Stems erect, unbranched, slender, unwinged, cobwebby to glabrescent. Leaves sessile, linear to linear-lanceolate, 3–20 × 0.4–0.7 cm, soft, abaxially grayish white and densely thickly felted, adaxially green and glabrous, base narrowed, apex acuminate to acute. Involucre 0.8–1.2 cm in diam., glabrous or subglabrous. Phyllaries in 6 or 7 rows; outer phyllaries broadly triangular to ovate, 3–3.5 × ca. 2 mm, apical spine ca. 0.5 mm; middle and inner phyllaries ovate, elliptic, or broadly linear, 6–11 × 1–1.5 mm, apical spine 1–2 mm. Corolla blue to purplish red, ca. 1.3 cm, tube ca. 6 mm. Achene ellipsoid, 6–7 mm, with toothed apical rim. Pappus scales of inner row 0.8–1.2 cm, longer than outer row. Fl. and fr. Jun–Jul.

Grasslands on rocky mountain slopes; 1200–1700 m. Xinjiang (Tian Shan) [Kazakhstan].

31. ONOPORDUM Linnaeus, Sp. Pl. 2: 827. 1753.

大翅蓟属 da chi ji shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Acanos Adanson.

Herbs, biennial. Stems erect, with spiny wings. Leaves toothed or pinnately lobed, spiny. Capitula single or few. Phyllaries numerous, imbricate, apex erect to reflexed but not hooked. Receptacle naked, alveolate. Stamen filaments papillose; anther with short entire to lacerate basal appendages. Style branches long. Achene obovoid, laterally compressed, with 3–5 ribs ending in inconspicuous apical rim; apical plate flat, disk not protruding. Pappus of 1 or several rows of scabrid or plumose bristles of unequal length.

About 40 species: C and SW Asia, Europe; two species in China.

1a. Pappus bristles scabrid; outer and middle phyllaries with divaricate to reflexed apex ..... 1. *O. acanthium*
1b. Pappus bristles plumose; phyllaries straight ..... 2. *O. leptolepis*

1. Onopordum acanthium Linnaeus, Sp. Pl. 2: 827. 1753.

大翅蓟 da chi ji

Acanos spina Scopoli, nom. illeg. superfl.

Herbs to 2 m tall. Stem erect, usually branched above, stout, glabrous or cobwebby; wings 2–5 cm wide, with triangular spiny lobes or teeth; spines yellowish brown, to 5 mm. Leaves glabrous or sparsely cobwebby to densely lanate. Basal leaves elliptic to broadly ovate, 10–30 × 4–15 cm, pinnately lobed or with unequal triangular teeth, teeth and lobes ending in yellowish brown spines. Middle and upper cauline leaves sessile, narrowly elliptic to oblanceolate, gradually smaller upward. Capitula solitary. Involucre globose to ovoid, ca. 5 cm in diam., cobwebby, glabrescent. Phyllaries abaxially gland-dotted, margin ciliate; outer and middle phyllaries ovate-subulate to lanceolate-subulate, 1.7–1.8 × 0.4–0.5 cm, leathery, apex narrowed into a pungent divaricate to reflexed spine; inner phyllaries lanceolate to linear, 2–3 × ca. 0.3 cm, straight, apex acuminate-subulate. Corolla purplish red to pink, ca. 2.4 cm, tube ca. 1.2 cm. Achene grayish black to gray, obovoid to narrowly ellipsoid, ca. 6 mm, 3-ribbed, transversely wrinkled, apical rim not prominent. Pappus bristles reddish, to 1.2 cm, scabrid. Fl. and fr. Jun–Sep. $2n = 34$.

Mountain slopes, wastelands, by ditches; 400–1200 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

2. Onopordum leptolepis Candolle, Prodr. 6: 619. 1838.

羽冠大翅蓟 yu guan da chi ji

Herbs 30–40 cm tall. Stem erect, unbranched or with few branches, densely lanate; wings broad, undulate, densely lanate, with yellow spines. Leaves densely lanate. Lower cauline leaves sessile, ± narrowly elliptic, 30–40 cm, pinnately lobed; lobes ovate, margin undulate, with spiny teeth. Upper cauline leaves gradually smaller upward, lobed or toothed; teeth and lobes apically with yellow spines. Capitula solitary. Involucre globose to subglobose, 4–6 cm in diam., lanate pubescent. Outer and middle phyllaries lanceolate, straight, apex accumbent to involucre and narrowed into a slender spine; innermost phyllaries 3–3.5 × ca. 0.2 cm, narrowed into a scarious 1.2–1.5 cm acumen. Achene brown to grayish brown, tetragonous, ca. 6 mm, 4-ribbed, wrinkled along edges, apical rim scarious. Pappus bristles to 2.5 cm, plumose, a single inner one more robust than others and ca. 3 cm. Fl. and fr. May–Jun. $2n = 34$.

Mountainous regions. Xinjiang [Kazakhstan].

No material of *Onopordum leptolepis* from China was seen by the present authors. The above description is taken from the treatment by Pavlov (Fl. Kazakhst. 9: 348–350. 1966).

32. ANCATHIA Candolle, Arch. Bot. (Paris) 2: 331. 1833.

肋果蓟属 lei guo ji shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial. Stems usually unbranched, unwinged. Cauline leaves undivided, linear-lanceolate or linear, margin entire and revolute between spaced, paired, or digitate spines. Capitula 1 or 2, erect. Involucre campanulate. Phyllaries numerous, imbricate, with reflexed to patent but not with an uncinate apical spine. Receptacle with dense long bristles. Stamen filaments glabrous; anther with long lacerate basal appendages. Style branches coherent, short, apex obtuse. Achene narrowly ellipsoid, laterally compressed, with ca. 15 raised contiguous wavily interlocking ribs, glabrous; apical rim forming a high crenulate crown; center of apical plate broadly conic, crowned by a cup-shaped disk. Pappus of 4 or 5 rows of plumose bristles; bristles basally connate into a ring, falling off together, outer not much shorter than inner.

One species: China, Kazakhstan, Mongolia, Russia.

1. Ancathia igniaria (Sprengel) Candolle, Arch. Bot. (Paris) 2: 331. 1833.

肋果蓟 lei guo ji

Cirsium igniarium Sprengel, Syst. Veg., ed. 16, 3: 375. 1826; *Cnicus igniarius* (Sprengel) Bentham.

Herbs 15–20 cm tall, rhizomatous. Rootstock stout,

branched. Stems densely felted. Basal leaves absent at anthesis. Cauline leaves numerous, sessile, 10–20 × 0.5–1 cm, leathery, abaxially grayish white and densely felted, adaxially glabrous and shiny, marginal and apical spines 5–6 mm. Involucre 3–5 cm, cobwebby. Outer phyllaries triangular, 7–8 × 1.6–2 mm, apex tipped with a reflexed 2–3 mm spine; middle phyllaries oblanceolate, 1.5–2.5 cm × 3–4 mm, apically abruptly constricted and tipped with a reflexed to patent 5–6 mm spine; inner phyllaries red, lanceolate, oblanceolate, or linear, 3–3.2 × ca. 0.4 cm, scarious, apex long acuminate. Corolla purple to red, ca. 2.8 cm, tube ca. 1.2 cm. Achene dark brown, ca. 6.5 mm. Pappus bristles whitish. Fl. and fr. Jun–Sep.

Mountain slopes, rocky areas; 1100–1500 m. N Xinjiang [Kazakhstan, Mongolia, Russia].

4. Subtribe CARDUINAE

飞廉亚族 fei lian ya zu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, annual to perennial. Capitula homogamous. Phyllaries pointed, ending in a straight or recurved spine; inner phyllaries sometimes with a scarious appendage. Receptacle with dense long bristles. Florets bisexual, rarely unisexual and then plants dioecious. Corolla ± actinomorphic. Stamen filaments distinct, ± pubescent. Style branches coherent for most of their length. Achene glabrous; apical rim forming a smooth-margined upright crown; apical plate with a prominent oleaginous central umbo (elaiosome). Pappus of scabrid or plumose bristles basally connate into a ring and falling off together.

Eleven genera and ca. 380 species: E and N Africa, Asia, Europe; two genera and 49 species (23 endemic) in China.

Cynara scolymus Linnaeus and *C. cardunculus* Linnaeus, of Mediterranean origin, are cultivated in China for their edible receptacle and phyllaries. Another Mediterranean species, *Silybum marianum* (Linnaeus) Gaertner, is grown as an ornamental and for its achenes, which are used medicinally.

1a. Pappus of plumose bristles ..... 33. *Cirsium*
1b. Pappus of scabrid bristles ..... 34. *Carduus*

33. CIRSIUM Miller, Gard. Dict. Abr., ed. 4, [334]. 1754.

蓟属 ji shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Cirsium sect. *Epitrachys* Candolle ex Duby; *C.* subg. *Lophiolepis* Cassini; *C.* subg. *Orthocentron* Cassini; *Echenais* Cassini; *Epitrachys* (Candolle ex Duby) K. Koch; *Eriolepis* Cassini; *Lophiolepis* (Cassini) Cassini; *Onotrophe* Cassini; *Orthocentron* (Cassini) Cassini.

Herbs, annual to perennial, bisexual or dioecious. Stems (when developed) unwinged or sometimes with spiny wings. Leaves subentire to bipinnately divided, lanceolate or wider, margin spinulose or spiny. Capitula solitary to clustered. Phyllaries numerous, regularly imbricate or of subequal length, abaxially often with a dark glandular resinous medial swelling below apex, apex ending in a straight or gradually recurved spine, spinule, or acumen. Florets normally all bisexual, or if unisexual then plants dioecious. Stamen filaments pubescent; anther with short subentire to lacerate basal appendages. Achene narrowly obovoid, laterally compressed, often with 4 or more slender spaced longitudinal ribs or striae, otherwise smooth; apical rim forming a smooth-margined upright crown; elaiosome crowned by an inconspicuous disk. Pappus of 3 or 4 rows of plumose bristles, outer ones not much shorter than inner.

About 250–300 species: N Africa, Asia, Central and North America, Europe; 46 species (23 endemic) in China.

In addition, the following four species have been reported to occur in Taiwan: *Cirsium ferum* Kitamura (Acta Phytotax. Geobot. 1: 149. 1932), *C. hosokawae* Kitamura (loc. cit.: 57), *C. kawakamii* Hayata (J. Coll. Sci. Imp. Univ. Tokyo 30(1): 159. 1911), and *C. suzukii* Kitamura (loc. cit.: 58). As no material has been seen by the present authors, these taxa have not been included in the following treatment and key.

1a. Plants dioecious.
2a. Stems glabrous or cobwebby-felted; leaves divided or undivided but if undivided then base cuneate ..... 45. *C. arvense*
2b. Stems hairy; leaves undivided with base auriculate and semiamplexicaul ..... 46. *C. shihianum*
1b. Florets bisexual.
3a. Some of phyllaries expanded laterally into membranous wings or distally into a scarious appendage.
4a. Leaves adaxially rough and spinulose.
5a. Leaves abaxially densely felted; outer and middle phyllaries unwinged but inner phyllaries expanded into a scarious white or pink appendage ..... 37. *C. leducii*
5b. Leaves abaxially sparsely cobwebby; outer and middle phyllaries with a margin expanded into yellowish scarious wings ..... 44. *C. chrysolepis*
4b. Leaves adaxially smooth or covered with hair-tipped papillae and slightly rough but not spinulose.
6a. Bracts surrounding capitula with pectinately arranged long pungent spines.
7a. Margin of middle phyllaries not laterally expanded into wings but inner phyllaries apically expanded ..... 41. *C. argyracanthum*

7b. Margin of middle phyllaries expanded above base into denticulate to lacerate scarious wings.
8a. Outer phyllaries unwinged but usually with pectinately spinulose margin, middle phyllaries with irregularly lacerate scarious wings ..... 42. *C. glabrifolium*
8b. Outer and middle phyllaries with regularly denticulate-lacerate wings ..... 43. *C. sieversii*
6b. Bracts surrounding capitula (if present) without pectinately arranged long pungent spines.
9a. Leaves green, concolorous, and glabrous or with sparse hairs along veins.
10a. Stems below capitulum felted ..... 33. *C. tianmushanicum*
10b. Stems with crispate hairs, below capitulum also ± cobwebby ..... 34. *C. chinense*
9b. Leaves abaxially grayish white and cobwebby or felted, adaxially green, glabrous, papillose, or with scattered crispate hairs.
11a. Leaves undivided or rarely slightly lobed in proximal third ..... 35. *C. lineare*
11b. Leaves pinnately lobed to pinnatipartite at least in proximal half ..... 36. *C. shansiense*
3b. Phyllaries lacking wings and scarious appendage.
12a. Outer and middle phyllaries villous or hirsute with multicellular hairs or bristles.
13a. Leaves concolorous, greenish, with sparse to dense bristles ..... 15. *C. fuscotrichum*
13b. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and glabrous ..... 16. *C. muliense*
12b. Involucre glabrous, sparsely cobwebby, or lanate, phyllaries never hirsute or villous.
14a. Involucre densely lanate.
15a. Leaves adaxially with scattered spinules or smooth, pinnately divided, segments elliptic, semiorbicular, or ovate ..... 7. *C. eriophoroides*
15b. Leaves adaxially rough with sparse to dense spinules, bipinnatipartite, segments triangular to triangular-lanceolate ..... 12. *C. lidjiangense*
14b. Involucre glabrous or cobwebby.
16a. Leaves adaxially rough and spinulose.
17a. Stems winged ..... 14. *C. vulgare*
17b. Stems unwinged.
18a. Leaf segments elliptic, semiorbicular, or ovate.
19a. Leaves discolorous, abaxially grayish white, adaxially green ..... 8. *C. subulariforme*
19b. Leaves concolorous, green ..... 9. *C. verutum*
18b. Leaf segments lanceolate to narrowly triangular.
20a. Leaves concolorous, green to yellowish green ..... 10. *C. chlorolepis*
20b. Leaves discolorous, abaxially grayish white, adaxially greenish.
21a. Outer and middle phyllaries ending in a subulate spine 8–13 mm, outer phyllaries not much shorter than inner ..... 11. *C. botryodes*
21b. Outer phyllaries ending in a spinule or acumen to 2 mm, outer phyllaries much shorter than inner ..... 13. *C. interpositum*
16b. Leaves adaxially smooth and not spinulose.
22a. Corolla yellow or white.
23a. Plants 80–150 cm tall; involucre 4–4.5 cm in diam.; leaves concolorous ..... 6. *C. monocephalum*
23b. Plants 45–50 cm tall; involucre ca. 2 cm in diam.; leaves discolorous ..... 40. *C. alberti*
22b. Corolla red to purple.
24a. Plants stemless with all leaves basal.
25a. Petiole unwinged or with discontinuous wing; outer and middle phyllaries narrowly triangular, pectinately fringed with spinules ..... 4. *C. souliei*
25b. Petiole with continuous wing; outer and middle phyllaries ovate to lanceolate, margin not spinulose ..... 23. *C. esculentum*
24b. Plants with leafy stems at least 20 cm tall.
26a. Stems winged ..... 29. *C. alatum*
26b. Stems unwinged.
27a. Outer phyllaries bractlike, dissimilar from and almost twice as long as middle and inner phyllaries ..... 1. *C. bracteiferum*
27b. Outer phyllaries not bractlike, similar to and not longer than middle ones.
28a. Outer and middle phyllaries pectinately fringed with spinules.
29a. Leaves abaxially cobwebby or glabrous, adaxially glabrous ..... 5. *C. fargesii*
29b. Leaves not cobwebby but with crispate multicellular hairs.
30a. Involucre ca. 4 cm in diam., sparsely cobwebby ..... 2. *C. leo*
30b. Involucre ca. 2 cm in diam., glabrous ..... 3. *C. henryi*
28b. Outer and middle phyllaries not fringed with spinules.
31a. Bracts surrounding capitula reduced to pectinately arranged long pungent spines.

32a. Leaves concolorous, green, glabrous ..... 38. *C. semenowii*
32b. Leaves discolorous, abaxially grayish green to whitish and cobwebby or felted, adaxially greenish and hairy.
33a. Outer and middle phyllaries narrowed into a 0.1–0.5 cm spine ..... 24. *C. periacanthaceum*
33b. Outer and middle phyllaries tipped with a ca. 3 cm spine ..... 39. *C. sairamense*
31b. Bracts surrounding capitula (if present) not reduced to pectinately arranged long pungent spines.
34a. Phyllaries in ca. 10 rows; corolla tube more than twice as long as limb ..... 32. *C. pendulum*
34b. Phyllaries in 5–8 rows; corolla tube shorter or at most slightly longer than limb.
35a. Leaves undivided, margins entire or toothed with spinules of at most 2 mm.
36a. Outer and middle phyllaries with an apical spine 3–7 mm ..... 30. *C. vernonioides*
36b. Phyllaries with an apical spinule of at most 1 mm.
37a. Leaves discolorous, abaxially grayish to white and felted.
38a. Lower cauline leaves petiolate, to 3 cm wide, narrowed at base ..... 19. *C. vlassovianum*
38b. All cauline leaves sessile, at least 4 cm wide, semiamplexicaul ..... 21. *C. helenioides*
37b. Leaves concolorous, abaxially green and glabrous or with multicellular hairs but not felted.
39a. Involucre ovoid ..... 18. *C. serratuloides*
39b. Involucre campanulate.
40a. Outer and middle phyllaries abaxially with a dark resinous gland ..... 17. *C. viridifolium*
40b. Phyllaries lacking a resinous gland ..... 20. *C. fanjingshanense*
35b. Leaves pinnately divided (or at least lobed), margin usually distinctly spiny.
41a. At least upper cauline leaves discolorous, abaxially gray to white and felted, adaxially ± green.
42a. Lower cauline leaves petiolate, often concolorous; capitula corymbose ..... 25. *C. maackii*
42b. All cauline leaves sessile, discolorous; capitula racemose ..... 26. *C. racemiforme*
41b. Leaves concolorous, abaxially green and glabrous or with sparse to dense multicellular hairs but not felted.
43a. Involucre 2–3 cm in diam.
44a. Cauline leaves sessile; basal leaves present at anthesis ..... 22. *C. japonicum*
44b. Lower and middle cauline leaves petiolate; basal leaves withered at anthesis ..... 28. *C. schantarense*
43b. Involucre 3–4.5 cm in diam.
45a. Corolla tube less than 1/2 as long as limb; outer and middle phyllaries abaxially with a dark resinous gland ..... 27. *C. fangii*
45b. Corolla tube slightly longer than limb; phyllaries lacking a resinous gland ..... 31. *C. handelii*

1. Cirsium bracteiferum C. Shih, Acta Phytotax. Sin. 22: 388. 1984.

刺盖草 ci gai cao

Herbs to 40 cm tall, perennial. Stems erect, branched above, unwinged, with long multicellular hairs and apically also cobwebby. Leaves concolorous, surface smooth but with sparse multicellular hairs. Upper cauline leaves sessile, elliptic, ca. 13 × 4 cm, pinnatipartite, semiamplexicaul; segments 6 or 7 pairs, obliquely triangular, margin sparsely spinose or with teeth tipped with a 3–6 mm spine. Bracts similar to leaves but smaller. Peduncles stout, with dense multicellular hairs. Capitula several, racemose. Involucre broadly campanulate, 3–4.5 cm in diam., glabrous. Phyllaries in ca. 6 rows, lacking wings and scarious appendage; outer phyllaries bractlike, 3.5–4 × 0.3–0.5 cm, margin minutely toothed and spiny, basal portion elliptic to lanceolate, apical portion subulate and narrowed into a long spine; middle and inner phyllaries markedly different, elliptic to broadly linear, ca. 2.1 × 0.2–0.4 cm, apex acute. Florets bisexual. Corolla purplish red, ca. 2.1 cm, tube ca. 1 cm. Mature achene unknown. Fl. Jul.

• Slopes; ca. 1500 m. Chongqing (Nanchuan).

2. Cirsium leo Nakai & Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 1: 60. 1934.

魁蓟 kui ji

Cirsium chienii C. C. Chang; *C. pinnatibracteatum* Y. Ling.

Herbs 40–100 cm, perennial. Stems simple or tufted, erect, branched above or rarely unbranched, ribbed, unwinged, with long crispate multicellular hairs. Leaves concolorous, green, surface smooth and not cobwebby but with crispate multicellular hairs dense abaxially along veins but scattered elsewhere. Basal and lower cauline leaves with petiole to 5 cm; leaf blade elliptic to oblanceolate-elliptic, 10–25 × 4–7 cm, pinnatipartite; segments 8–12 pairs, semiorbicular, ± narrowly elliptic, or obliquely triangular, with unequal triangular teeth laterally spiny and with an apical (3–)5–6(–12) mm spine. Middle and upper cauline leaves similar but sessile and gradually smaller upward. Capitula corymbose. Involucre campanulate, ca. 4 cm in diam., sparsely cobwebby. Phyllaries in ca. 8 rows, lacking wings and scarious appendage, all of similar length; outer and middle phyllaries 2–3 × 0.2–0.3 cm, pectinately fringed with spinules

to 2.5 mm, basal portion triangular to lanceolate, apical portion subulate tipped with a ca. 3 mm spinule; inner phyllaries lanceolate to linear, ca. 2 × 0.1–0.2 cm, apex long acuminate. Florets bisexual. Corolla purplish red, ca. 2.4 cm, tube ca. 1 cm. Achene dark gray, ca. 5 mm. Pappus bristles dirty white, ca. 2.2 cm. Fl. and fr. May–Sep.

• Mountain valleys, slopes, forest margins, flooded lands, rock crevices, along streams, wet places; 700–3400 m. Gansu, Hebei, Henan, Ningxia, Shaanxi, Shanxi, Sichuan.

3. Cirsium henryi (Franchet) Diels, Bot. Jahrb. Syst. 29: 627. 1901.

刺苞蓟 ci bao ji

Cnicus henryi Franchet, J. Bot. (Morot) 11: 21. 1897; *Cirsium forrestii* (Djels) H. Léveillé; *C. melanolepis* Petrak; *C. taliense* (Jeffrey) H. Léveillé; *Cnicus forrestii* Diels; *C. taliensis* Jeffrey.

Herbs 30–50 cm tall, perennial. Stems erect, branched above, rarely unbranched, unwinged, with brown multicellular hairs. Leaves concolorous, surface green to pale green, smooth, and not cobwebby but with ± dense crispate multicellular hairs. Basal and lower cauline leaves petiolate; leaf blade lanceolate, oblanceolate, or ± narrowly elliptic, 10–18 × 4–8 cm, pinnately divided; segments 5–8 pairs, elliptic, lanceolate, or triangular, with unequal triangular teeth laterally spiny and with an apical (2–)6–7 mm spine; terminal segment largest. Middle and upper cauline leaves similar but sessile and gradually smaller upward. Bracts entire, ± broadly linear, margin spiny. Capitula corymbose or paniculate, ± nodding. Involucre campanulate, ca. 2 cm in diam., glabrous. Phyllaries in ca. 6 rows, lacking wings and scarious appendage, all of similar length; outer and middle phyllaries narrowly triangular, 11–14 × 1.5–2 mm, pectinately fringed with geminate 2.5–3 mm spinules, apex narrowed into a spinule; inner phyllaries triangular to lanceolate, 13–14 × ca. 2 mm, not spinulose. Florets bisexual. Corolla purple, ca. 1.6 cm, tube ca. 1 cm. Achene brownish, ca. 4 mm. Pappus bristles brownish, to 1.5 cm. Fl. and fr. Jun–Oct.

• Meadows; 2700–3500 m. W Hubei, Sichuan, Yunnan.

4. Cirsium souliei (Franchet) Mattfeld, J. Arnold Arbor. 14: 42. 1933.

葵花大蓟 kui hua da ji

Cnicus souliei Franchet, J. Bot. (Morot) 11: 21. 1897.

Herbs, stemless, perennial. All leaves basal, rosulate, petiolate, concolorous, green, smooth, with long multicellular hairs particularly along veins; petiole 1.5–4 cm, unwinged or with discontinuous wing; leaf blade ± narrowly elliptic, elliptic-lanceolate, or oblanceolate, 8–21 × 2–6 cm, pinnately lobed to pinnatipartite; segments 7–11 pairs, ovate-lanceolate, elliptic, or broadly triangular, toothed; teeth with a 2–5 mm apical spinule or spine; terminal segment largest. Peduncles short. Capitula few to many, clustered in center of rosette. Involucre campanulate, 3–5 cm in diam., glabrous. Phyllaries in 3–5 rows, lacking wings and scarious appendage, all of similar length; outer and middle phyllaries narrowly triangular, 1.8–2.3 × 0.1–0.2 cm, pectinately fringed with 2–3 mm spinules, tipped with a slender ca. 5 mm spine; inner phyllaries ca. 2.5 × 0.2 cm, not spinulose. Florets bisexual. Corolla purplish red, ca. 2.3 cm, tube ca. 1.8 cm. Achene dark, ca. 5 mm. Pappus bristles dirty white to brownish, to 2 cm. Fl. and fr. Jul–Sep.

Forest margins, roadsides, fallow fields, flooded lands, fields, moist places by water; 1900–4800 m. Gansu, S Ningxia, Qinghai, Sichuan, Xizang [India (Sikkim)].

5. Cirsium fargesii (Franchet) Diels, Bot. Jahrb. Syst. 29: 627. 1901.

等苞蓟 deng bao ji

Cnicus fargesii Franchet, J. Bot. (Morot) 11: 22. 1897.

Herbs to 1 m tall, perennial. Stems erect, sparingly branched above, ribbed, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves smooth on both faces, abaxially green or grayish white and glabrous or sparsely cobwebby-felted, adaxially green and glabrous. Lower to middle cauline leaves petiolate; leaf blade broadly lanceolate to lanceolate, 20–30 × 7–8 cm, pinnatifid; segments ca. 6 pairs, elliptic to ± broadly triangular, teeth laterally shortly spiny and with an apical spine to 1 cm; terminal segment narrowly lanceolate, margin spiny. Middle and upper cauline leaves similar but sessile, semiamplexicaul. Capitula few, corymbose. Involucre broadly campanulate, ca. 4 cm in diam., ± cobwebby. Phyllaries in ca. 4 rows, lacking wings and scarious appendage, all of similar length; outer and middle phyllaries 2.1–2.4 × ca. 0.3 cm, pectinately fringed with ca. 2 mm spinules, basal portion linear to triangular, apical portion subulate, patent to slightly recurved, and tipped with a brown spine; inner phyllaries linear, ca. 2.1 × 0.2 cm, with an apical spine. Florets bisexual. Corolla purplish, ca. 2.2 cm, tube ca. 1 cm. Mature achene unknown. Pappus bristles to 2 cm. Fl. Jul.

• Slopes; 2400–2500 m. Hubei, Shaanxi, Sichuan.

6. Cirsium monocephalum (Vaniot) H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 189. 1913.

马刺蓟 ma ci ji

Cnicus monocephalus Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 122. 1903; *Cirsium cavaleriei* (H. Léveillé) H. Léveillé; *C. provostii* (Franchet) Petrak var. *monocephalum* (Vaniot) Petrak; *C. provostii* var. *oleracioides* Petrak; *C. provostii* var. *racemosum* Petrak; *C. provostii* var. *spinosum* Petrak; *Cnicus cavaleriei* H. Léveillé.

Herbs 0.8–1.5 m tall, perennial. Stems erect, branched above, ribbed, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves concolorous, green, surface smooth and glabrous or with sparse long multicellular hairs. Middle cauline leaves sessile, ± narrowly elliptic to lanceolate, 15–25 × 5–9 cm, pinnatipartite; segments 5–10 pairs, ± narrowly lanceolate to triangular, margin spiny or with teeth tipped with a 3–10 mm spine. Upper cauline leaves similar but smaller. Capitula few, corymbose to paniculate. Involucre broadly campanulate to hemispheric, 4–4.5 cm in diam., sparsely cobwebby. Phyllaries in ca. 8 rows, 2.2–3.5 × 0.3–0.4 cm, all of similar length, lacking wings and scarious appendage, basal portion linear, apical portion subulate, patent to reflexed, and narrowed into a

long spine. Florets bisexual. Corolla white or yellowish, ca. 1.4 cm, tube ca. 7 mm. Achene brown, ca. 3.5 mm. Pappus bristles to 1.7 cm. Fl. and fr. Jul–Oct.

• Mountain valleys, forest margins, forests, thickets, wastelands; 700–2000 m. Chongqing, S Gansu, Guizhou, SW Hubei, S Shaanxi (Qin Ling), S Shanxi, Sichuan.

7. Cirsium eriophoroides (J. D. Hooker) Petrak, Biblioth. Bot. 18(Heft 78): 9. 1912.

贡山蓟 gong shan ji

Cnicus eriophoroides J. D. Hooker, Fl. Brit. India 3: 363. 1881; *Cirsium bolocephalum* Petrak; *C. bolocephalum* var. *racemosum* Petrak; *C. bolocephalum* subsp. *setschwanicum* Petrak.

Herbs 1–3 m tall, perennial. Stems erect, branched above, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves papery, concolorous, green, abaxially glabrous or sparsely cobwebby and with multicellular hairs, adaxially with sparse 3–8 mm spinules and spines but sometimes almost completely smooth. Lower and middle cauline leaves petiolate; leaf blade elliptic, 20–35 × 8–15 cm, toothed or pinnately divided; segments when present 4–8 pairs, elliptic, semiorbicular, or ovate, with 2–5 spines or teeth laterally shortly spiny and with a 0.5–1.5 cm apical spine. Upper cauline leaves similar but sessile. Capitula few, corymbose, nodding to erect. Involucre globose, ca. 5 cm in diam., densely and fluffily lanate. Phyllaries in ca. 6 rows, all of similar length or inner somewhat longer, lacking wings and scarious appendage; outer and middle phyllaries 2–3 × 0.2–0.4 cm, basal portion lanceolate to triangular, apical portion subulate and 1.5–2 cm; inner phyllaries ca. 3.5 × 0.2–0.3 cm, basal portion linear-lanceolate to linear, apical portion subulate and ca. 1.5 cm. Florets bisexual. Corolla purple, ca. 3.5 cm, tube ca. 2.2 cm. Achene dark brown, ca. 5 mm. Pappus bristles ca. 2.5 cm. Fl. and fr. Jul–Oct.

Slopes, thickets, thicket margins, grasslands, meadows, flooded lands, by water; 2000–4100 m. SW Sichuan, SE Xizang, Yunnan [Bhutan, India (Sikkim)].

8. Cirsium subulariforme C. Shih, Fl. Reipubl. Popularis Sin. 78(1): 90. 1987.

钻苞蓟 zuan bao ji

Cirsium subuliforme C. Shih, Acta Phytotax. Sin. 22: 391. 1984, not G. B. Ownbey (1982).

Herbs 1.5–2 m tall, perennial. Stems erect, ribbed, unwinged, sparsely cobwebby, often densely cobwebby below capitula. Leaves papery, discolorous, abaxially grayish white and densely felted, adaxially green to yellowish green, very rough, and covered with dense 1–3 mm spinules and scattered 4–11 mm spines. Lower cauline leaves with winged petiole to 14 cm, wing undulate to dissected into semiorbicular segments and with 1–1.5 cm spines or spine-tipped teeth; leaf blade elliptic, ca. 33 × 18 cm, pinnatifid; segments 7 or 8 pairs, elliptic, with 3–5 unequal triangular teeth fringed with ca. 1 mm spinules and with a ca. 1 cm apical spine. Middle and upper cauline leaves sessile, narrowly elliptic to lanceolate, gradually smaller upward, semiamplexicaul, margin entire or toothed and with 5–10 mm spines. Bracts reduced to spines. Capitula corymbose to racemose. Involucre campanulate, 3–4 cm in diam., glabrous. Phyllaries in ca. 7 rows, ca. 18 × 1.5–2 mm, all of similar length or somewhat longer inwardly, lacking wings and scarious appendage, basal portion linear, lanceolate, or elliptic, apical portion subulate and 3–10 mm. Florets bisexual. Corolla purple, ca. 3 cm, tube ca. 1.9 cm. Achene ca. 5 mm. Pappus bristles brownish to dirty white, ca. 1.8 cm. Fl. and fr. Jul–Aug.

• Grasslands on mountain slopes, thickets in river valleys, forests; 1500–2500 m. SE Xizang, NW Yunnan.

9. Cirsium verutum (D. Don) Sprengel, Syst. Veg., ed. 16, 3: 370. 1826.

苞叶蓟 bao ye ji

Cnicus verutus D. Don, Prodr. Fl. Nepal. 167. 1825; *Cirsium involucratum* Candolle, nom. illeg. superfl.

Herbs 1–1.5 m tall, perennial. Stems erect, branched, unwinged, with long multicellular hairs. Leaves concolorous, green, abaxially glabrous or sparsely cobwebby and with long multicellular hairs, adaxially rough and sparsely to densely spinulose. Middle cauline leaves sessile, oblanceolate, 15–20 × 3–9 cm, pinnatipartite, semiamplexicaul; segments ca. 10 pairs, ovate to elliptic, with unequal triangular teeth with 1–2 mm lateral spinules and a 3–5 mm apical spine, basal teeth sometimes spiniform. Upper cauline leaves similar but ovate to narrowly elliptic, segments or teeth with a 5–10 mm apical spine. Bracts ovate, margin spiny or with spiny teeth. Capitula corymbose. Involucre campanulate, 3–3.5 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 7 rows, lacking wings and scarious appendage; outer and middle phyllaries 1.2–2.5 × 0.2–0.3 cm, basal portion triangular to lanceolate, apical portion subulate, 1–1.2 cm, and patent to reflexed; inner phyllaries linear-lanceolate, ca. 2.5 × 0.2 cm, apex long acuminate. Florets bisexual. Corolla reddish purple, ca. 2.8 cm, tube ca. 1.5 cm. Achene dark, ca. 3.5 mm. Pappus bristles brownish, to 2 cm. Fl. and fr. Jul–Sep.

Slopes, forests, forest margins; 2900–3900 m. Xizang [Afghanistan, Bhutan, India, Nepal, Pakistan, Vietnam].

10. Cirsium chlorolepis Petrak, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 109. 1926.

两面蓟 liang mian ji

Herbs 30–100 cm tall, perennial. Stems erect, branched above, unwinged, with dense long multicellular hairs and sparsely cobwebby, densely cobwebby-felted above. Leaves concolorous, green to yellowish green, abaxially sparsely covered with spinules less than 1 mm, adaxially rough and densely covered with 1–2 mm spinules. Lower and middle leaves sessile, lanceolate, oblanceolate, or elliptic, 16–20 × 6–8 cm, pinnately divided, amplexicaul; segments 5–8 pairs, triangular-lanceolate to ± narrowly triangular, fringed with spinules, with a 5–7 mm apical spine; terminal segment largest. Upper cauline leaves similar but smaller. Capitula racemose or corymbose, ± nodding. Involucre broadly campanulate, 3.5–4 cm in diam., glabrous or sparsely cobwebby. Phyllaries in 7 or 8 rows, 1.3–2.3 × 0.3–0.5 cm, all of similar length, lacking wings and

scarious appendage, basal portion lanceolate, apical portion subulate, 6–10 mm, and patent to recurved. Florets bisexual. Corolla purplish red, ca. 2 cm, tube ca. 1 cm. Achene yellowish, cuneate-oblanceolate, ca. 4 mm. Pappus bristles brownish. Fl. and fr. Jul–Oct.

• Forests, grasslands on mountain slopes; 1300–1800 m. SW Guizhou, Yunnan.

11. Cirsium botryodes Petrak, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 109. 1926.

灰蓟 hui ji

Cirsium griseum H. Léveillé (1913), not (Rydberg) Cockerell (1911); *C. heleophilum* Petrak; *C. mairei* (H. Léveillé) H. Léveillé (1913), not Halácsy (1908); *C. yunnanense* Petrak; *Cnicus mairei* H. Léveillé.

Herbs 50–100 cm tall, perennial. Stems grayish white, erect, usually branched, unwinged, with dense long multicellular hairs and cobwebby, densely felted below capitula. Leaves rigid, discolorous, abaxially grayish white and densely felted, adaxially greenish, rough, and densely spinulose. Lower to upper cauline leaves sessile, lanceolate to ovate-lanceolate, 12–16 × 6.5–8 cm, pinnately divided, semiamplexicaul; segments ca. 4 pairs, narrowly triangular to lanceolate, basally on one or both sides with a triangular tooth with 1–1.5 mm lateral spinules and a 3–7 mm apical spine, apex narrowed into a 5–7 mm spine. Bracts reduced to spines. Capitula racemose to racemose-corymbose. Involucre broadly campanulate, ca. 3.5 cm in diam., sparsely cobwebby. Phyllaries in ca. 7 rows, lacking wings and scarious appendage; outer phyllaries not much shorter than inner ones; outer and middle phyllaries 10–20 × 3–4 mm, basal portion ovate to elliptic, apical portion subulate and ending in a 0.8–1.3 cm spine; inner phyllaries lanceolate-subulate to linear, ca. 2.5 × 0.1–0.2 cm. Florets bisexual. Corolla white, ca. 2 cm, tube ca. 9 mm. Achene ca. 5 mm. Pappus bristles brownish, to 2 cm. Fl. and fr. May–Sep.

• Mountain valleys, grasslands on mountain slopes; 2800–3000 m. W Guizhou, W Hunan, S Sichuan, Yunnan.

12. Cirsium lidjiangense Petrak & Handel-Mazzetti in Handel-Mazzetti, Symb. Sin. 7: 1170. 1936.

丽江蓟 li jiang ji

Herbs 70–120 cm tall, perennial. Stems erect, ribbed, branched above, unwinged, cobwebby to hirsute below, densely cobwebby above. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and rough with sparse to dense 0.3–1 mm spinules. Lower cauline leaves sessile, elliptic, 50–60 × 18–24 cm, bipinnatipartite, semiamplexicaul; primary segments 10 or 11 pairs; secondary segments 1 or 2 pairs, triangular to triangular-lanceolate, basally with 1 triangular, spine-tipped tooth; terminal lobe narrowly lanceolate, with 1 or 2 marginal spines and a 4–12 mm apical spine. Middle and upper cauline leaves similar but gradually smaller upward, with ± equally forked primary segments; secondary segments lanceolate. Capitula racemose to racemose-paniculate, nodding. Involucre globose, 4–5 cm in diam., densely lanate. Phyllaries in ca. 7 rows, lacking wings and scarious appendage; outer phyllaries not much shorter than inner ones; outer and middle phyllaries 2.2–2.5 × 0.4–0.5 cm, apical portion triangular, lanceolate, or elliptic, apical portion subulate and with a 1–1.2 cm terminal spine; inner phyllaries linear-subulate, ca. 3.8 × 0.3 cm. Florets bisexual. Corolla reddish purple, ca. 2.2 cm, tube ca. 1.9 cm. Achene brown, ca. 5 mm. Pappus bristles brownish, ca. 2 cm. Fl. and fr. Jun–Aug.

• Meadows; 1800–3200 m. SW Sichuan, NW Yunnan.

13. Cirsium interpositum Petrak, Repert. Spec. Nov. Regni Veg. 43: 283. 1938.

披裂蓟 pi lie ji

Cnicus griffithii J. D. Hooker (1881), not *Cirsium griffithii* Boissier (1875).

Herbs 2–2.5 m tall, perennial. Stems erect, stout, branched in upper half, ribbed, unwinged, sparsely cobwebby. Leaves discolorous, abaxially grayish white and densely felted, adaxially green, rough, and sparsely to densely spinulose. Middle cauline leaves sessile, ± narrowly elliptic, ca. 60 × 25 cm, pinnately divided, semiamplexicaul with auricles bearing 2–4 cm spines; segments 9–11 pairs, ± narrowly lanceolate, basally on both sides with 1 or 2 spiny teeth, fringed with 1–3 mm spinules, apex narrowed into a 1.5–2.5 cm spine. Upper cauline leaves similar but gradually smaller upward. Bracts lanceolate to linear, smaller than upper leaves, fringed with 2–2.5 cm spines. Capitula corymbose, ± nodding. Involucre broadly campanulate, 4–4.5 cm in diam., sparsely cobwebby, glabrescent. Phyllaries in ca. 10 rows, lacking wings and scarious appendage, outer phyllaries much shorter than inner ones; outer phyllaries triangular to lanceolate, 8–10 × 2.5–3 mm, apex narrowed into a 0.5–2 mm acumen or spinule; middle and inner phyllaries lanceolate to linear, 1.5–3 × 0.2–0.3 cm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 3.5 cm, tube ca. 2.5 cm. Achene dark, ca. 5 mm. Pappus bristles brownish, ca. 2.5 cm. Fl. and fr. Sep–Nov.

• Forests, open forests, grasslands on mountain slopes; 2000–2500 m. SE Xizang, W Yunnan.

14. Cirsium vulgare (Savi) Tenore, Fl. Napol. 5: 209. 1835–1838.

翼蓟 yi ji

Carduus vulgaris Savi, Fl. Pis. 2: 241. 1798; *C. lanceolatus* Linnaeus; *Cirsium lanceolatum* (Linnaeus) Scopoli (1772), not Hill (1769); *Eriolepis lanceolata* (Linnaeus) Cassini.

Herbs 25–150 cm tall, biennial. Stems grayish white, erect, branched above, winged, with sparse long multicellular hairs and cobwebby, densely felted above; wings toothed, teeth ending in a long spine. Leaves herbaceous, discolorous, abaxially grayish white and densely felted, adaxially green to yellowish green, rough and densely covered with ca. 1.5 mm spinules. Middle cauline leaves sessile, linear-lanceolate, lanceolate, or oblanceolate, 10–15 × 4–5 cm, bipinnatipartite; primary segments 3 or 4 pairs, equally or unequally forked; secondary segments triangular to lanceolate, fringed with spinules, apex with a 5–10 mm spine; terminal lobe lanceolate, fringed

with spinules and a few spines 5–10 mm. Upper cauline leaves similar but gradually smaller upward. Bracts linear, margin with long spines. Capitula few to many, paniculate-corymbose to racemose, erect. Involucre ovoid, 3–5 cm in diam., glabrous. Phyllaries imbricate, in ca. 10 rows, lacking wings and scarious appendage; outer and middle phyllaries 0.8–3 × 0.2–0.4 cm, basal portion triangular, lanceolate, or linear, apical portion subulate, 5–9 mm, and narrowed into a spine; inner phyllaries linear, ca. 3.4 × 0.3 cm, apex acuminate. Florets bisexual. Corolla red, ca. 3 cm, tube filiform, ca. 2 cm. Achene brown, ca. 4 mm. Pappus bristles white, to 3 cm. Fl. and fr. Jul–Aug. $2n$ = 34, 68.

Farmlands, wet grasslands; 400–1800 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Turkmenistan; N Africa, SW Asia, Europe].

Cirsium vulgare is a noxious weed that is naturalized in many parts of the world.

15. Cirsium fuscotrichum C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 7: 161. 1936 [*"fusco-trichum"*].

褐毛蓟 he mao ji

Herbs ca. 90 cm tall, perennial. Stems ribbed, unwinged, ± densely brownish hirsute. Leaves concolorous, greenish, abaxially with short brown bristles along veins but otherwise glabrous, adaxially sparsely to densely bristly and rough. Lower cauline leaves sessile, oblanceolate, ca. 22 × 9 cm, pinnatifid; segments ca. 7 pairs, subtriangular, often 1- or 2-lobulate near base, fringed with spinules, apex with a long spine. Middle and upper cauline leaves similar but smaller, base amplexicaul. Capitula few, corymbose. Involucre hemispheric, ca. 6 cm in diam., hirsute. Phyllaries in ca. 6 rows, 3–4 × 0.1–0.2 cm, lacking wings and scarious appendage, abaxially brownish hirsute with dense long rigid bristles, basal portion lanceolate to linear, apical portion subulate. Corolla not seen. Achene brownish, ca. 4 mm, with 1 stria on each side. Pappus bristles brownish, ca. 1.4 cm. Fl. and fr. Aug.

• Slopes; ca. 2500 m. Sichuan (Pingwu).

16. Cirsium muliense C. Shih, Acta Phytotax. Sin. 22: 393. 1984.

木里蓟 mu li ji

Herbs 25–100 cm tall, perennial. Stems grayish white, erect, unbranched, ribbed, unwinged, long villous; synflorescence axes densely felted. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and glabrous. Cauline leaves sessile, elliptic, 6–7 × 1.5–2 cm, pinnatifid, auriculate amplexicaul; segments 3 or 4 pairs, broadly triangular to semiorbicular, fringed with 1–2 mm spinules and with 3–5 unequal triangular teeth ending in a 4–6 mm spine. Upper cauline leaves usually undivided, margin spiny or with spine-tipped teeth, spines to 1.4 cm. Capitula few, racemose, erect. Involucre campanulate, ca. 5 cm in diam., villous. Phyllaries in ca. 6 rows, lacking wings and scarious appendage, abaxially villous with dense long multicellular hairs; outer phyllaries 15–16 × 1–2 mm, basal portion triangular, apical portion subulate, 0.9–1.1 cm, and spine-tipped; middle phyllaries 1.6–1.9 × 0.2–0.3 cm, basal portion lanceolate, apical portion subulate and 4–11 mm; inner phyllaries linear, ca. 17 × 1 mm, apex acuminate and scarious. Florets bisexual. Corolla red, ca. 1.4 cm, tube ca. 6 mm. Mature achene unknown. Pappus bristles white, ca. 1.2 cm. Fl. Nov.

• Dry mountain slopes; ca. 3200 m. SW Sichuan (Muli).

17. Cirsium viridifolium (Handel-Mazzetti) C. Shih, Acta Phytotax. Sin. 22: 394. 1984.

块蓟 kuai ji

Cirsium vlassovianum Fischer ex Candolle var. *viridifolium* Handel-Mazzetti, Oesterr. Bot. Z. 85: 223. 1936; *C. salicifolium* (Kitagawa) C. Shih; *C. vlassovianum* var. *salicifolium* Kitagawa.

Herbs 30–40 cm tall, perennial. Stems erect, unbranched or little branched, ribbed, unwinged, with sparse long bristles, also cobwebby above. Leaves undivided, concolorous, green, surface smooth, glabrous or with multicellular hairs. Lower cauline leaves sessile and semiamplexicaul or narrowed into a petiole to 2.5 cm; leaf blade elliptic to lanceolate, 7–8 × 1.5–2 cm, margin fringed with 1–2 mm spinules, apex acute and spine-tipped. Middle and upper cauline leaves similar but gradually smaller upward. Capitula 1 to few. Involucre campanulate, 1.5–2 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 7 rows, lacking marginal spinules, wings, and scarious appendage, all or only inner phyllaries abaxially with a resinous gland; outer and middle phyllaries triangular to lanceolate, 3–10 × 1–2 mm, apex acute and tipped with an acumen less than 0.5 mm; inner phyllaries elliptic to linear-lanceolate, 12–15 × 1.5–2 mm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 1.9 cm, tube ca. 9 mm. Achene brown, 3.5–4 mm, ribbed. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Aug–Sep.

• Moist places, streamsides, roadsides, slopes; 200–2000 m. Hebei, Jilin, Nei Mongol.

18. Cirsium serratuloides (Linnaeus) Hill, Hort. Kew. 64. 1768.

麻花头蓟 ma hua tou ji

Carduus serratuloides Linnaeus, Sp. Pl. 2: 825. 1753; *Cirsium asiaticum* Schischkin; *Cnicus serratuloides* (Linnaeus) Roth.

Herbs to 1.2 m tall, perennial. Stem solitary, erect, branched above, ribbed, unwinged, with sparse long multicellular hairs; synflorescence branches usually sparsely cobwebby. Leaves undivided, concolorous, green, surface smooth but with long multicellular hairs. Middle cauline leaves sessile, lanceolate, 10–15 × 1.5–3 cm, auriculate semiamplexicaul, fringed with spinules less than 0.5 mm, apex acute. Upper cauline leaves similar but narrower and gradually smaller upward. Capitula erect, laxly corymbose. Involucre ovoid, 1.5–2 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 7 rows, lacking marginal spinules, wings, and scarious appendage, abaxially glabrous; outer phyllaries triangular, ca. 6 × 1.2 mm, apex acuminate and tipped with a ca. 1 mm spinu-

lose acumen; middle phyllaries ovate-lanceolate to lanceolate, ca. 7 × 2–2.2 mm, tipped with an acumen less than 0.5 mm; inner phyllaries lanceolate to linear-lanceolate, 8–15 × 1.5–2 mm, apex acuminate and scarious. Florets bisexual. Corolla purplish red, ca. 2 cm, tube ca. 1 cm. Achene brownish, ca. 4 mm. Pappus bristles white, ca. 1.5 cm. Fl. and fr. Jul–Oct. $2n = 34$.

Forests on mountain slopes, by rivers, by water; 1200–2600 m. Xinjiang (Altay Shan) [Mongolia, Russia].

19. Cirsium vlassovianum Fischer ex Candolle, Prodr. 6: 653. 1838.

绒背蓟 rong bei ji

Cirsium vlassovianum var. *bracteatum* Ledebour; *Cnicus vlassovianus* (Fischer ex Candolle) Maximowicz.

Herbs 25–90 cm tall, perennial. Roots tuberous. Stems erect, unbranched or branched above, ribbed, unwinged, with sparse long multicellular hairs apically mixed with sparse felt. Leaves discolorous, surface smooth, abaxially white and densely felted, adaxially green and with sparse multicellular hairs. Lower cauline leaves petiolate; leaf blade lanceolate to elliptic-lanceolate, 6–20 × 2–3 cm, undivided, fringed with ca. 1 mm spinules, apex obtuse to acuminate. Middle and upper cauline leaves similar but auriculate semiamplexicaul. Capitula 1 to few, corymbose, erect. Involucre narrowly ovoid, ca. 2 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 7 rows, lacking marginal spinules, wings, and scarious appendage, abaxially with a dark resinous gland; outer and middle phyllaries triangular to lanceolate, 5–11 × ca. 2 mm, apex acute and tipped with a spinule less than 1 mm; inner phyllaries broadly linear, ca. 2 × 0.2 cm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 1.7 cm, tube ca. 7 mm. Achene brownish striate with brown, ca. 4 mm. Pappus bristles ca. 1.5 cm. Fl. and fr. May–Sep. $2n = 28, 34$.

Forests, forest margins, by rivers, moist places; 300–1500 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shanxi [Korea, Mongolia, Russia].

20. Cirsium fanjingshanense C. Shih, Acta Phytotax. Sin. 22: 394. 1984.

梵净蓟 fan jing ji

Herbs to 1 m tall, ?perennial. Stems erect, sparingly branched above, unwinged, subglabrous. Leaves concolorous, green, surface smooth and glabrous. Upper cauline leaves sessile, ovate-elliptic, broadly elliptic, or obovate, 8–16 × 5–9 cm, undivided, auriculate semiamplexicaul, fringed with 0.5–2 mm spinules and with simple or double teeth, apex acute to obtuse and spinule-tipped. Bracts sessile, narrowly elliptic to lanceolate, base auriculate semiamplexicaul. Capitula few, terminal on long branches. Involucre broadly campanulate, 2–2.5 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows, lacking an abaxial resinous gland, marginal spinules, wings, and scarious appendage; outer and middle phyllaries ovate-lanceolate, elliptic, or lanceolate, 12–17 × 2–3.5 mm, apex acuminate and tipped with a short spinule; inner phyllaries broadly linear, ca. 15 × 1.8 mm, apex acuminate and scarious. Florets bisexual. Corolla purplish, ca. 1.8 cm, tube ca. 8 mm. Mature achene unknown. Pappus bristles dirty white, ca. 1.3 cm. Fl. Jul.

• Grasslands, mountain slopes. Guizhou (Fanjing Shan).

21. Cirsium helenioides (Linnaeus) Hill, Hort. Kew. 64. 1768.

堆心蓟 dui xin ji

Carduus helenioides Linnaeus, Sp. Pl. 2: 825. 1753; *Cirsium heterophylloides* Pavlov (1938), not Treuinfels (1875); *Cnicus helenioides* (Linnaeus) Retzius.

Herbs 0.4–2 m tall, perennial. Stems erect, branched above, ribbed, unwinged, sparsely cobwebby. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and with multicellular hairs. Basal leaves present at anthesis, long petiolate. Lower and middle cauline leaves sessile, ± narrowly elliptic or lanceolate, 10–30 × 4–6 cm, undivided, semiamplexicaul, margin with numerous obliquely triangular teeth tipped by a 0.5–1 mm spinule and smaller regular spinules in sinuses. Upper cauline leaves similar but gradually smaller upward. Capitula 1 to few, corymbose, erect. Involucre campanulate, ca. 2.5 cm in diam., glabrous or subglabrous. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries triangular to lanceolate-elliptic, 6–10 × 1.5–2 mm, apex acute and tipped with a spinule less than 0.2 mm; inner phyllaries elliptic to linear-elliptic, 13–15 × 2–2.5 mm, apex acuminate and scarious. Florets bisexual. Corolla red, ca. 2 cm, tube ca. 8 mm. Achene yellowish, ca. 4.5 mm. Pappus bristles white or dirty white, ca. 2 cm. Fl. and fr. Sep. $2n = 34$.

Moist grasslands in mountain valleys, forests, forest margins; 1700–2300 m. N Xinjiang (Burqin) [Kazakhstan, Russia].

22. Cirsium japonicum Candolle, Prodr. 6: 640. 1838.

蓟 ji

Carduus japonicus (Candolle) Franchet; *Cirsium belingschanicum* Petrak; *C. bodinieri* (Vaniot) H. Léveillé; *C. cerberus* (Vaniot) H. Léveillé; *C. hainanense* Masamune; *C. japonicum* var. *australe* Kitamura; *C. japonicum* var. *fukienense* Kitamura; *C. japonicum* var. *intermedium* (Maximowicz) Matsumura; *C. japonicum* var. *takaoense* Kitamura; *C. kiusianum* Nakai; *C. lacinulatum* Nakai; *C. maackii* Maximowicz var. *intermedium* (Maximowicz) Nakai; *C. maackii* var. *kiusianum* (Nakai) Nakai; *C. senile* Nakai; *C. smithianum* Petrak; *Cnicus bodinieri* Vaniot; *C. cerberus* Vaniot; *C. japonicus* (Candolle) Maximowicz; *C. japonicus* var. *intermedius* Maximowicz.

Herbs 30–80(–150) cm tall, perennial. Roots tuberous, fusiform. Stems grayish white, erect, unbranched or branched above, ribbed, unwinged, with sparse to dense long multicellular hairs mixed with dense felt under capitula. Leaves concolorous, green, with sparse multicellular hairs along veins or glabrous, surface smooth. Basal leaves present at anthesis, with winged petiole, wing spiny or with spiny teeth; leaf blade ovate, obovate, or ± narrowly elliptic, 8–20 × 2.5–8 cm, pinnately divided; segments 6–12 pairs, ovate-lanceolate, elliptic, ± narrowly triangular, or triangular-lanceolate, toothed, teeth with marginal and 2–6 mm apical spines; terminal segment largest, lanceolate to narrowly triangular. Lower and middle cauline

leaves similar but sessile, gradually smaller upward, semiamplexicaul. Capitula solitary or few, clustered at end of stem, erect or rarely nodding. Involucre campanulate, ca. 3 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage, abaxially with a dark resinous gland; outer and middle phyllaries triangular to narrowly triangular, 8–13 × 3–3.5 mm, narrowed into a 1–2 mm spine; inner phyllaries lanceolate to linear-lanceolate, 1.5–2 × 0.2–0.3 cm, apex acuminate and softly spiny. Florets bisexual. Corolla red to purple, ca. 2.1 cm, tube ca. 9 mm. Achene ca. 4 mm. Pappus bristles pale brown, ca. 2 cm. Fl. and fr. Apr–Nov.

Forests, forest margins, thickets, grasslands, wastelands, farmlands, roadsides, streamsides; 400–2100 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Hubei, Hunan, S Jiangsu, Jiangxi, Nei Mongol, NE Qinghai, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea, Russia (Far East), Vietnam].

23. Cirsium esculentum (Sievers) C. A. Meyer, Beitr. Pflanzenk. Russ. Reiches 5: 43. 1848.

莲座蓟 lian zuo ji

Cnicus esculentus Sievers, Neueste Nord. Beytr. Phys. Geogr. Erd- Volkerbeschreib. 3: 362. 1796; *Cirsium acaule* Ledebour var. *gmelinii* (Sprengel) C. A. Meyer; *C. acaule* var. *sibiricum* Ledebour; *C. esculentum* var. *acaule* C. A. Meyer; *C. gmelinii* (Sprengel) Tausch; *Cnicus gmelinii* Sprengel.

Herbs, stemless, perennial. All leaves basal, rosulate, concolorous, green, surface smooth with dense to sparse long multicellular hairs; petiole with entire, continuous wings; leaf blade oblanceolate or ± narrowly elliptic, 6–21 × 2.5–7 cm, pinnately divided; segments 4–7 pairs, basal ones usually reduced to spines, others obliquely ovate, elliptic, or semiorbicular, margin with 2–4 mm spinules and teeth tipped with spines to 1 cm; terminal segment largest. Capitula 5–9, in basal cluster. Involucre campanulate, 2.5–3 cm in diam., glabrous. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries ovate to lanceolate, 10–20 × 2–4 mm, apex acute and tipped with a spinule to 0.5 mm; inner phyllaries linear-lanceolate to linear, 2.5–3 × 0.2–0.3 cm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 2.7 cm, tube ca. 1.5 cm. Achene yellowish, ca. 5 mm. Pappus bristles white or dirty white, ca. 2.7 cm. Fl. and fr. Aug–Sep. $2n = 34$.

Moist places, by water in plains or on hilly areas; 500–3200 m. Hebei, Jilin, Liaoning, Nei Mongol, N and NW Xinjiang [Kazakhstan, Mongolia, Russia, Uzbekistan].

24. Cirsium periacanthaceum C. Shih, Acta Phytotax. Sin. 22: 396. 1984.

川蓟 chuan ji

Herbs 40–70 cm tall, perennial. Stems erect, branched above, ribbed, unwinged, densely felted with multicellular hairs. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially greenish and with multicellular hairs. Basal leaves persistent at anthesis. Cauline leaves sessile, elliptic, 12–22 × 5–7 cm, pinnately divided, auriculate semiamplexicaul; segments 4–8 pairs, ± obliquely elliptic, with 3–7 unequal triangular teeth; teeth with 4–14 mm lateral spines and apical spine. Capitula many, corymbose, surrounded by pectinately spiny bracts with pungent 2–3 cm spines. Involucre campanulate, ca. 2 cm in diam., glabrous. Phyllaries imbricate, in ca. 5 rows, lanceolate to elliptic-lanceolate, 8–12 × ca. 3 mm, lacking marginal spinules, wings, and scarious appendage, apex narrowed into a 1–5 mm spine. Florets bisexual. Corolla red, ca. 1.5 cm, tube ca. 6 mm. Achene brown, ca. 4 mm. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Jul–Sep.

• River valleys, grasslands on mountain slopes, roadsides; 2400–2600 m. Sichuan.

25. Cirsium maackii Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 172. 1859.

野蓟 ye ji

Cirsium asperum Nakai; *C. japonicum* Candolle var. *amurense* Kitamura; *C. japonicum* subsp. *maackii* (Maximowicz) Nakai; *C. japonicum* var. *maackii* (Maximowicz) Matsumura; *C. japonicum* var. *ussuriense* (Regel) Kitamura; *C. litorale* Maximowicz var. *ussuriense* Regel; *C. maackii* var. *koreiense* (Nakai) Nakai; *Cnicus japonicus* Maximowicz var. *maackii* (Maximowicz) Maximowicz; *C. maackii* (Maximowicz) Nakai; *C. maackii* var. *koreiensis* Nakai.

Herbs 40–150 cm tall, perennial. Roots tuberous, fusiform. Stems grayish white, erect, branched or unbranched, unwinged, with multicellular hairs and densely felted above. Leaves with smooth surface, concolorous with crispate hairs along veins or ± discolorous, abaxially grayish green and cobwebby. Basal and lower cauline leaves often concolorous, with winged petiole, wing spiny or with triangular spine-tipped teeth; leaf blade elliptic to lanceolate, 15–30 × 7–9 cm, pinnately divided; segments 4–8 pairs, elliptic, fringed with spinules and with unequal triangular teeth with lateral spinules less than 1 mm and a ca. 5 mm apical spine; terminal segment largest. Middle and upper cauline leaves similar but sessile, smaller, sometimes undivided, discolorous, auriculate semiamplexicaul. Capitula 1 or several, corymbose, erect or nodding. Involucre campanulate, ca. 2 cm in diam., glabrous or sparsely cobwebby. Phyllaries in ca. 5 rows, lacking marginal spinules, wings, and scarious appendage, abaxially with a dark resinous gland; outer and middle phyllaries triangular-lanceolate to lanceolate, 6–13 × 2–2.5 mm, margin ciliate, apex acute and tipped with a spinule less than 0.5 mm; inner phyllaries lanceolate to linear-lanceolate, 1.3–2.3 × 0.2–0.3 cm. Florets bisexual. Corolla purplish red, ca. 2.4 cm, tube ca. 1.2 cm. Achene yellowish, ca. 4 mm. Pappus bristles white, ca. 2 cm. Fl. and fr. Jun–Sep. $2n = 34, 36$.

Grasslands on mountain slopes, forest margins, meadows, near villages; 100–1100 m. S Anhui, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, SE Nei Mongol, E Shandong, Sichuan, N Zhejiang [Korea, Russia].

26. Cirsium racemiforme Y. Ling & C. Shih, Acta Phytotax. Sin. 22: 445. 1984.

总序蓟 zong xu ji

Herbs to 1.5 m tall, perennial. Stems erect, branched above, ribbed, unwinged, with long multicellular hairs and cobwebby; synflorescence branches densely felted. Leaves dis-

colorous, surface smooth, abaxially grayish white and densely felted, adaxially green and with multicellular hairs. Basal leaves withered at anthesis. Cauline leaves sessile, ± narrowly elliptic, 9–21 × 4–7 cm, pinnately lobed or pinnatifid, auriculate semiamplexicaul; segments 3–8 pairs, elliptic to broadly triangular, toothed; teeth fringed with ca. 2 mm spinules and with a ca. 4 mm apical spine; terminal segment largest. Bracts similar to leaves or with spiny teeth. Peduncles ca. 2 cm. Capitula 4–8, racemose. Involucre campanulate, 2.5–3 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries triangular to triangular-lanceolate, 6–9 × 1–1.5 mm, abaxially with a dark resinous gland, apex acute and tipped with a 0.8–1.2 mm spinule; inner phyllaries linear-lanceolate to linear, 14–22 × 0.5–1.5 mm, apex acuminate and scarious. Florets bisexual. Corolla purplish red, ca. 2.3 cm, tube ca. 1.2 cm. Achene yellowish, ca. 5 mm, striate. Pappus bristles dirty brown, ca. 2.2 cm. Fl. and fr. Apr–Jun.

• Mountain valleys, mountain slopes, forests, forest margins; 1000–1300 m. W Fujian, NE Guangxi, SW Guizhou, SW Hunan, NE Jiangxi, SE Yunnan.

27. Cirsium fangii Petrak, Repert. Spec. Nov. Regni Veg. 44: 48. 1938.

峨眉蓟 e mei ji

Herbs to 1.2 m tall, ?perennial. Stems branched above, ribbed, unwinged, with long sparse multicellular hairs. Leaves concolorous, green, surface smooth, glabrous or abaxially with sparse long multicellular hairs. Basal leaves present at anthesis. Lower cauline leaves petiolate; petiole 2.5–4 cm, with expanded semiamplexicaul base and spiny wings; leaf blade lanceolate to linear-lanceolate, ca. 16 × 7–10 cm, subpinnatisect; segments 6 or 7 pairs, elliptic, fringed with spinules, ca. 0.5 mm cilia, and a few triangular teeth with a ca. 2 mm apical spinule. Middle and upper cauline leaves similar but sessile, gradually smaller upward, semiamplexicaul. Bracts linear to linear-lanceolate, toothed, teeth with an apical spine to 6 mm. Capitula few, terminal on long branches, nodding. Involucre broadly campanulate, ca. 4.5 cm in diam., glabrous or sparsely cobwebby. Phyllaries in ca. 7 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries triangular-lanceolate to lanceolate, 6–15 × 1.5–3 mm, abaxially with a dark resinous gland, margin sparsely ciliate, apex acute and tipped with a 0.5–1 mm spinule; inner and innermost phyllaries linear to broadly linear, ca. 2.4 × 0.2–0.3 cm, apex acuminate. Florets bisexual. Corolla red, ca. 2.1 cm, tube ca. 6 mm. Achene ca. 3.5 mm, many ribbed. Pappus bristles brown, ca. 2 cm. Fl. and fr. Jul.

• Grasslands on mountain slopes; 2300–2400 m. Sichuan.

28. Cirsium schantarense Trautvetter & C. A. Meyer in Middendorff, Reise Sibir. 1(2): 58. 1856.

林蓟 lin ji

Cirsium diamantiacum (Nakai) Nakai; *C. japonicum* Candolle var. *litorale* (Maximowicz) Kitamura; *C. litorale* Maximowicz; *C. litorale* var. *nudum* Regel; *C. maackii* Maximowicz var. *spiniferum* Nakai; *C. pendulum* Fischer ex Candolle var. *oligocephalum* Regel & Tiling; *Cnicus diamantiacus* Nakai; *C. japonicus* (Candolle) Maximowicz var. *schantarensis* (Trautvetter & C. A. Meyer) Maximowicz.

Herbs 70–120 cm tall, perennial. Stems erect, diffusely branched above, unwinged, with sparse long multicellular hairs. Leaves concolorous, green, surface smooth, glabrous or with sparse multicellular hairs. Basal leaves withered at anthesis. Lower and middle cauline leaves petiolate; petiole base auriculate semiamplexicaul, margin winged and spiny or with spiny teeth; leaf blade elliptic, ± narrowly ovate to triangular-lanceolate, 14–27 × 8–12 cm, pinnately divided; segments 4–8 pairs, obliquely triangular, lanceolate, or broadly linear, fringed with spinules; terminal segment lanceolate. Upper cauline leaves sessile, progressively smaller, pinnately lobed or uppermost ones undivided, amplexicaul. Peduncles long. Capitula few, terminal, nodding. Involucre campanulate, ca. 2 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage, abaxially with or without a resinous gland; outer and middle phyllaries triangular to ovate-triangular, 5–8 × 1.5–2 mm, apex narrowed into a ca. 1 mm spinule; inner phyllaries lanceolate to linear-lanceolate, 10–12 × ca. 2 mm, apex narrowed into a soft spinule and scarious. Florets bisexual. Corolla purplish red, ca. 1.6 cm, tube ca. 5 mm. Achene yellowish, ca. 4.5 mm. Pappus bristles brownish, ca. 1.6 cm. Fl. and fr. Jun–Sep. $2n = 34$.

Forests, forest margins, along rivers, meadows; 1500–2000 m. Heilongjiang, Jilin, Liaoning [Russia].

29. Cirsium alatum (S. G. Gmelin) Bobrov, Bot. Zhurn. (Moscow & Leningrad) 43: 1547. 1958.

准噶尔蓟 zhun ga er ji

Serratula alata S. G. Gmelin, Reise Russland 1: 155. 1770–1774; *Carduus desertorum* (Fischer ex Link) Steudel; *Cirsium desertorum* Fischer ex Link; *C. desertorum* var. *sinuatolobatum* Trautvetter; *C. desertorum* var. *subintegerrimum* Trautvetter; *C. elodes* M. Bieberstein var. *setigerum* (Ledebour) Krylov; *C. elodes* var. *sinuatolobatum* (Trautvetter) O. Fedtschenko & B. Fedtschenko; *C. elodes* var. *subintegerrimum* (Trautvetter) O. Fedtschenko & B. Fedtschenko; *C. setigerum* Ledebour.

Herbs 30–100 cm tall, perennial. Roots tuberous, fusiform. Stem solitary, usually branched above; wings undulate, with ca. 5 mm stout rigid spines. Leaves concolorous, green, surface smooth, glabrous. Basal leaves with winged petiole; leaf blade elliptic, to 30 × 4 cm, margin with teeth ending in a 4–9 mm spine. Lower and middle cauline leaves similar but sessile, decurrent, gradually smaller upward. Upper cauline leaves lanceolate to elliptic. Capitula 1 to several, terminal, corymbose to corymbose-paniculate. Involucre ovoid, ca. 1.5 cm in diam., glabrous. Phyllaries in ca. 6 rows, lacking marginal spinules, wings, and scarious appendage; outer phyllaries ovate, ca. 3 × 1.2 mm, apex acute and tipped with a ca. 1.5 mm spinule; middle phyllaries linear-lanceolate, 5–8 × 1.7–2 mm, apex acute and tipped with a ca. 2 mm spinule; inner phyllaries linear, 8–9 × ca. 1.5 mm, apex acuminate and scarious. Florets bisexual. Corolla reddish purple, 1.8–1.9 cm, tube 7–8 mm. Achene yel-

lowish, ca. 3 mm. Pappus bristles white, 1.2–1.3 cm. Fl. and fr. Jul–Aug. $2n = 34$.

Flooded lands, grasslands by lakes, farmlands; 400–1500 m. Xinjiang (Junggar Pendi, Tian Shan) [Kazakhstan, Russia, Uzbekistan; E Europe].

30. Cirsium vernonioides C. Shih, Acta Phytotax. Sin. 22: 447. 1984.

斑鸠蓟 ban jiu ji

Herbs, perennial. Rhizome tuberous. Stem solitary, erect, ribbed, unwinged, with long multicellular hairs and cobwebby, densely felted below capitula. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and with multicellular hairs. Lower cauline leaves withered at anthesis. Middle and upper cauline leaves with petiole to 1.5 cm; leaf blade elliptic to lanceolate-elliptic, 8–11 × 2.5–4.5 cm, undivided, base cuneate, fringed with ca. 1 mm incurved spinules and sometimes alternating with ca. 2 mm patent spinules, apex acuminate. Capitula several, corymbose, erect. Involucre 2–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 8 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries 3–10 × 1.5–3 mm, basal portion triangular, lanceolate, or elliptic, apical portion subulate and narrowed into a 3–7 mm spine; inner phyllaries elliptic to linear, 1.5–2 × 0.2–0.3 cm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 2.1 cm, tube ca. 1 cm. Achene ca. 6 mm. Pappus bristles dark brown, ca. 1.8 cm. Fl. and fr. Oct.

• Guangxi (Yangshuo).

31. Cirsium handelii Petrak, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 110. 1926.

骆骑 luo qi

Herbs to 1.7 m tall, perennial. Stems erect, branched above, ribbed, unwinged, with sparse multicellular hairs and cobwebby. Leaves concolorous, green, surface smooth, glabrous or with sparse multicellular hairs. Basal leaves present at anthesis. Lower and middle cauline leaves with winged petiole, base auriculate and semiamplexicaul, wing spiny or with spiny teeth; leaf blade elliptic, to 27 × 7 cm, pinnately divided; segments ca. 6 pairs, semiorbicular, ovate-lanceolate, or broadly triangular, margin spiny or with triangular teeth tipped with a 1–4 cm spine. Upper cauline leaves similar but sessile, lanceolate, gradually smaller upward, auriculate semiamplexicaul, margin with teeth ending in a 1–4 cm spine. Capitula few to many, laxly corymbose to corymbose-paniculate or rarely solitary, ± nodding. Involucre campanulate, 3–4.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 7 rows, lacking an abaxial resinous gland, marginal spinules, wings, and scarious appendage; outer and middle phyllaries 0.7–1.5 cm × 1.5–2 mm, basal portion lanceolate, apical portion subulate, patent to reflexed, and narrowed into a short and soft spinule; inner phyllaries linear-subulate, ca. 18 × 1.5 mm, apex narrowed into a short soft spinule. Florets bisexual. Corolla purple, ca. 2.1 cm, tube ca. 1.2 cm. Achene brown, ca. 3.2 mm. Pappus bristles brownish, ca. 2 cm. Fl. and fr. May–Sep.

• Forests, forest margins, thickets, grasslands, wastelands; 1700–3400 m. Sichuan, NW and SW Yunnan.

32. Cirsium pendulum Fischer ex Candolle, Prodr. 6: 650. 1838.

烟管蓟 yan guan ji

Cirsium hilgendorfii (Franchet & Savatier) Makino; *C. provostii* (Franchet) Petrak; *Cnicus hilgendorfii* Franchet & Savatier; *C. pendulus* (Fischer ex Candolle) Maximowicz; *C. provostii* Franchet.

Herbs 1–3 m tall, perennial. Stems erect, branched above, stout, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves concolorous, surface smooth, green, glabrous. Basal and lower cauline leaves sessile or with winged petiole; leaf blade ± narrowly elliptic to oblanceolate, 40–50 × ca. 20 cm, bipinnatipartite; primary segments 5–7 pairs; ultimate lobes obliquely triangular, fringed and tipped with ca. 3 mm spines; terminal lobe of segments narrowly lanceolate to broadly linear. Middle and upper cauline leaves sessile, gradually smaller upward, semiamplexicaul. Capitula several, terminal, racemose-paniculate, nodding. Involucre campanulate, 3.5–5 cm in diam., glabrous. Phyllaries imbricate, in ca. 10 rows, lacking an abaxial resinous gland, marginal spinules, wings, and scarious appendage; outer and middle phyllaries 1–4 × 0.1–0.3 cm, basal portion triangular to lanceolate, apical portion subulate and reflexed; inner and innermost phyllaries lanceolate to linear-lanceolate, 1.2–2.5 × ca. 0.2 cm, apex acuminate-subulate. Florets bisexual. Corolla purple to red, ca. 2.2 cm, tube filiform, ca. 1.6 cm. Achene ca. 4 mm. Pappus bristles dirty white, ca. 2.2 cm. Fl. and fr. Jun–Sep. $2n = 34$.

Grasslands in mountain valleys and on mountain slopes, forests, forest margins, streamsides, near villages, rock crevices; 300–2300 m. SE Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, WC Yunnan [Japan, Korea, Mongolia, Russia].

33. Cirsium tianmushanicum C. Shih, Bull. Bot. Res., Harbin 4(2): 64. 1984.

杭蓟 hang ji

Herbs to 1 m tall, perennial. Stems erect, branched above, unwinged, felted below capitula. Leaves concolorous, green, surface smooth, with sparse crispate hairs along veins or glabrous. Upper cauline leaves with winged petiole 2–2.5 cm; leaf blade elliptic to rarely ovate, 10–15 × 6–7 cm, undivided, margin serrulate, teeth with lateral spinules less than 1 mm, apex acute and with a 1–1.5 mm spinule. Uppermost leaves and bracts similar but narrower. Capitula few to many, corymbose, erect, not surrounded with pectinately spiny pungent bracts. Involucre ovoid, 2–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 8 rows; outer and middle phyllaries triangular-lanceolate, ovate-lanceolate, or linear-elliptic, 5–16 × 2–3 mm, apex tipped with a 0.5–1 mm spinule; inner phyllaries linear to broadly linear, ca. 18 × 1–2 mm, apically expanded into a scarious red appendage. Florets bisexual. Corolla white, ca. 2.3 cm, tube ca. 1.1 cm. Achene ca. 4.5 mm. Pappus bristles white, ca. 2 cm. Fl. and fr. Oct.

• Forests; ca. 1300 m. Zhejiang (Tianmu Shan).

34. Cirsium chinense Gardner & Champion, Hooker's J. Bot. Kew Gard. Misc. 1: 323. 1849.

绿蓟 lü ji

Cirsium chinense var. *laushanense* (Y. Yabe) Kitamura; *C. laushanense* Y. Yabe; *C. lineare* (Thunberg) Schultz Bipontinus var. *glabrescens* Petrak; *C. lineare* var. *laushanense* (Y. Yabe) Kitamura; *C. lineare* var. *tchefouense* (Debeaux) Y. Ling; *C. manshuricum* Kitagawa; *C. tchefouense* Debeaux; *C. uninervium* (H. Léveillé & Vaniot) Nakai var. *laushanense* (Y. Yabe) Kitagawa; *Cnicus chinensis* (Gardner & Champion) Bentham ex Maximowicz; *C. tchefouensis* (Debeaux) Franchet.

Herbs 40–100 cm tall, perennial. Stems erect, branched in upper half, rarely unbranched, unwinged, with crispate hairs, below capitula also ± cobwebby. Leaves concolorous, green, surface smooth, glabrous or with long crispate hairs along veins. Basal and lower cauline leaves petiolate; leaf blade elliptic to lanceolate and pinnately divided or narrower to sometimes linear and undivided, 5–7 × 1–4 cm; segments (when present) 3 or 4 pairs, margin with 3 or 4 unequal teeth with 1–2 mm lateral spinules and a to 4 mm apical spine. Middle and upper cauline leaves usually undivided, margin with spines to 3 mm. Capitula (1 or) few, irregularly corymbose, not surrounded with pectinately spiny pungent bracts. Involucre ovoid, ca. 2 cm in diam., glabrous or subglabrous. Phyllaries imbricate, in ca. 7 rows, abaxially often with a dark resinous gland; outer phyllaries triangular, 5–8 × 1.2–2 mm, apex acute to acuminate and tipped with a ca. 0.5 mm spinule; middle and inner phyllaries lanceolate to linear-lanceolate, 1–1.4 cm × 2–3 mm; inner phyllaries apically expanded into a scarious purplish pink denticulate appendage. Florets bisexual. Corolla purplish red, ca. 2.4 cm, tube ca. 1.2 cm. Achene ca. 4 mm. Pappus bristles dirty white, ca. 1.5 cm. Fl. and fr. Jun–Oct.

• Grasslands on mountain slopes; 100–1600 m. Fujian, Guangdong, Guangxi, Hebei, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Shandong, Sichuan, Zhejiang.

35. Cirsium lineare (Thunberg) Schultz Bipontinus, Linnaea 19: 335. 1846.

线叶蓟 xian ye ji

Carduus linearis Thunberg in Murray, Syst. Veg., ed. 14, 726. 1784; ?*Cirsium hupehense* Pampanini; *C. lineare* var. *franchetii* Kitamura; *C. lineare* var. *latifolium* H. C. Fu; *C. lineare* f. *oreithales* (Hance) Koyama; *C. lineare* f. *pallidum* Kitamura; *C. lineare* var. *pallidum* (Kitamura) Y. Ling; *C. lineare* var. *salicifolium* Y. Ling; *C. lineare* var. *tsoongianum* (Y. Ling) Y. Ling; *C. oreithales* Hance; *C. tsoongianum* Y. Ling; *Cnicus linearis* (Thunberg) Bentham & J. D. Hooker ex Franchet & Savatier; *Spanioptilon lineare* (Thunberg) Lessing.

Herbs (0.3–)0.6–1.5 m tall, perennial. Stems erect, branched from base or above, ribbed, unwinged, cobwebby and with long crispate hairs to glabrous. Leaves discolorous, abaxially grayish white and cobwebby, adaxially green, glabrous, with some crispate hairs, or ± densely covered with hair-tipped papillae and surface slightly rough but not spinulose. Lower and middle cauline leaves sessile or shortly petiolate; leaf blade ovate, lanceolate, elliptic, or oblanceolate, 6–18(–23) × 1.5–3(–5) cm, undivided or rarely with a few lobules or teeth in proximal third, base cuneate, margin ± regularly spinulose, apex obtuse to caudate-acuminate. Upper cauline leaves similar but always sessile, often narrower, gradually smaller upward. Capitula terminal, laxly corymbose, not surrounded with pectinately spiny pungent bracts. Involucre ± narrowly ovoid, 1–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 6 rows, abaxially with a dark resinous gland; outer and middle phyllaries triangular-lanceolate, 5–8 × ca. 1 mm, tipped with a spinule to 2 mm; inner phyllaries triangular-lanceolate to linear, 10–15 × 1–3.5 mm, apically expanded into a scarious, acuminate, pale or purplish pink, and irregularly denticulate appendage. Florets bisexual. Corolla purplish red to pink, 2–2.2 cm, tube equaling limb. Achene ca. 2.5 mm. Pappus brownish to dirty white, ca. 1.5 cm. Fl. and fr. Aug–Oct.

Mountain slopes, thickets, forest margins, grasslands, roadsides, wastelands, farmlands; 500–2500 m. S Anhui, Chongqing, Fujian, S Gansu, Guangdong, Guizhou, Hebei, Henan, Hubei, Hunan, NE Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, NE Thailand, Vietnam].

Cirsium lineare is variable in leaf shape and papillosity as well as features of the involucre, but any attempt at subdividing it is premature. *Cirsium hupehense* is sometimes regarded as distinct; it was described with phyllaries ending in long, patent to recurved spines, a feature we have not observed in any of our material.

36. Cirsium shansiense Petrak, Mitth. Thüring. Bot. Vereins 50: 176. 1943.

牛口蓟 niu kou ji

Cirsium chinense Gardner & Champion var. *australe* Diels; *C. lineare* (Thunberg) Schultz Bipontinus var. *intermedium* (Pampanini) Petrak; *C. lineare* var. *rigidum* Petrak; *C. lineare* var. *spatulatum* Petrak; *C. lineare* var. *tenii* Petrak; *C. lineare* var. *yunnanense* Petrak; *C. wallichii* Candolle var. *intermedium* Pampanini.

Herbs 30–150 cm tall, perennial. Stems erect, branched or unbranched, ribbed, unwinged, with long multicellular hairs and felted. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and glabrous or with long crispate hairs. Middle cauline leaves sessile or petiolate; leaf blade ovate, lanceolate, or ± narrowly elliptic, 5–14 × 1–6 cm, pinnately lobed to pinnatipartite at least in proximal half; segments 3–6 pairs, obliquely triangular to obliquely elliptic, with a 3–6 mm apical spine; terminal segment narrowly triangular to linear. Upper cauline leaves similar but gradually smaller upward. Capitula (1 or) few to many, terminal, paniculate-corymbose, not surrounded with pectinately spiny pungent bracts. Involucre ovoid, 2–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 7 rows, abaxially with a dark resinous gland; outer phyllaries triangular-lanceolate to ovate-lanceolate, 8–10 mm, tipped with a ca. 1 mm spinule; middle and inner phyllaries lanceolate to broadly linear, 12–17 × 1.2–3 mm; inner phyllaries apically expanded into a scarious, pale to pink, and often denticulate appendage. Florets bisexual. Corolla pink to purple, ca. 1.8 cm, tube ca. 8 mm. Achene ca. 4 mm. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. May–Nov.

Forests, thickets, wastelands by rivers, streamsides, roadsides; 1300–3400 m. Anhui, Chongqing, SE Fujian, S Gansu, NE Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, S Hunan, NW Jiangxi, Nei Mongol, E Qinghai, S Shaanxi, Shanxi, Sichuan, NE Xizang, Yunnan [Bhutan, India, Myanmar, Vietnam].

The occurrence of *Cirsium chinense* reported from Vietnam by K. B. Lê (Fl. Vietnam 7: 454. 2007) is actually *C. shansiense*.

37. Cirsium leducii (Franchet) H. Léveillé, Cat. Pl. Yun-Nan, 42. 1916.

覆瓦蓟 fu wa ji

Cnicus leducii Franchet, J. Bot. (Morot) 11: 23. 1897.

Herbs 30–150 cm tall, perennial. Stems grayish white, erect, much branched above or rarely unbranched, unwinged, densely felted below capitula. Leaves discolorous, abaxially grayish white and densely felted, adaxially green, rough, and sparsely to densely spinulose. Middle cauline leaves sessile, lanceolate to ± narrowly elliptic, 4–10 × 1–3 cm, undivided or pinnately divided; segments (when present) 3–5 pairs, triangular, margin entire or with 1 spine-tipped tooth, apical spine ca. 3.5 mm; terminal segment narrowly lanceolate to broadly linear. Upper cauline leaves similar, usually undivided. Bracts smaller than leaves, lanceolate to linear-lanceolate, fringed with spinules or spinulose teeth. Capitula (1 or) few to many, corymbose. Involucre campanulate, 2–2.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 6 rows, abaxially with a dark resinous gland; outer and middle phyllaries lanceolate, 5–11 × 1–2 mm, apex narrowed into a ca. 1.5 mm spinule; inner phyllaries elliptic-lanceolate to broadly lanceolate, 12–16 × 1.2–2 mm, apically expanded into a scarious white or pink appendage. Florets bisexual. Corolla purplish red, ca. 1.9 cm, tube ca. 9 mm. Achene dark brown, ca. 3 mm, striate. Pappus bristles brownish, ca. 1.5 cm.

Forests, forest margins, grasslands on mountain slopes; 500–1500 m. Guangdong, Guangxi, Guizhou, Sichuan, Yunnan [Vietnam].

38. Cirsium semenowii Regel, Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 161. 1867 [*"Semenowi"*].

新疆蓟 xin jiang ji

Chamaepeuce macrantha Schrank var. *bracteata* Ruprecht; *Cnicus semenowii* (Regel) C. Winkler.

Herbs 50–60(–80) cm tall, perennial. Stems erect, branched above, unwinged, with sparse long multicellular hairs and cobwebby. Leaves concolorous, green, surface smooth, glabrous. Lower and middle cauline leaves with long, winged petiole; wing margin with spinules and spine-tipped teeth; leaf blade lanceolate, linear-lanceolate, or elliptic, to 15 × 3.5 cm, pinnatifid; segments 4–6 pairs, elliptic to ovate, with unequal triangular teeth, teeth with a 0.3–2 cm apical spine. Upper cauline leaves similar but sessile, gradually smaller upward, semiamplexicaul. Capitula few to many, racemose to glomerate, erect, surrounded by pectinately spiny bracts with long pungent spines. Involucre ovoid, ca. 2(–3) cm in diam., glabrous or very sparsely cobwebby. Phyllaries in ca. 7 rows, lacking an abaxial resinous gland, marginal spinules, wings, and scarious appendage; outer phyllaries 10–14 × 2–2.5 mm, basal portion triangular, apical portion subulate and narrowed into a 6–9 mm spine; middle phyllaries 12–13 × ca. 2.5 mm, basal portion ovate, apical portion subulate and narrowed into a 5–6 mm spine; inner phyllaries linear to linear-lanceolate, 12–15 × 1.5–2 mm, apex acuminate and scarious. Florets bisexual. Corolla red, ca. 1.9 cm, tube ca. 8 mm. Achene brown, ca. 5 mm. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Jul–Oct.

Alpine meadows, forests, by water, wastelands; 1700–3000 m. Xinjiang (Tian Shan) [Kazakhstan, Uzbekistan].

39. Cirsium sairamense (C. Winkler) O. Fedtschenko & B. Fedtschenko, Consp. Fl. Turkestan. 4: 286. 1911.

赛里木蓟 sai li mu ji

Cnicus sairamensis C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 522. 1886; *Cirsium semenowii* Regel subsp. *sairamense* (C. Winkler) Petrak.

Herbs 20–60 cm tall, perennial. Stems erect, branched from base or middle, unwinged, sparsely cobwebby and with long multicellular hairs. Leaves discolorous, surface smooth, abaxially grayish green and sparsely cobwebby, adaxially green and with long multicellular hairs. Lower and middle cauline leaves sessile, elliptic or ± narrowly lanceolate, 13–20 × 4–6 cm, pinnately divided, semiamplexicaul; segments 4–7 pairs, elliptic to triangular-ovate, with 3–5 unequal, triangular teeth fringed with 2–3 mm spinules and with a 1–2 cm apical spine. Upper cauline leaves similar but gradually smaller upward. Capitula many, terminal, corymbose-paniculate, erect or nodding, surrounded by pectinately spiny bracts with long pungent spines. Involucre campanulate to ovoid, ca. 2.5 cm in diam., glabrous or sparsely cobwebby. Phyllaries imbricate, in 7 or 8 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries ca. 4 × 0.2–0.3 cm, basal portion triangular, apical portion subulate, rigid, patent to reflexed, and tipped with a ca. 3 cm spine; inner phyllaries lanceolate, elliptic, or linear, 10–20 × 1–2 mm, apex acuminate and scarious. Florets bisexual. Corolla purple, ca. 2.2 cm, tube ca. 9 mm. Achene brownish, ca. 5 mm. Pappus bristles dirty white, ca. 1.5 cm. Fl. and fr. Jul–Sep.

Mountain slopes, mountain valleys, by water, moist places; 1700–2300 m. Xinjiang (Tian Shan) [Kazakhstan, Uzbekistan].

40. Cirsium alberti Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 318. 1880.

天山蓟 tian shan ji

Herbs 45–50 cm tall, perennial. Stems branched from base, ribbed, unwinged, densely cobwebby and with sparse long multicellular hairs. Leaves discolorous, surface smooth, abaxially grayish white and densely felted, adaxially green and with sparse long hairs. Lower cauline leaves with spiny winged petiole; leaf blade elliptic-lanceolate to lanceolate, 22–27 × ca. 7 cm, pinnatipartite; segments 4–8 pairs, triangular-ovate to elliptic, fringed with 0.5–2 mm spinules and with 3–5 teeth tipped with a 5–11 mm spine. Middle and upper cauline leaves sessile, lanceolate to narrowly lanceolate, gradually smaller upward, auriculate semiamplexicaul. Capitula several to many, terminal, corymbose to corymbose-paniculate, erect or nodding,

surrounded by pectinately spiny bracts with long pungent spines. Involucre subovoid to campanulate, ca. 2 cm in diam., glabrous. Phyllaries imbricate, in 7 or 8 rows, lacking marginal spinules, wings, and scarious appendage; outer and middle phyllaries 8–16 × 2–3 mm, basal portion triangular, ovate, or lanceolate, apical portion subulate, patent to reflexed, and tipped with a 4–8 mm spine; inner and innermost phyllaries lanceolate to linear, 12–20 × 1–2 mm, apex acuminate and scarious. Florets bisexual. Corolla yellow or white, ca. 1.9 cm, tube ca. 8 mm. Achene brown with darker striae, ca. 4 mm. Pappus bristles white, ca. 1.5 cm. Fl. and fr. Jul–Sep.

Forest margins in mountain valleys, mountain slopes, flooded lands, by streams; 1000–2400 m. Xinjiang (Tian Shan) [Kazakhstan].

41. Cirsium argyracanthum Candolle, Prodr. 6: 640. 1838.

南蓟 nan ji

Cirsium tibeticum Kitamura; *Cnicus argyracanthus* (Candolle) C. B. Clarke.

Herbs 30–100 cm tall, perennial. Stems erect, branched above, unwinged, with sparse long multicellular hairs, also cobwebby above. Leaves concolorous, green, surface smooth, with long multicellular hairs along veins. Middle cauline leaves sessile, elliptic-lanceolate to elliptic, 8–14 × 2–4 cm, pinnately divided, auriculate semiamplexicaul; segments 4–9 pairs, each with 3–5 unequal teeth with 1–2 mm lateral spinules and a 4–7 mm apical spine. Upper cauline leaves with sparse teeth tipped with a 0.7–1.4 cm spine. Capitula few to many, spicate, racemose, or racemose-paniculate, erect, surrounded by pectinately spiny bracts with pungent spines to 1.5 cm. Involucre ovoid, 1.5–2 cm in diam., glabrous. Phyllaries imbricate, in ca. 6 rows; outer phyllaries triangular, 7–8 × 1.5–2 mm, narrowed into a 3–4 mm spine; middle phyllaries lanceolate to ovate-lanceolate, ca. 10 × 2 mm, lacking membranous wings, narrowed into a 2–3 mm apical spinule; inner phyllaries linear-elliptic to broadly linear, ca. 13 × 2–3 mm, apically expanded into a scarious appendage. Florets bisexual. Corolla purple or white, ca. 1.6 cm, tube ca. 8 mm. Achene yellowish, ca. 3 mm. Pappus bristles brownish, ca. 1.4 cm. Fl. and fr. Jun–Oct. $2n = 34$.

Forests, forest margins, grasslands, thickets by rivers, by farmlands; 2100–3700 m. Xizang, NW Yunnan [Bhutan, India, Nepal, Pakistan].

42. Cirsium glabrifolium (C. Winkler) Petrak, Oesterr. Bot. Z. 61: 324. 1911.

无毛蓟 wu mao ji

Cnicus glabrifolius C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 523. 1885.

Herbs 70–100 cm tall, perennial. Stems erect, ribbed, unwinged, with sparse multicellular hairs. Leaves concolorous, green, surface smooth, abaxially with scattered multicellular hairs, adaxially glabrous. Middle cauline leaves sessile, elliptic to elliptic-lanceolate, to 20 × 8 cm, pinnately divided, semiamplexicaul; segments 5 or 6 pairs, elliptic, ovate, or triangular-ovate, with 3–5 unequal teeth tipped with a 5–12 mm spine. Upper cauline leaves similar but narrower, gradually smaller upward, undivided but with spiny teeth and apex. Capitula many, paniculate, surrounded by pectinately spiny bracts with long pungent spines. Involucre ovoid, 1.5–2 cm in diam., glabrous or very sparsely cobwebby. Phyllaries imbricate, in ca. 6 rows; outer phyllaries lanceolate, 6–7 × 1–2 mm, basal portion usually with pectinately spinulose margin, narrowed into a ca. 3 mm apical spinule; middle phyllaries triangular-lanceolate to lanceolate, 12–15 × 2–3 mm, above base with loosely and irregularly lacerate scarious wings, apically spine-tipped; inner phyllaries linear-lanceolate, ca. 15 × 2 mm, apically with a spiny-tipped appendage. Florets bisexual. Corolla purplish red, ca. 1.8 cm, tube ca. 9 mm. Achene yellowish with darker striae, ca. 4 mm. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Aug–Sep.

Mountain slopes, thickets; 2500–2700 m. Xinjiang (Tian Shan), S Xizang [India, Kashmir, Kazakhstan, Uzbekistan].

43. Cirsium sieversii (Fischer & C. A. Meyer) Petrak, Oesterr. Bot. Z. 61: 324. 1911.

附片蓟 fu pian ji

Echenais sieversii Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 44. 1841.

Herbs 1–2 m tall, perennial. Stems erect, long branched, unwinged, with sparse long multicellular hairs. Leaves concolorous, green, surface smooth, glabrous or ± hairy. Upper cauline leaves sessile, elliptic to lanceolate, 10–18 × 3–6 cm, pinnately lobed or pinnatifid; segments 3–5 pairs, obliquely ovate to semiorbicular, with 3–5 unequal triangular teeth each with few to many lateral spinules and a 4–6 mm apical spine. Capitula 3–6 in terminal cluster or many, terminal, and paniculate, surrounded by pectinately spiny bracts with long pungent spines. Involucre narrowly ovoid, 1.5–2 cm in diam., glabrous. Phyllaries imbricate, in ca. 7 rows; outer and middle phyllaries 3–10 × 1–2 mm, above base with densely and regularly denticulate-lacerate wings, apex narrowed into a 1–3 mm spinule; inner phyllaries 10–12 × ca. 1 mm, apex acuminate and scarious. Florets bisexual. Corolla purplish red, ca. 2 cm, tube as long as limb. Mature achene not seen. Pappus bristles brownish, ca. 1.5 cm. Fl. and fr. Jul–Oct.

Forests on mountain slopes, by water; 1600–2900 m. N Xinjiang [Kazakhstan, Russia, Uzbekistan].

44. Cirsium chrysolepis C. Shih, Acta Phytotax. Sin. 22: 451. 1984.

黄苞蓟 huang bao ji

Herbs to 1 m tall, perennial. Stems erect, branched above, unwinged. Leaves discolorous, abaxially grayish white and sparsely cobwebby, adaxially green, rough, and densely covered with ca. 0.5 mm spinules. Lower and middle cauline leaves not seen. Upper leaves of branches sessile, elliptic to lanceolate, 4–8 × ca. 2 cm, pinnately lobed; segments ca. 3 pairs, lanceolate to obliquely triangular-ovate, with 2–4 unequal triangular teeth fringed with spinules less than 0.5 mm and with a 5–10 mm apical spine. Bracts numerous, lanceolate, with spiny teeth and marginal spines to 2 cm. Capitula corymbose, erect. Involucre campanulate, 3–3.5 cm in diam., glabrous. Phyllaries imbricate, in ca. 8 rows, straight, appressed;

outer and middle phyllaries elliptic to lanceolate, 8–25 × 2–3 mm, margin above base expanded into yellowish, scarious lacerate wings, apex narrowed into a spine; inner phyllaries lanceolate to linear, apically expanded into a short and narrow, acuminate, and spine-tipped appendage. Florets bisexual. Corolla purplish red. Mature achene unknown. Pappus bristles yellowish, ca. 1.5 mm. Fl. Aug.

• Mountain slopes; ca. 3500 m. S Xizang (Nyalam).

Cirsium chrysolepis is allied to *C. flavisquamatum* Kitamura from Nepal but differs in having cobwebby leaves.

45. Cirsium arvense (Linnaeus) Scopoli, Fl. Carniol., ed. 2, 2: 126. 1772.

丝路蓟 si lu ji

Herbs 30–160 cm tall, perennial, dioecious. Roots far creeping, bearing adventitious shoots. Stems erect, branched above, unwinged. Leaf surface smooth. Capitula often numerous, terminal, corymbose. Involucre ± narrowly ovoid, 1.5–2 cm in diam. Phyllaries imbricate, in 5–7 rows, lacking wings and scarious appendage; outer and middle phyllaries triangular to ovate, 3–8 × 1.2–2.5 mm, apex acute; inner phyllaries elliptic-lanceolate to broadly linear, 9–20 × 1–3 mm, apex acute to acuminate and scarious. Corolla reddish purple or rarely white; female florets 1.6–2.4 cm, tube 1.3–1.8 cm; male florets 1.5–1.8 cm, tube 0.9–1.2 cm. Achene yellowish, 3–4.5 mm. Pappus bristles dirty white, 2.5–3.5 cm.

Moist places, ditches, farmlands, lakesides, grasslands, mountain slopes, roadsides, near villages, by rivers, wet or flooded lands; 100–4300 m. Anhui, Chongqing, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Zhejiang [Afghanistan, India, Japan, Kazakhstan, Korea, Mongolia, Nepal, Russia; SW Asia, Europe].

Cirsium arvense is one of the world's most noxious weeds of cultivated land. Its strong potential for vegetative multiplication from long trailing roots or root fragments results in morphologically uniform clonal stands, which at times have led to the recognition of some of the variants as distinct species.

1a. Lower cauline leaves pinnately divided, segments with 2–5 triangular spiny teeth.
  2a. Leaves ± concolorous, green, glabrous or abaxially sparsely cobwebby ..... 45a. var. *arvense*
  2b. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and glabrous ..... 45b. var. *alpestre*
1b. Lower cauline leaves simple, or if lobed then with entire spinulose lobes.
  3a. Leaves ± concolorous, green, glabrous or abaxially sparsely cobwebby ..... 45c. var. *integrifolium*
  3b. Leaves discolorous, abaxially grayish white and densely and thickly felted, adaxially green and glabrous or sparsely cobwebby ..... 45d. var. *vestitum*

45a. Cirsium arvense var. **arvense**

丝路蓟(原变种) si lu ji (yuan bian zhong)

Serratula arvensis Linnaeus, Sp. Pl. 2: 820. 1753; *Breea arvensis* (Linnaeus) Lessing; *Carduus arvensis* (Linnaeus) Robson; *Cephalonoplos arvensis* (Linnaeus) Fourreau; *Cirsium ochrolepideum* Juzepczuk; *Cnicus arvensis* (Linnaeus) Roth.

Stems glabrous but sparsely cobwebby below capitula. Leaves ± concolorous, green, glabrous or abaxially very sparsely cobwebby. Lower cauline leaves ± shortly petiolate; leaf blade elliptic to elliptic-lanceolate, 7–17 × 1.5–4.5 cm, pinnately lobed or pinnatifid; segments 3–5 pairs, obliquely triangular to obliquely elliptic, with 2 or 3 teeth each with lateral spinules and a ca. 5 mm apical spine. Middle and upper cauline leaves similar but sessile, base semiamplexicaul. Involucre very sparsely cobwebby. Outer and middle phyllaries with a ca. 0.5 mm patent to reflexed apical spinule. Fl. and fr. Jun–Sep. $2n$ = 34, 34+0–1B, 51, 68.

Moist places by ditches, farmlands, lakesides; 700–4300 m. Gansu, Xinjiang, Xizang [Afghanistan, India, Kazakhstan, Nepal; SW Asia, Europe].

45b. Cirsium arvense var. **alpestre** Nägeli, Neue Denkschr. Allg. Schweiz. Ges. Gesammten Naturwiss. 5(1): 104. 1840.

藏蓟 zang ji

Aplotaxis cirsioides Candolle; *Cephalonoplos arvensis* var. *alpestris* (Nägeli) Kitamura; *Cirsium lanatum* (Willdenow) Sprengel; *Cnicus lanatus* Willdenow.

Stems densely cobwebby-felted or glabrous. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and glabrous. Lower cauline leaves sessile or shortly petiolate; leaf blade elliptic to oblanceolate, 7–12 × 2.5–3 cm, pinnately lobed or pinnatifid or lower ones undivided, base cuneate; segments (0–)3–5 pairs, semiorbicular, broadly ovate, or elliptic, with (2 or)3–5 triangular teeth each with lateral spinules and a 3.5–10 mm apical spine. Upper cauline leaves similar but smaller. Involucre glabrous. Outer and middle phyllaries tipped with a 2.5–4 mm spinule. Fl. and fr. Jun–Sep.

Grasslands on mountain slopes, moist places, roadsides, near villages; 500–4300 m. Gansu, Qinghai, Xinjiang, Xizang [Europe].

45c. Cirsium arvense var. **integrifolium** Wimmer & Grabowski, Fl. Siles. 2(2): 92 ["82"]. 1829.

刺儿菜 ci er cai

Breea segetum (Bunge) Kitamura; *Carduus segetum* (Bunge) Franchet; *Cephalonoplos segetum* (Bunge) Kitamura; *Cirsium argunense* Candolle; *C. arvense* f. *albiflorum* Kitagawa; *C. arvense* var. *mite* Wimmer & Grabowski; *C. arvense* var. *setosum* (Willdenow) C. A. Meyer; *C. arvense* var. *subulatum* (Ledebour) Ledebour; *C. laevigatum* Tausch; *C. segetum* Bunge; *C. setosum* (Willdenow) M. Bieberstein; *C. setosum* f. *albiflorum* (Kitagawa) Kitagawa; *C. setosum* var. *subulatum* Ledebour; *Cnicus arvensis* var. *setosus* (Willdenow) Maximowicz; *C. setosus* (Willdenow) Besser; *Serratula setosa* Willdenow.

Stems glabrous or sparsely felted. Leaves ± concolorous, surface smooth, abaxially green to grayish green and glabrous or sparsely cobwebby, adaxially green and glabrous. Lower and middle cauline leaves usually sessile, ± narrowly elliptic to elliptic-lanceolate, 7–15 × 1.5–10 cm, undivided or sometimes pinnately divided into entire lobes, base usually cuneate, margin entire and densely fringed with tender spinules, apex obtuse to rounded. Upper cauline leaves elliptic, lanceolate, or linear-lanceolate, gradually smaller upward. Involucre glabrous. Outer and middle phyllaries with an apical spinule less than 0.5 mm. Fl. and fr. May–Sep.

Mountain slopes, by rivers, wet lands, farmlands; 100–2700 m. Anhui, Chongqing, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Zhejiang [Japan, Korea, Mongolia, Russia; SW Asia, Europe].

Cirsium arvense var. *integrifolium* is the most common variant in China. The whole plant is used medicinally.

45d. Cirsium arvense var. **vestitum** Wimmer & Grabowski, Fl. Siles. 2(2): 92 ["82"]. 1829.

阿尔泰蓟 a er tai ji

Cirsium argenteum Peyer ex Vest; *C. arvense* var. *argenteum* (Peyer ex Vest) Fiori; *C. arvense* var. *incanum* (S. G. Gmelin) Ledebour; *C. incanum* (S. G. Gmelin) Fischer ex M. Bieberstein; *Serratula incana* S. G. Gmelin.

Stems grayish white, cobwebby-felted in upper half. Leaves discolorous, abaxially grayish white and densely felted, adaxially green and glabrous or sparsely cobwebby. Lower and middle cauline leaves sessile with cuneate base, elliptic to ovate, 7–8 × ca. 3.4 cm, undivided or sometimes pinnately divided into entire lobes, base cuneate, densely fringed with tender 0.2–0.5 mm spinules. Upper cauline leaves similar but smaller. Involucre glabrous. Outer and middle phyllaries tipped with a ca. 1 mm spinule. Fl. and fr. Aug–Sep. $2n = 34, 68$.

Grasslands on flooded lands; 500–1700 m. Xinjiang (Altay Shan) [Kazakhstan; SW Asia, Europe].

46. Cirsium shihianum Greuter, **nom. nov.**

薄叶蓟 bao ye ji

Replaced synonym: *Cirsium tenuifolium* C. Shih, Acta Phytotax. Sin. 22: 452. 1984, not *Cirsium tenuifolium* (Gaudin) Hagenbach, Verh. Schweiz. Naturf. Ges. 23: 235. 1838.

Herbs to 40 cm tall, ?annual, dioecious. Stems erect, unbranched or rarely with up to 10 branches above, unwinged, with sparse long multicellular hairs. Leaves subconcolorous, abaxially pale green and glabrous or very sparsely cobwebby, adaxially green and with sparse long multicellular hairs. Lower cauline leaves withered at anthesis. Middle cauline leaves sessile, elliptic to elliptic-lanceolate, 6–18 × 1.3–2 cm, undivided, auriculate semiamplexicaul, fringed with ca. 3 mm spinules alternating with ca. 5 mm spines, apex acute to acuminate. Upper cauline leaves linear-lanceolate to narrowly linear, gradually smaller upward. Capitula 1 to few. Involucre narrowly ovoid to narrowly ellipsoid, 1.5–2 cm, glabrous. Phyllaries imbricate, in ca. 7 rows, lacking wings and scarious appendage; outer phyllaries triangular, ca. 5 × 1–1.5 mm, tipped with a 1–2 mm recurved to reflexed spinule; middle phyllaries ovate-lanceolate to lanceolate, 7–10 × 2–3 mm, apex acuminate; inner phyllaries linear to linear-lanceolate, ca. 15 × 2 mm, apex acuminate. Corolla red, ca. 1.7 cm; tube in male florets ca. 8 mm and in female florets ca. 7.5 mm. Achene yellowish, ca. 4 mm. Pappus bristles white, to 1.5 cm. Fl. and fr. Jul–Aug.

• Forests in mountain valleys, grasslands; 1400–1600 m. Xinjiang (Altay Shan).

34. CARDUUS Linnaeus, Sp. Pl. 2: 820. 1753.

飞廉属 fei lian shu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, biennial or perennial. Stems with spiny wings. Leaves subentire or pinnately divided, spiny. Capitula solitary to clustered. Involucre cylindric to depressed-globose. Phyllaries imbricate. Florets bisexual. Corolla purple to red or rarely white. Stamen filaments densely pubescent; anther with short, basal appendages entire to somewhat lacerate. Style branches short. Achene narrowly obovoid, laterally compressed, often with 10–15 slender longitudinal striae but otherwise smooth; elaiosome crowned by an inconspicuous disk. Pappus 4 or 5 rows of scabrid bristles, outer ones shorter than inner.

About 95 species: tropical Africa, Asia, Europe; three species in China.

1a. Capitula solitary, ± nodding; involucre 4–7 cm in diam.; outer and middle phyllaries 4–5 mm wide, distal portion narrowed at base ..... 1. *C. nutans*

1b. Capitula clustered by 3–5 or sometimes solitary, erect; involucre 1.5–2(–2.5) cm in diam.; phyllaries to 2 mm wide, distal portion not narrowed at base.

2a. Plants dark green; leaves abaxially sometimes gray and thinly cobwebby; leaf and wing spines weak, to 3 mm ..... 2. *C. crispus*

2b. Plants light green or bluish green; leaves concolorous and hardly cobwebby; major leaf and wing spines pungent, 3–6 mm ..... 3. *C. acanthoides*

1. Carduus nutans Linnaeus, Sp. Pl. 2: 821. 1753.

飞廉 fei lian

Carduus armenus Boissier; *C. coloratus* Tamamschjan; *C. leiophyllus* Petrovič; *C. nutans* subsp. *leiophyllus* (Petrovič) Stojanov & Stefanov; *C. schischkinii* Tamamschjan; *C. songoricus* Tamamschjan; *C. thoermeri* Weinmann.

Herbs 30–100 cm tall, biennial or perennial. Stems grayish

white, usually branched, sparsely cobwebby and hirsute below, densely cobwebby-felted above; wings continuous, unequally toothed; teeth triangular, margin and apex with spines. Leaves green, concolorous, hirsute along veins or sparsely cobwebby. Lower and middle cauline leaves sessile, ovate to lanceolate, (5–)10–40 × (1.5–)3–10 cm, pinnatifid or pinnatipartite; segments 5–7 pairs, obliquely triangular to triangular-ovate, margin spinulose, apex with a 4–6 mm spine. Upper cauline leaves similar but gradually smaller upward, pinnately lobed or entire. Capitula 4–6, solitary at end of stem and branches, ± nodding. Involucre ± broadly campanulate, 4–7 cm in diam. Phyllaries slightly constricted at or beyond middle then expanded into a lanceolate, spiny-tipped, and patent to recurved distal portion; outer phyllaries 14–15 × 4–5 mm; middle and inner phyllaries 1.5–2 × ca. 0.5 cm; innermost phyllaries broadly linear to linear-lanceolate, 2–2.2 × 0.2–0.3 cm, not constricted. Corolla purplish red, ca. 2.5 cm, tube ca. 1.3 cm. Achene grayish yellow with pale brown striae, ca. 3.5 mm. Pappus bristles white, unequal, to 2 cm. Fl. and fr. Jun–Sep. $2n = 16, 40$.

By croplands, grasslands, valleys; 500–2300 m. N Xinjiang [Kazakhstan, Mongolia, Russia; N Africa, SW Asia, Europe].

Carduus nutans is a variable species. At least fifteen subspecies have been recognized in the western, European part of its range. *Carduus nutans* subsp. *nutans* does not extend to Asia. The Chinese plants probably belong to *C. nutans* subsp. *leiophyllus*, as the synonymy indicates, but more research is needed.

2. Carduus crispus Linnaeus, Sp. Pl. 2: 821. 1753.

丝毛飞廉 si mao fei lian

Herbs 40–150 cm tall, biennial or perennial. Stems erect, apically usually branched, sparsely hirsute, usually cobwebby above; wings toothed, teeth with slender spines 1–3 mm at margin and apex. Leaves dark green, abaxially sometimes gray and thinly cobwebby, sparsely hirsute along veins. Lower cauline leaves sessile, ± narrowly elliptic or oblanceolate, 5–18 × 1–7 cm, pinnatifid or lowermost undivided; segments 7–12 pairs, elliptic, triangular, or ovate-triangular, margin spinulose and unequally toothed, teeth triangular, laterally with short spinules, and apically with a spine to ca. 3 mm. Middle cauline leaves similar but smaller. Uppermost cauline leaves oblanceolate to broadly linear. Capitula mostly 3–5 clustered at end of stem or branches, rarely solitary. Involucre subglobose, 1.5–2(–2.5) cm in diam., glabrous or sparsely cobwebby. Outer phyllaries triangular, ca. 3 × 0.7 mm, apex mucronulate to spiniform; middle phyllaries 4–13 × 0.9–2 mm, narrowed into a triangular-subulate erect-patent or spreading spiny-tipped distal portion; inner phyllaries linear, straight, distally membranous and acuminate. Corolla purplish red or rarely white, ca. 1.5 cm, tube ca. 7 mm. Achene ca. 4 mm. Pappus bristles white, to 1.3 cm. Fl. and fr. Feb–Oct. $2n = 16, 16+2B, 18$.

Grasslands on mountain slopes, farmlands, wastelands, by rivers, forests; 400–3600 m. Widely distributed in China (but see discussion for *Carduus acanthoides*) [Kazakhstan, Korea, Mongolia, Russia; SW Asia, Europe].

Carduus crispus is weedy but a good nectariferous plant. It is widely naturalized in North America.

3. Carduus acanthoides Linnaeus, Sp. Pl. 2: 821. 1753.

节毛飞廉 jie mao fei lian

Herbs (10–)20–100 cm tall, biennial or perennial. Stem solitary, long branched, ± hirsute; wings toothed, teeth with major spines pungent, 3–5 mm. Leaves concolorous, light or bluish green, not or scarcely cobwebby, sparsely hirsute along veins. Basal and lower cauline leaves sessile, elliptic to oblanceolate, 6–29 × 2–7 cm, pinnately lobed to pinnatipartite; segments 6–12 pairs, elliptic to triangular, margin toothed, teeth laterally and apically with 3–5 mm spines. Middle and upper cauline leaves similar but gradually smaller upward; uppermost cauline leaves ± broadly linear, sometimes undivided. Capitula mostly solitary or clustered at end of stem and branches. Involucre subglobose, 1.5–2(–2.5) cm in diam., glabrous or sparsely cobwebby. Outer phyllaries linear to triangular-subulate, ca. 7 × 1 mm, apical spinule 1–2 mm; middle phyllaries 8–14 × 1.5–1.6 mm, narrowed into a triangular-subulate erect-patent or spreading distal portion with apical 1–2 mm spinule; inner phyllaries linear, straight, ca. 16 × 1 mm, apex thin and acuminate. Corolla purplish red or rarely white, ca. 1.7 cm, tube ca. 8 mm. Achene brownish, ca. 4 mm. Pappus bristles white, ca. 1.5 cm. Fl. and fr. May–Oct. $2n = 16, 22$.

Mountain slopes, mountain valleys, ravines, grasslands, forest margins, thickets, farmlands, by water; 200–3500 m. Gansu, Guizhou, Hebei, Henan, SW Hunan, W Jiangsu, N Jiangxi, S Nei Mongol, Ningxia, E and S Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, N Xinjiang, E Xizang, Yunnan [Russia; SW Asia, Europe].

The distinction between *Carduus crispus* and *C. acanthoides* breaks down in Chinese material, which for the most part shows intermediate features. Perhaps only a single species (best assigned to *C. acanthoides*) exists in China.

Carduus acanthoides is naturalized in North and South America and the Pacific islands (New Zealand).

5. Subtribe CENTAUREINAE

矢车菊亚族 shi che ju ya zu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs or subshrubs, annual, biennial, or perennial. Stems and leaves usually unarmed. Capitula homogamous or heterogamous; if capitula heterogamous then outer florets in 1 row, tubular, often enlarged and radiant, sterile or rarely female; inner florets in many rows, bisexual. Receptacle with dense whitish linear smooth setae. Corolla tube slender. Achene with or without an apical rim, glabrous or rarely hairy; attachment scar usually lateral. Pappus usually double (i.e., differentiated into 2 types of pappus elements); outer pappus elements bristlelike, usually in many rows and increasing in length from outermost to inner; inner pappus elements scalelike or bristlelike but wider than outer ones; or pappus simple and all pappus elements bristlelike or scalelike, rarely absent.

About 29 genera and ca. 750 species: mainly in N Africa, C and SW Asia, and Europe, with a few in tropical Africa, tropical and E Asia, Australia, and North and South America; 16 genera (one endemic, two introduced) and 37 species (two endemic, four introduced) in China.

1a. Capitula homogamous; all florets bisexual.
2a. Middle phyllaries apically rounded, with a narrow hyaline margin or with a scarious appendage.
3a. Involucre 3–6 cm in diam., or if involucre smaller then pappus elements pinnate at apex and persistent ..... 35. *Rhaponticum*
3b. Involucre 1–2.5 cm in diam. and pappus elements serrulate and easily falling off ..... 41. *Plagiobasis*
2b. Middle phyllaries apically acute or acuminate, without an appendage or with a simple spine, spinule, or subulate tip.
4a. Outer phyllaries leaflike or with a leaflike appendage ..... 48. *Carthamus*
4b. All phyllaries ± leathery and without a leaflike appendage but often apicalmost leaves approximate to capitulum.
5a. Annuals; pappus elements of two types (i.e., innermost bristle or bristles wider and longer than others).
6a. Middle phyllaries with an apical spinule; stems mostly branched from base and branches procumbent or ascending ..... 36. *Oligochaeta*
6b. Middle phyllaries without apical spinule; stems erect and branched only in apical part ..... 42. *Russowia*
5b. Perennials; pappus elements all ± of one type.
7a. Middle phyllaries 0.5–1 mm wide, subulate or narrowly ovate, apex attenuate into long subulate tip ..... 39. *Tricholepis*
7b. Middle phyllaries 1–6 mm wide, narrowly triangular or narrowly ovate, apex with or without a short apical spinule.
8a. Stem virgately branched, terminal branches densely foliate up to capitulum ..... 38. *Archiserratula*
8b. Stem simple or branched, terminal branches sparsely foliate or leafless ..... 37. *Klasea*
1b. Capitula heterogamous; outer florets female or sterile, inner florets bisexual.
9a. Outer and middle phyllaries with a fimbriate, spiny, scarious, or hyaline appendage.
10a. Appendage of middle phyllaries fimbriate, long decurrent almost to base; bisexual florets violet-blue ..... 49. *Cyanus*
10b. Appendage of middle phyllaries fimbriate, lacerate, or entire, not or only shortly decurrent; bisexual florets purple, pink, white, or yellow.
11a. Leaves densely tomentose especially on abaxial side ..... 46. *Psephellus*
11b. Leaves glabrous or with various pubescence types but not densely tomentose.
12a. Leaf blade margin argutely toothed; longitudinal striae of middle phyllaries conspicuous ..... 45. *Rhaponticoides*
12b. Leaf blade margin entire, coarsely dentate, or spinose; longitudinal striae of middle phyllaries inconspicuous or lacking ..... 50. *Centaurea*
9b. Outer and middle phyllaries without an appendage but sometimes with a spinule and/or hyaline margin.
13a. Apex of middle phyllaries broadly rounded.
14a. Pappus elements scalelike; plants annual or biennial ..... 40. *Amberboa*
14b. Pappus elements bristlelike; plants perennial.
15a. Corolla pink to purplish; leaf blade undivided but margin serrate ..... 41. *Plagiobasis*
15b. Corolla yellow to yellowish; leaf blade pinnatisect, pinnate, or bipinnatisect ..... 45. *Rhaponticoides*
13b. Apex of middle phyllaries acute or acuminate.
16a. Perennials; phyllaries lanate or velvety ..... 44. *Serratula*
16b. Annuals; phyllaries glabrous or subglabrous.
17a. Leaf blade margin spiny; dwarf plants less than 20 cm tall ..... 43. *Schischkinia*
17b. Leaf blade margin serrate-dentate, not spiny; erect plants 20–60 cm tall ..... 47. *Crupina*

35. RHAPONTICUM Vaillant, Königl. Akad. Wiss. Paris 5: 177. 1754.

漏芦属 lou lu shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Acroptilon Cassini; *Klaseopsis* L. Martins; *Leuzea* Candolle; *Stemmacantha* Cassini.

Herbs, perennial. Stems erect, simple or branched. Capitulum homogamous, solitary, at end of stem or branches. Phyllaries imbricate, with narrow membranous margin or apical scarious or membranous appendage. Florets bisexual. Corolla pink to purple. Achene tetragonal or inconspicuously striate. Pappus elements in several rows, brittle, scabrid to shortly plumose; pappus elements of innermost row basally wider than and as long as or slightly longer than others.

About 26 species: Africa, Asia, Australia, Europe; four species (one endemic) in China.

1a. Stem simple; capitulum 1; middle phyllaries with a conspicuous scarious appendage; involucre 3.5–6 cm in diam.
2a. Pappus elements scabrid; appendage of phyllaries glabrous or puberulent ..... 1. *R. uniflorum*
2b. Pappus elements plumose; appendage of phyllaries villous ..... 2. *R. carthamoides*
1b. Stem branched; capitula few to many, or if rarely 1 then middle phyllaries with a very narrow membranous margin but without an appendage; involucre 0.5–3 cm in diam.
3a. Involucre 0.5–1.3 cm in diam.; phyllaries with membranous appendage; corolla ca. 1.4 cm; achene 3.5–4 mm ... 3. *R. repens*
3b. Involucre 1.5–3 cm in diam.; phyllaries with very narrow membranous margin; corolla 1.8–3 cm; achene 5–8 mm ..... 4. *R. chinense*

1. Rhaponticum uniflorum (Linnaeus) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 189. 1810.

漏芦 lou lu

Cnicus uniflorus Linnaeus, Mant. Pl. 2: 572. 1771; *Centaurea monantha* Georgi; *Leuzea uniflora* (Linnaeus) Holub; *Rhaponticum monanthum* (Georgi) Voroschilov; *R. satzyperovii* Soskov; *R. uniflorum* subsp. *satzyperovii* (Soskov) Voroschilov; *Serratula uniflora* (Linnaeus) Poiret; *Stemmacantha uniflora* (Linnaeus) Dittrich.

Herbs (10–)20–100 cm tall. Stems single or few, grayish white, ca. 5 mm in diam., lanate, basally clothed with remains of petioles. Leaves grayish white, soft, arachnoid lanate. Basal and lower stem leaves petiolate; petiole 6–20(–40) cm; leaf blade elliptic, narrowly elliptic, or oblanceolate, 10–25 × 3–9 cm, pinnatipartite or subpinnatisect; lateral lobes or segments 5–12 pairs, elliptic to oblanceolate, margin toothed, coarsely toothed, or entire. Middle and upper stem leaves sessile or shortly petiolate, similar in form and same in division to basal and lower stem leaves. Peduncle stout, leafless or with a few diminished leaves. Capitulum 1. Involucre 3.5–6 cm in diam. Phyllaries in (4 or)5–8 rows, appendaged; appendages brown, broadly ovate to suborbicular, 0.9–1.5 × 0.8–1.5 cm, margin lacerate; outer phyllaries ovate, ca. 5 × 3 mm excluding apical appendage; middle phyllaries elliptic to lanceolate, ca. 10 × 4 mm excluding apical appendage; inner and innermost phyllaries lanceolate, ca. 2 × 0.3 cm excluding apical appendage. Corolla 2.5–3.5 cm. Achene cuneate, ca. 4 mm, with denticulate rim at apex. Pappus elements in many rows, longest ca. 2 cm, scabrid. Fl. Apr–Jul, fr. May–Aug. $2n = 26$*.

Hills, forests, rocky slopes; 100–2700 m. Gansu, Hebei, SW Heilongjiang, Henan, Hubei, E Jilin, Liaoning, Nei Mongol, Ningxia, E Qinghai, Shaanxi, Shandong, Shanxi, Sichuan [Korea, Mongolia, Russia].

The occurrence of *Rhaponticum satzyperovii* in NE China was indicated by Soskov (Fl. URSS 28: 317. 1963). It is said to differ from *R. uniflorum* by its more robust habit and its stem leaves with 4–6 pairs of ovate lobes (not 8–12 pairs of lanceolate lobes). This taxon should probably be treated as *R. uniflorum* subsp. *satzyperovii*, but the material seen is too scarce to make a decision about its taxonomic status.

2. Rhaponticum carthamoides (Willdenow) Iljin, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 204. 1933.

漏草 lou cao

Cnicus carthamoides Willdenow, Sp. Pl. 3: 1686. 1803; *Leuzea carthamoides* (Willdenow) Candolle; *Serratula carthamoides* (Willdenow) Poiret; *Stemmacantha carthamoides* (Willdenow) Dittrich.

Herbs 60–90 cm tall. Stems simple, ca. 1 cm in diam., sparsely arachnoid. Leaves green, sparsely arachnoid along veins and margin. Lower and middle stem leaves shortly petiolate to subsessile; leaf blade elliptic, oblanceolate, or lanceolate, 13–25 × ca. 7 cm, pinnatipartite or subpinnatisect; lateral lobes or segments 5–8 pairs, lanceolate to narrowly lanceolate, margin serrate, apex attenuate-apiculate. Upper stem leaves sessile, lanceolate, decreasing in size upward, basally pinnatisect or pinnatipartite with 3 or 4 pairs of lateral segments or undivided, margin toothed. Capitulum 1. Involucre 4.5–6 cm in diam. Phyllaries in 10–12 rows; outer and middle phyllaries ovate to narrowly ovate, 5–10 × 4–5 cm excluding apical appendage, apically purplish red; appendage of middle phyllaries brown, ovate, broadly triangular, or subrhombic, to 7 × 7 mm, spreading to reflexed, villous; inner and innermost phyllaries lanceolate to linear-lanceolate, 15–18 × 2–3 mm excluding apical appendage; appendage of inner phyllaries brown, ovate, 6–8 × 2–5 mm, villous. Corolla ca. 2.5 cm. Achene brown, narrowly ellipsoid, ca. 7 mm, with denticulate rim at apex. Pappus elements yellowish to pale brown, longest ca. 1.8 cm, shortly plumose. Fl. and fr. Jul. $2n = 24$.

Grasslands, meadows; 2000–2700 m. NW Xinjiang [Kazakhstan, Mongolia, Russia].

The rhizomes are used medicinally.

3. Rhaponticum repens (Linnaeus) Hidalgo, Ann. Bot. (Oxford) 97: 714. 2006.

顶羽菊 ding yu ju

Centaurea repens Linnaeus, Sp. Pl., ed. 2, 2: 1293. 1763; *Acroptilon australe* Iljin; *A. picris* (Pallas ex Willdenow) C. A. Meyer; *A. repens* (Linnaeus) Candolle; *C. picris* Pallas ex Willdenow; *Serratula picris* (Pallas ex Willdenow) M. Bieberstein.

Herbs 25–70 cm tall. Stems 1 or few, erect, branched from base, densely foliate, arachnoid. Leaves sessile, elliptic, spatulate, or linear, 2–7 × 0.4–1.3 cm, pinnatifid, slightly rigid, grayish green, sparsely arachnoid to glabrescent, margin dentate or entire. Upper leaves often smaller. Capitula many, corymbose to corymbose-paniculate. Involucre ovoid to ellipsoid-ovoid, 5–13 mm in diam. Phyllaries in ca. 6 rows; outer and middle phyllaries ovate to broadly ovate, 3–11 × 2–6 mm, appendaged, basal part green and to a large extent concealed by appendages; appendage of outer phyllaries white, membranous, glabrous, apically ciliate or villous, apex obtuse to acuminate; inner phyllaries lanceolate to linear-lanceolate, ca. 13 × 2–3 mm; appendage of inner phyllaries small, apically densely vil-

lous. Corolla ca. 1.4 cm. Achene yellowish to pale brown, narrowly obovoid, 3.5–4 mm, apex rounded. Pappus elements 8–10 mm, shortly plumose at apex, easily falling off at maturity. Fl. and fr. May–Sep. $2n = 26$*.

Mountain slopes, hills, waste places, farmlands, plains; 600–2600 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, N Shaanxi, N Shanxi, Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

4. Rhaponticum chinense (S. Moore) L. Martins & Hidalgo, Bot. J. Linn. Soc. 152: 461. 2006.

华漏芦 hua lou lu

Herbs 60–120 cm tall. Stems erect, branched or rarely unbranched, sparsely arachnoid, glabrescent, or glabrous. Leaf blade of middle stem leaves ovate, lanceolate, or narrowly lanceolate, 6–15 × 0.9–7.5 cm, scabrid, setiferous and minutely brownish yellow gland-dotted, margin dentate, denticulate, or serrate, apex acute to attenuate-acuminate. Middle stem leaves petiolate; petiole 0.5–2.5(–4.5) cm. Upper leaves sessile or subsessile, similar to middle stem leaves, decreasing in size upward. Peduncle inflated below capitula. Involucre bowl-shaped, 1.5–3 cm in diam. Phyllaries in 6 or 7 rows, tinged purple, margin narrow and scarious, apex rounded to obtuse; outer phyllaries ovate to elliptic, 5–13 × 3–5 mm; inner and innermost phyllaries elliptic to linear-elliptic, 2–2.6 × 0.2–0.5 cm. Corolla 1.8–3 cm. Achene dark brown, narrowly ellipsoid, 5–8 mm, without an apical rim. Pappus elements brown, longest 1–1.6 cm, scabrid. Fl. and fr. Jul–Oct.

• Grasslands on slopes, forest margins, forests, thickets, thicket margins; 300–1400 m. W Anhui, Fujian, SE Gansu, N and NE Guangdong, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Yunnan, S Zhejiang.

1a. Leaf blade of middle stem leaves ovate to lanceolate, 1.5–3 × as long as wide ..... 4a. var. *chinense*

1b. Leaf blade of middle stem leaves narrowly lanceolate, 3.5–8 × as long as wide ..... 4b. var. *missionis*

4a. Rhaponticum chinense var. **chinense**

华漏芦(原变种) hua lou lu (yuan bian zhong)

Serratula chinensis S. Moore, J. Bot. 13: 228. 1875; *Klaeopsis chinensis* (S. Moore) L. Martins; *Klasea chinensis* (S. Moore) Kitagawa.

Leaf blade of middle stem leaves ovate to narrowly elliptic, 6–15 × 2.5–7.5 cm, margin dentate to denticulate, apex acute; teeth cartilaginous, directed slightly toward apex to almost rectangularly outward. Anther appendages obtuse, rounded, or slightly emarginate. $2n = 26$*.

• Grasslands on slopes, forest margins, forests, thickets, thicket margins; 300–1400 m. W Anhui, Fujian, SE Gansu, N and NE Guangdong, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi (Qin Ling), Sichuan, S Zhejiang.

4b. Rhaponticum chinense var. **missionis** (H. Léveillé) L. Martins, **comb. et stat. nov.**

滇黔漏芦 dian qian lou lu

Basionym: *Centaurea missionis* H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 451. 1910.

Leaf blade of middle stem leaves narrowly lanceolate, 6–11 × 0.9–2.5 cm, margin serrate, apex attenuate-acuminate; teeth herbaceous, directed toward apex at an acute angle. Anther appendages narrowly triangular, acuminate.

• Guizhou, Yunnan.

36. OLIGOCHAETA (Candolle) K. Koch, Linnaea 17: 42. 1843.

寡毛菊属 gua mao ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Serratula sect. *Oligochaeta* Candolle, Prodr. 6: 671. 1838.

Herbs, annual. Stem usually branched from base. Leaves undivided or lyrately pinnatipartite. Capitula homogamous, sessile, axillary or terminal at end of stem and branches, solitary or in clusters of 2 or 3. Phyllaries imbricate, attenuate into a short spinule or acuminate. Florets bisexual. Corolla pink. Stigmatic branches patent. Achene with an entire or minutely denticulate apical rim. Pappus elements of two types; outer pappus of scabrid bristles; inner pappus of 1–5 bristles, slightly longer and distinctly wider than outer ones.

Four species: Asia; one species in China.

1. Oligochaeta minima (Boissier) Briquet, Arch. Sci. Phys. Nat., sér. 5, 12: 113. 1930.

寡毛菊 gua mao ju

Microlonchus minimus Boissier, Fl. Orient. 3: 701. 1875; *Centaurea minima* (Boissier) B. Fedtschenko; *C. vvedenskyi* M. Popov; *Jurinea korolkowii* Regel & Schmalhausen.

Primary stem very short. Branches 5–15(–25) cm, procumbent or ascending, rarely absent in weak individuals, pubescent. Leaves petiolate; leaf blade elliptic to elliptic-obovate, 1–2 × 0.4–0.7 cm, arachnoid or abaxially scabrid and setiferous and adaxially glabrous, base cuneate, margin serrate and sometimes lobed near base, apex acute. Capitula few. Involucre ellipsoid to ellipsoid-ovoid, 10–13 × 4–7 mm. Phyllaries in ca. 5 rows; outer and middle phyllaries ovate to elliptic, 4–10 × 1.5–2 mm, abaxially white pubescent, apex attenuate into a 2–3 mm spinule; inner phyllaries linear, ca. 12 × 1 mm, apex acuminate and spiniform. Corolla ca. 7.5 mm. Achene yellowish, oblanceolate, ca. 2.5 mm, apex truncate. Pappus elements white, scabrid; outer pappus elements ca. 4 mm; inner pappus elements 1(or 2), ca. 6 mm. Fl. and fr. Jul.

Mountain slopes. N Xinjiang [Afghanistan, Pakistan, Turkmenistan, Uzbekistan; SW Asia].

37. KLASEA Cassini in F. Cuvier, Dict. Sci. Nat. 35: 173. 1825.

麻花头属 ma hua tou shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Nikitinia Iljin; *Schumeria* Iljin.

Herbs, perennial. Leaves pinnatilobed, pinnatipartite, or pinnatisect, rarely undivided, rigid or soft, margin entire or toothed. Capitula homogamous, 1 or to many in a panicle, rarely compactly corymbose, solitary at end of stem and branches. Involucre globose, ovoid, hemispheric, or bowl-shaped. Phyllaries imbricate, rigid; middle phyllaries with apex acute to acuminate and often with apical spinule; inner phyllaries longest, papillose-puberulent at apex. Florets bisexual. Corolla purple to pink, rarely almost white; tube 1/3–1/2 as long as corolla. Stigmatic branches to 1(–3) mm. Achene glabrous, with a subentire apical rim. Pappus elements of one type, in several rows, whitish to yellowish brown, all ± same length or outer ones shorter, scabrid or finely barbellate.

About 45 species: N Africa, Asia, Europe; eight species in China.

All Chinese species belong to *Klasea* sect. *Klasea*.

1a. Leaf blade adaxially scabrous with multicellular hairs but sometimes sparsely so.
2a. Stems always simple, to 10 cm; margin of phyllaries black ..... 6. *K. lyratifolia*
2b. Stems simple or branched, (10–)15–150 cm; margin of phyllaries purplish or pale-colored.
3a. Middle phyllaries acuminate, with apical spinule 2.5–5 mm; leaf blade glandular with minute sessile glands ..... 3. *K. dissecta*
3b. Middle phyllaries acute, with apical spinule 0.2–2 mm or without spinule; leaf blade not glandular ..... 8. *K. centauroides*
1b. Leaf blade adaxially glabrous but margin sometimes pubescent.
4a. Leaf blade glaucous, margin entire.
5a. Involucre 1.5–3 cm in diam.; middle phyllaries with conspicuous black to dark brown area at apex ..... 1. *K. marginata*
5b. Involucre 0.8–1.5 cm in diam.; middle phyllaries with inconspicuous brownish spot at apex ..... 2. *K. cardunculus*
4b. Leaf blade green, margin dentate.
6a. Stem to 15 cm, usually decumbent; involucre 1.8–2.5 cm in diam. ..... 5. *K. procumbens*
6b. Stem 15–80 cm, erect; involucre 1.1–1.7 cm in diam.
7a. Spinule of middle phyllaries to 1 mm; leaf blade leathery with paler venation and margin white cartilaginous ..... 4. *K. suffruticulosa*
7b. Spinule of middle phyllaries (1–)3–5 mm; leaf blade herbaceous, concolorous ..... 7. *K. sogdiana*

1. Klasea marginata (Tausch) Kitagawa, J. Jap. Bot. 40: 137. 1965.

薄叶麻花头 bao ye ma hua tou

Serratula marginata Tausch, Flora 11: 484. 1828; *Klasea algida* (Iljin) Hidalgo; *S. algida* Iljin; *S. dshungarica* Iljin; *S. glauca* Ledebour (1812), not Linnaeus (1753); *S. nitida* Fischer ex Sprengel var. *glauca* Trautvetter.

Herbs 15–80 cm tall. Rhizomes ascending to procumbent. Stem solitary, erect, simple or rarely with 1 branch, base clothed with fibrous remains of petioles. Leaves glabrous or with sparse hairs, glaucous, margin often minutely ciliate. Basal leaves petiolate; leaf blade elliptic, narrowly elliptic, or ovate, tapering into petiole, 3–15 × 1.5–4 cm, margin entire, repand-crenate, or rarely pinnatilobed. Stem leaves few, sessile, lanceolate to linear, pinnatilobed or undivided, margin entire or toothed. Capitulum 1(or 2). Involucre campanulate to bowl-shaped, 1.5–2.5(–3) cm in diam. Phyllaries in 5–7 rows, apically dark brown to black; outer and middle phyllaries ovate-triangular, elliptic, or ovate-elliptic, 5–14 × 2–3 mm, apex acuminate and with a 1–3 mm spinule; inner and innermost phyllaries lanceolate to linear-lanceolate 10–20 × 1.5–3 mm. Corolla purple, (1.3–)1.6–2.3 cm. Achene brown, oblong, 4–6 mm. Pappus whitish, ca. 1.2 cm. Fl. and fr. Jun–Aug. $2n = 30$.

Mountain steppes, hilly areas; 1500–2300 m. Gansu, Heilongjiang, Nei Mongol, N Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan].

2. Klasea cardunculus (Pallas) Holub, Folia Geobot. Phytotax. 12: 305. 1977.

分枝麻花头 fen zhi ma hua tou

Centaurea cardunculus Pallas, Reise Russ. Reich. 1: 500. 1771; *Serratula cardunculus* (Pallas) Schischkin; *S. nitida* Fischer ex Sprengel.

Herbs 20–70 cm tall. Rhizomes short. Stems erect, unbranched or apically branched, glabrous or subglabrous, base clothed with remains of petioles. Leaves glabrous or with sparse hairs, glaucous. Basal leaves shortly to long petiolate; leaf blade oblong-elliptic, elliptic, or lanceolate, 5–10 × 0.8–2 cm, base cuneate-attenuate, margin entire or toothed, apex obtuse to acute. Stem leaves several, sessile, lanceolate to narrowly elliptic, smaller than basal ones, margin entire, toothed, or pinnatilobed. Upper stem leaves linear, smaller than others, margin entire. Capitula (1 or)2–7(–9). Involucre campanulate, 0.8–1.5 cm in diam., glabrous. Phyllaries imbricate, in 5 or 6 rows; outer and middle phyllaries ovate to ovate-lanceolate, 1.7–2.5 mm wide. Corolla purple or rarely white, 1.5–1.7 cm. Achene dark brown to black, oblong, 3.5–5 mm. Pappus whitish, 7–9 mm. Fl. and fr. Jun–Jul.

Meadows; 500–1500 m. Nei Mongol (Xilin Gol Meng), Xinjiang [Kazakhstan, Mongolia, Russia; Europe].

3. Klasea dissecta (Ledebour) L. Martins, Bot. J. Linn. Soc. 152: 455. 2006.

羽裂麻花头 yu lie ma hua tou

Serratula dissecta Ledebour, Fl. Altaic. 4: 40. 1833; *S. angulata* Karelin & Kirilov; *S. dissecta* var. *angulata* (Karelin & Kirilov) Trautvetter.

Herbs 20–40 cm tall. Rhizomes short and thick. Stems solitary or few, erect, branched in upper part, sparsely setiferous, with fibrous remains of petioles at base. Leaves pubescent with multicellular hairs and minute sessile yellow glands. Basal and lower stem leaves long petiolate; petiole fibrous; leaf blade elliptic, 10–15 × 1.5–3.5 cm, pinnatipartite; lateral lobes 5–8 pairs, lanceolate, narrowly elliptic, or broadly linear, margin toothed. Middle stem leaves sessile, similar in form and same in division to basal and lower stem leaves. Upper stem leaves lanceolate, margin toothed. Capitula few to many, corymbose-paniculate. Involucre ovoid-cylindric to narrowly obconic, 5–12 mm in diam., sparsely tomentose. Phyllaries in 6 or 7 rows; outer phyllaries ovate, 3.5–6 × 1.5–2 mm, apex with a 0.5–2 mm straight to patent spinule; middle phyllaries lanceolate, ca. 10 × 2 mm, apex attenuate into a straight or spreading 2.5–5 mm spinule; inner and innermost phyllaries elliptic to broadly linear, ca. 17 × 1.5–2 mm, apex acuminate. Corolla purple to pink, ca. 1.3 cm. Achene pale to dark brown, narrowly ellipsoid, 4–6 mm, many striate. Pappus whitish to straw-colored, ca. 8 mm. Fl. and fr. Jun–Jul.

Deserts; 1000–1500 m. NW Xinjiang [Kazakhstan].

4. Klasea suffruticulosa (Schrenk) L. Martins, Taxon 54: 636. 2005.

木根麻花头 mu gen ma hua tou

Serratula suffruticulosa Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 3: 110. 1845; *S. ajdarovae* Sultanova.

Herbs (10–)15–50 cm tall. Rhizomes brown, robust, woody. Stems erect, woody at base, apically with few branches or rarely simple. Leaves rigid, leathery, glabrous or subglabrous, venation paler than rest of blade, margin toothed and white cartilaginous. Basal leaves petiolate; petiole 2.5–5 cm; leaf blade elliptic to spatulate, 4.5–9 × 1.5–5 cm, base cuneate, apex obtuse to acute. Middle cauline leaves similar to basal ones or lanceolate to oblanceolate and smaller. Upper cauline leaves smallest, linear. Capitula few or rarely 1. Involucre green to yellowish green, cylindric to ovoid-cylindric, 1.1–1.5 cm in diam., glabrous. Phyllaries imbricate, in 6–8 rows; outer phyllaries triangular-ovate to ovate, 2.5–5 × 2–3 mm; middle phyllaries elliptic, narrowly elliptic, or elliptic-lanceolate, 7–15 × 2.5–4 mm, apex acute and with a less than 1 mm spinule; inner and innermost phyllaries broadly linear to linear, 14–20 × 1.3–2 mm, apex acute and mucronate. Corolla purple, 1.5–1.9 cm. Achene brown, cuneate-ellipsoid, ca. 6 mm, striate. Pappus 6–11 mm. Fl. and fr. Jul–Aug.

Mountain slopes; ca. 1500 m. Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan].

5. Klasea procumbens (Regel) Holub, Folia Geobot. Phytotax. 12: 427. 1977.

歪斜麻花头 wai xie ma hua tou

Serratula procumbens Regel, Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 165. 1867.

Herbs 7–15 cm tall. Rhizomes long, procumbent. Stems single or few, decumbent or ascending, simple or sparingly branched, glabrous. Leaves narrowly elliptic, lanceolate-elliptic, or lanceolate, leathery, inconspicuously puberulent especially on margin or glabrous. Basal and lower stem leaves shortly petiolate; leaf blade 3–7 × 0.7–2 cm, base attenuate, margin toothed; teeth with cartilaginous tip. Middle stem leaves sessile, base semiamplexicaul, margin toothed below middle. Uppermost stem leaves broadly linear, margin entire. Capitula 1–3. Involucre ovoid-cylindric, 1.8–2.5 cm in diam., glabrous or subglabrous. Phyllaries in 7–9 rows; outer phyllaries triangular to ovate-lanceolate, 5–7 × ca. 3 mm, apex acute and with a straight or patent 1–2 mm spinule; middle phyllaries elliptic-lanceolate to elliptic, 9–12 × ca. 3 mm, with an apical straight or patent 1.5–2 mm spinule; inner phyllaries lanceolate, linear-lanceolate, or broadly linear, 1.6–2.2 × ca. 0.2 cm. Corolla purple to pink, ca. 2.5 cm. Achene brown, ellipsoid, ca. 6 mm. Pappus pale, ca. 1.3 cm. Fl. and fr. Jul–Sep.

Mountain slopes, ruderal areas; 2600–3600 m. SW Xinjiang [Afghanistan, Kashmir, Pakistan, Tajikistan].

6. Klasea lyratifolia (Schrenk ex Fischer & C. A. Meyer) L. Martins, Taxon 54: 636. 2005.

无茎麻花头 wu jing ma hua tou

Serratula lyratifolia Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 45. 1841; *Klasea rugosa* (Iljin) Kitagawa; *S. modestii* Borissova; *S. rugosa* Iljin; *S. tianschanica* Saposhnikow & Nikitina.

Herbs, stemless or stem to 10 cm tall. Rhizome stout, oblique. Leaves petiolate; petiole 1–5 cm; leaf blade 2.5–10 × 1.5–4 cm, lyrate or pinnatipartite, subleathery, with scattered rather large multicellular hairs on adaxial surface, margin denticulate; lateral lobes 1–3(–5) pairs, broadly triangular, elliptic, or narrowly elliptic; terminal lobe ovate to orbicular, larger than others. Capitulum 1. Involucre bowl-shaped, 1.5–3 cm in diam., glabrous or subglabrous. Phyllaries in 6–8 rows, green with narrow black margin; outer phyllaries triangular, 5–10 × 2–6 mm, apex acute; middle phyllaries ovate to ovate-elliptic, 6–15 × 4–6 mm, apex acute and with a less than 2 mm spinule; inner phyllaries lanceolate, elliptic-lanceolate, or broadly linear, 1.4–2.2 × 0.2–0.5 cm, apex with a scarious appendage. Corolla purple, 2–2.6 cm. Achene grayish brown or dark brown, narrowly cuneate-ellipsoid, 5–6 mm. Pappus 1.5–2.2 cm. Fl. and fr. Jul–Sep. $2n = 30$.

Mountain slopes; 2000–3400 m. NW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan Uzbekistan].

The taxonomic status of *Klasea rugosa* needs clarification. It should possibly be assigned subspecific rank. It differs from typical *K. lyratifolia* by the terminal leaf segment not enlarged and by long (ca. 3 mm) stigmatic branches.

7. Klasea sogdiana (Bunge) L. Martins, Bot. J. Linn. Soc. 152: 455. 2006.

阿拉套麻花头 a la tao ma hua tou

Serratula sogdiana Bunge, Beitr. Fl. Russl. 191. 1852; *S. alatavica* C. A. Meyer; *S. dissecta* Ledebour var. *asperula* Regel & Herder; *S. trautvetterana* Regel & Schmalhausen.

Herbs 30–80 cm tall. Rhizomes long, woody. Stems erect, apically long virgately branched, glabrous or basally with scattered hairs. Leaves glabrous except at margin, adaxially shiny. Basal leaves petiolate; leaf blade elliptic, undivided, margin toothed. Lower and middle stem leaves lyrately pinnatipartite; lobes toothed, lateral lobes sublinear to linear, terminal lobe ovate to narrowly elliptic. Upper stem leaves pinnatipartite or undivided. Capitula several, solitary at end of a branch. Involucre campanulate, 1.2–1.7 cm in diam. Phyllaries tightly imbricate, in 8 or 9 rows; outer phyllaries triangular, ovate, or ovate-elliptic, 4–7.5 × 1.5–2.5 mm, apex acute and with a (1–)3–5 mm apical spinule; middle phyllaries elliptic-lanceolate or narrowly lanceolate, 11–13 × 1.8–2.5 mm, apex acute and with a (1–)3–5 mm spinule; inner and innermost phyllaries oblanceolate, 20–23 × 1.5–2 mm, apex acuminate. Corolla purple, 1.6–2 cm. Achene brown, ovoid-ellipsoid, ca. 5 mm. Pappus ca. 1 cm. Fl. and fr. Jul–Sep. $2n = 30, 60$.

Mountain slopes; ca. 1400 m. NW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

8. Klasea centauroides (Linnaeus) Cassini ex Kitagawa, J. Jap. Bot. 21: 138. 1947.

麻花头 ma hua tou

Herbs (10–)25–150 cm tall. Stem erect, simple or branched, sparsely to densely crispate-pubescent near base, subglabrous in upper part, base with lacerate remains of old petioles. Leaves subglabrous to scabrid; pubescence often sparse, somewhat denser toward margin and along veins, composed of small appressed (ca. 0.2 × 0.03 mm) and larger patent (ca. 1 × 0.1 mm) multicellular hairs. Basal and lower stem leaves petiolate. Upper leaves sessile. Capitula 1 to many. Involucre 0.6–3 cm in diam. Phyllaries imbricate, in 4–10 rows; outer and middle phyllaries 2–11 × 1.5–5(–6) mm, without an apical spine or with a 0.2–2 mm spinule. Corolla purple to pink, rarely almost white, 2–3 cm. Achene brown to pale brown, cuneate-ellipsoid to obliquely cuneate, 4.5–6 mm, faintly ribbed. Pappus 7–11 mm. Fl. and fr. May–Oct.

Mountain slopes, steppes, meadows, sandy hills, open forests, forests, grasslands, wastelands, roadsides, riversides, watersides, farmlands; 200–3500 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan [Korea, Mongolia, Russia].

Klasea centauroides is a very polymorphic species with respect to number of capitula, leaf shape, shape of involucre, and coloration of phyllaries. Several distinctive forms have been described as species, but all of them are connected by intermediate forms. Delimitation of subspecies is problematic especially in regions where their ranges overlap. Herbarium specimens are often misidentified; therefore, distribution data from literature have to be taken with care and may be incomplete for some subspecies treated here.

1a. Stem much branched; capitula (3–)10–60; involucre 0.6–1.2 cm in diam. ..... 8b. subsp. *polycephala*
1b. Stem simple or sparingly branched; capitula 1–6(–12); involucre 1.1–3 cm in diam.
2a. All leaves undivided ..... 8e. subsp. *cupuliformis*
2b. At least middle stem leaves pinnatisect or pinnatipartite.
3a. Involucre obconic to bowl-shaped; inner phyllaries straight, without clear distinction between basal part and scarious appendage; middle phyllaries yellowish green with pale margin ..... 8f. subsp. *chanetii*
3b. Involucre semiglobose, ovoid, or campanulate; inner phyllaries mostly geniculate between basal part and appendage; middle phyllaries with dark tip and/or purple scarious margins.
4a. Involucre base shortly attenuate; middle phyllaries 1.8–3 mm wide; lateral segments of middle stem leaves usually antrorse at an acute angle ..... 8c. subsp. *komarovii*
4b. Involucre base rounded or slightly umbilicate; middle phyllaries 2.5–6 mm wide; lateral segments of middle stem leaves usually at right angle or nearly so.
5a. Stem ± foliate throughout; peduncles 1–12(–18) cm; involucre not or slightly constricted, 1.1–2.2 cm in diam. ..... 8a. subsp. *centauroides*
5b. Stem ± leafless in upper part; peduncles (10–)15–40 cm; involucre conspicuously constricted, (1.5–)2–3 cm in diam. ..... 8d. subsp. *strangulata*

8a. Klasea centauroides subsp. **centauroides**

麻花头(原亚种) ma hua tou (yuan ya zhong)

Serratula centauroides Linnaeus, Sp. Pl. 2: 820. 1753; *Klasea centauroides* var. *albiflora* Y. B. Chang; *K. centauroides* var. *yamatsutana* (Kitagawa) Kitagawa; *K. mongolicola* (Kitagawa) Kitagawa; *K. ortholepis* (Kitagawa) Kitagawa; *S. mongolicola* Kitagawa; *S. ortholepis* Kitagawa; *S. polycephala* Iljin var. *ortholepis* (Kitagawa) Y. Ling ex H. C. Fu; *S. yamatsutana* Kitagawa; *S. yamatsutana* var. *mongolicola* (Kitagawa) Kitagawa.

Herbs (10–)25–80 cm tall. Rhizomes prostrate. Stem unbranched or sparingly branched in upper part. Petiole of basal

and lower stem leaves 2–10 cm; leaf blade elliptic to narrowly elliptic in outline, 5–12(–16) × 2–5(–8) cm, pinnatipartite; lateral lobes 5–8 pairs, narrowly elliptic to broadly linear, margin entire or few toothed, apex acute. Middle stem leaves sessile or very shortly petiolate, similar in form and same in division to basal and lower stem leaves; lateral segments usually at right angle or nearly so. Upper stem leaves smaller than others. Peduncles 1–12(–18) cm. Capitula 1–4(–12). Involucre ovoid to narrowly ovoid, 1.1–2.2 cm in diam., base rounded or slightly umbilicate, apically ± constricted. Phyllaries loosely imbricate, in 6–8 rows; outer and middle phyllaries triangular, triangular-ovate, or ovate-lanceolate, 4–15 × 2.5–4 mm, leathery, greenish, darker toward apex and purple at margin, apex acute and with a 0.5–2 mm spinule; inner and innermost phyllaries narrowly elliptic or linear, 10–20 × 1–2 mm, transitioning into appendage; appendage straw-colored or purple-tinged, linear to linear-lanceolate, slightly bent outward or almost straight, margin slightly revolute or plane. Fl. and fr. Jun–Sep. $2n = 30$, 60.

Mountain slopes, steppes, meadows, sandy hills; 800–1700 m. Hebei, Heilongjiang, Liaoning, Nei Mongol, Shandong [Mongolia, Russia].

8b. Klasea centauroides subsp. **polycephala** (Iljin) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

多花麻花头 duo hua ma hua tou

Serratula polycephala Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 90. 1928; *Klasea polycephala* (Iljin) Kitagawa.

Herbs 30–80 cm tall. Rhizomes stout. Stem branched in upper part. Petiole of basal and lower stem leaves 1.5–4 cm; leaf blade oblanceolate, elliptic-lanceolate, or elliptic in outline, 5–15 × 2.5–5 cm, pinnatipartite or pinnatilobate; lateral lobes 5–9 pairs, broadly elliptic, triangular, or narrowly elliptic, margin entire or toothed, apex acute to acuminate. Middle and upper stem leaves sessile, pinnatipartite; lateral lobes usually at right angle or nearly so, narrowly elliptic to broadly linear, margin entire or few toothed, apex acute. Uppermost leaves linear to subulate or with 1–3 pairs of lateral segments. Capitula (3–)10–60, corymbose. Involucre narrowly ovoid, 6–12 mm in diam. Phyllaries imbricate, in 6–8 rows; outer and middle phyllaries greenish with darker tip, ovate, ovate-triangular, or elliptic-lanceolate, 3–11 × 2–3 mm, acute and with 0.2–0.8 mm apical spinule; inner phyllaries linear, ca. 16 × 1–2 mm, transitioning into appendage; appendage straw-colored or purple-tinged, slightly bent outward or almost straight, linear to linear-lanceolate, with slightly revolute or plane margins. Fl. and fr. Jul–Sep.

• Mountain slopes, roadsides, farmlands; 600–2000 m. Hebei, Liaoning, Nei Mongol, Shanxi.

8c. Klasea centauroides subsp. **komarovii** (Iljin) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

北麻花头 bei ma hua tou

Serratula komarovii Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 89. 1928; *Klasea hayatae* (Nakai) Kitagawa; *K. nishimurana* (Kitagawa) Kitagawa; *S. charbinensis* A. I. Baranov & Skvortsov; *S. hayatae* Nakai; *S. hsinganensis* Kitagawa; *S. nishimurana* Kitagawa.

Herbs 0.5–1.5 m tall. Rhizomes prostrate. Stems unbranched or sparingly branched in upper part. Petiole of basal and lower stem leaves 3–9 cm; leaf blade elliptic in outline, 8–20 × 3–10 cm, pinnatipartite or rarely undivided; lateral lobes 4–8 pairs, narrowly elliptic to broadly linear, margin entire or few toothed, apex acute. Middle stem leaves sessile or very shortly petiolate, similar in form and same in division to basal and lower stem leaves; lateral segments usually falcate or antrorse at an acute angle. Upper stem leaves smaller than others, linear or with 1–3 pairs of lateral segments. Peduncles (8–)12–30 cm, leafless or with 1 or few linear diminished leaves. Capitula 1–6(–9). Involucre campanulate or ovoid-campanulate, 1.1–1.5(–1.7) cm in diam., constricted, base shortly attenuate. Phyllaries tightly imbricate, in 7–10 rows; outer and middle phyllaries triangular, triangular-ovate, or ovate-lanceolate, 3–10 × 1.8–3 mm, leathery, greenish, often darker toward apex and purple at margin, apex acute and with a 0.5–1.5 mm apical spinule; inner and innermost phyllaries narrowly elliptic to linear, 10–20 × 1–2.5 mm, transitioning into appendage; appendage straw-colored or purple-tinged, linear to linear-lanceolate, bent outward, margin slightly revolute. Fl. and fr. Jul–Oct.

Mountain slopes, steppes, meadows; 200–1800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi [Korea, Russia].

8d. Klasea centauroides subsp. **strangulata** (Iljin) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

缢苞麻花头 yi bao ma hua tou

Serratula strangulata Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 89. 1928; *Klasea strangulata* (Iljin) Kitagawa.

Herbs 40–100 cm tall. Rhizomes procumbent. Stem unbranched or sparingly branched from middle and branches erect. Petiole of basal and lower stem leaves 4–10 cm; leaf blade elliptic, oblanceolate-elliptic, or oblanceolate in outline, 10–20 × 3–7 cm, lyrately pinnatipartite or pinnatipartite, rarely undivided; lateral lobes 3–7 pairs, elliptic to triangular, margin toothed, few toothed, or entire. Middle stem leaves sessile, similar in form and same in division as basal and lower stem leaves; lateral segments usually at right angle or nearly so, narrowly triangular, linear-triangular, or lanceolate, 0.5–1.5 cm wide, margin entire or distantly toothed. Upper stem leaves linear, margin entire. Peduncles (10–)15–40 cm. Capitula 1 or few. Involucre hemispheric, (1.5–)2–3 cm in diam., conspicuously constricted, base rounded. Phyllaries imbricate, in 7 or 8 rows; outer and middle phyllaries yellowish, blackish green striate toward apex, dark purple at margin, ovate, ovate-lanceolate, or elliptic, 6–13 × 3–5(–6) mm, leathery, apex acute and with a ca. 1 mm apical spinule; inner and innermost phyllaries elliptic to linear, 14–22 × 2–5 mm, transitioning into appendage; appendage straw-colored, linear to linear-lanceolate, bent outward, margin slightly revolute. Fl. and fr. Jun–Sep.

• Mountain slopes, grasslands, riversides, farmlands; 1300–3500 m. S Gansu, W Henan, Nei Mongol, Ningxia, Qinghai, S Shaanxi, Shanxi, N Sichuan.

8e. Klasea centauroides subsp. **cupuliformis** (Nakai & Kitagawa) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

钟苞麻花头 zhong bao ma hua tou

Serratula cupuliformis Nakai & Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 1: 66. 1934; *Klasea cupuliformis* (Nakai & Kitagawa) Kitagawa.

Herbs 40–100 cm tall. Rhizome robust. Stem unbranched or sparingly branched in upper part. Petiole of basal and lower stem leaves 1–6 cm; leaf blade narrowly elliptic, oblanceolate, or elliptic, 8–20 × 2–7 cm, base attenuate, margin coarsely toothed to biserrate, apex acuminate. Middle stem leaves lyrately pinnatilobed or undivided. Upper stem leaves similar to lower and middle stem leaves, oblanceolate, or linear, smaller than other leaves. Peduncles 2–24 cm. Capitula usually 1, rarely to 4 in robust individuals. Involucre hemispheric to ovoid, (1.3–)1.8–2.5 cm in diam., constricted. Phyllaries in 7 or 8 rows; outer and middle phyllaries yellowish, blackish green striate toward apex, dark purple at margin, ovate to lanceolate, 2.5–9 × 2–3.5 mm, leathery, apex acute and with a 0.3–1 mm apical spinule; inner phyllaries lanceolate, linear-lanceolate, or narrowly linear, 9–11 × 1.5–3 mm, transitioning into appendage; appendage straw-colored, linear to linear-lanceolate, bent outward, margin slightly revolute. Fl. and fr. Jul–Oct.

• Grasslands on mountain slopes, open forests; 900–2400 m. Hebei, Henan, Liaoning, Shanxi.

8f. Klasea centauroides subsp. **chanetii** (H. Léveillé) L. Martins, Bot. J. Linn. Soc. 152: 457. 2006.

碗苞麻花头 wan bao ma hua tou

Serratula chanetii H. Léveillé, Repert. Spec. Nov. Regni Veg. 10: 351. 1912; *Klasea potaninii* (Iljin) Kitagawa; *S. potaninii* Iljin.

Herbs (15–)30–90 cm tall. Rhizome short. Stems solitary or few, branched in upper part, rarely unbranched. Petiole of basal and lower stem leaves 2–9 cm; leaf blade elliptic, oblanceolate, or oblanceolate-elliptic in outline, pinnatilobed, pinnatipartite, lyrately pinnatilobed, or lyrately pinnatipartite, 6–20 × 3–7 cm; lateral lobes 6–10 pairs, margin few toothed or entire. Middle leaves sessile, similar in form and same in division as basal and lower stem leaves. Upper stem leaves broadly linear to linear or with 3–5 pairs of lateral segments, margin entire. Peduncles 1–22 cm. Capitula (1–)3–6(–12), inconspicuously corymbose. Involucre obconic to bowl-shaped, 1.8–2.5 cm in diam. Phyllaries loosely imbricate, in 4–6 rows; outer and middle phyllaries yellowish green, paler at margin, triangular, narrowly triangular, linear-lanceolate, or elliptic-lanceolate, 2–10 × 1.5–3.5 mm, apex acute and without an apical spinule or with a ca. 0.5 mm spinule; inner phyllaries linear-lanceolate to linear, 10–18 × 1–2.5 mm, straight, plane, without distinction between basal part and appendage. Fl. and fr. May–Sep.

• Grasslands on mountain slopes, forests, wastelands, farmlands, watersides; 200–2100 m. Anhui, Hebei, Henan, Shandong, Shanxi.

38. ARCHISERRATULA L. Martins, Taxon 55: 973. 2006.

滇麻花头属 dian ma hua tou shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Serratula sect. *Suffruticosae* Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 92. 1928.

Subshrubs or perennial herbs. Stems virgately branched, foliate throughout. Leaves undivided, with reticulate resin ducts. Capitula solitary at end of branches, homogamous. Phyllaries imbricate, apex acute or apiculate. Receptacle cylindric to obconic. Florets bisexual. Stigmatic branches divergent, canaliculate. Achene ellipsoid-cylindric, smooth, glabrous, apex with a denticulate rim. Pappus elements in many rows, bristlelike, not connate into a ring, pinnate at least in their distal part.

• One species: China.

1. Archiserratula forrestii (Iljin) L. Martins, Taxon 55: 973. 2006.

滇麻花头 dian ma hua tou

Serratula forrestii Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 27: 91. 1928.

Herbs or subshrubs, 0.7–1.5 m tall. Stems sometimes purplish red, erect, long virgately branched, woody at base, leafy, glabrous or subglabrous. Leaves subsessile, lanceolate to linear-lanceolate, glabrous, with resin ducts along veins visible on abaxial side, base cuneate, margin denticulate, apex acute. Lower and middle stem leaves 2.5–10 × 0.3–2 cm. Upper stem leaves similar to lower and middle stem leaves, decreasing in size upward. Capitula several to many. Involucre cylindric to narrowly obconic, 6–10 mm in diam. Phyllaries imbricate, in 7 or 8 rows, green to yellowish green, sometimes slightly purple tinged; outer and middle phyllaries triangular, ovate-triangular, ovate, or lanceolate, 2–14 × 1–3 mm, apex acute or acuminate; inner phyllaries linear-lanceolate, ca. 18 × 1.5–2 mm, densely puberulent near apex. Corolla pale purple, 1.9–2.2 cm. Achene ellipsoid-cylindric, 7–9.5 mm. Pappus elements light brown, ca. 1.2 cm, finely serrulate, pinnate toward apex. Fl. and fr. Aug–Nov.

• Grasslands on mountain slopes, rock crevices; 1300–2000 m. NW Yunnan.

39. TRICHOLEPIS Candolle, Arch. Bot. (Paris) 2: 515. 1833.

镇苞菊属 zhen bao ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Stictophyllum Edgeworth.

Herbs or subshrubs, annual or perennial. Stem erect, branched from base or middle. Lower stem leaves pinnately divided or entire. Capitula homogamous, several, solitary at end of stem and branches. Involucre campanulate to hemispheric. Phyllaries subulate to subulate-lanceolate, very narrow, unappendaged or with an awnlike appendage. Florets bisexual. Corolla purple, pink, yellow, or whitish. Stigmatic branches divergent. Achene with a denticulate rim at apex. Pappus elements in many rows or absent; outer pappus elements shortly plumose, scabrid, or serrulate, distinct or basally connate into a ring; inner pappus elements scarcely longer and basally wider, flattened.

About 17 species: Asia; three species in China.

There is one specimen of *Tricholepis roylei* J. D. Hooker from "Tibet." However, this is probably erroneous or is from a locality outside of China but referred to as "Tibet" in a historical sense. This species is only known from Himachal Pradesh, India, and it is very unlikely to occur in China.

1a. Involucre 0.9–1.5 cm in diam.; middle and upper leaves linear or nearly so, to 0.2 cm wide ..... 3. *T. tibetica*
1b. Involucre 1.5–6 cm in diam.; middle and upper leaves lanceolate or narrowly lanceolate, 0.3–3 cm wide.
2a. Capitula not subtended by leaves; peduncles slender, ca. 1 mm in diam.; phyllaries flexuous or bent outward ..... 1. *T. furcata*
2b. Capitula subtended by uppermost leaf or leaves; peduncles stout, ca. 2 mm in diam.; phyllaries straight ..... 2. *T. karensium*

1. Tricholepis furcata Candolle, Prodr. 6: 563. 1838.

镇苞菊 zhen bao ju

Herbs 0.6–1.4 m tall, perennial. Stem branched from base or middle; stem and branches purplish red, glabrous or sparsely pubescent. Lower stem leaves shortly petiolate; leaf blade elliptic to lanceolate, 5–12 × 3–5 cm, scabrid, yellowish gland-dotted, base cuneate, margin serrate, apex acute to acuminate. Upper stem leaves sessile, similar to lower stem leaves, 2–4 × 0.3–1.3 cm. Peduncles slender, ca. 1 mm in diam. Capitula nodding. Involucre hemispheric, 1.5–4 cm in diam. Phyllaries in many rows; appendage usually blackish, awnlike, 4–24 × 0.5–0.7 mm, somewhat recurved; outer phyllaries sparsely ciliate toward apex; inner phyllaries densely ciliate to plumose toward apex. Corolla yellow, ca. 2 cm; lobes glabrous. Achene cuneate-ellipsoid, 4–5 mm, glabrous. Pappus elements scabrid to serrulate, deciduous, decreasing in length outward, basally connate into a ring; innermost pappus elements ca. 15 × 0.1 mm, flattened. Fl. and fr. Oct.

Forest margins in mountain valleys; ca. 2600 m. SE Xizang [Bhutan, India (Sikkim), Nepal].

Tricholepis furcata has been indicated to also occur in NW India, Kashmir, and Pakistan (Nasir & Ali, Fl. W. Pakistan, 797. 1972; Hajra, Fl. India 12: 222. 1995). Those specimens, however, are distinct from typical *T. furcata* by their erect capitula and wider (ca. 1 mm wide), apically glabrous phyllaries and should instead be referred to *T. elongata* Candolle.

2. Tricholepis karensium Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41: 318. 1872.

云南镇苞菊 yun nan zhen bao ju

Herbs or subshrubs, 0.5–1 m tall, perennial. Stem erect, basally woody, branched, puberulent. Leaves sessile or shortly petiolate, linear-lanceolate to linear-oblong, 3.5–18 × 0.5–2 cm, undivided, both surfaces puberulent, abaxially with minute dark dots, base narrowly cuneate, apex acute to acuminate. Lower leaves distantly denticulate. Upper leaves entire. Peduncles stout, ca. 2 mm in diam. Capitula erect, subtended by 1 or few leaves. Involucre ovoid to broadly obconic, 4–6 cm in diam., base truncate. Phyllaries in many rows, subulate and slightly broader at base, 10–50 × 0.5–1 mm, straight, sparsely ciliate or glabrous near base, densely ciliate at apex. Corolla white or nearly so, ca. 2.1 cm; lobes appressed puberulent toward apex. Achene oblong, base oblique, apex slightly curved. Pappus elements multiseriate, filiform, 1–1.5 cm, shortly ciliate. Fl. Jun–Oct.

Rocky slopes, open dry places; ca. 1400 m. Yunnan [India, Kashmir, Myanmar, N Thailand].

3. Tricholepis tibetica J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 241. 1876.

红花镇苞菊 hong hua zhen bao ju

Herbs or subshrubs, 25–60 cm tall, perennial. Stems virgately branched, sparsely pubescent or glabrous, floccose lanate at base; branches slender. Leaves glabrous, glabrescent, or sparsely tomentose, somewhat fleshy. Lower leaves oblong, 2–6 × 0.2–0.5 cm, margin dentate to pinnatifid; lobes few, distant. Upper leaves oblong to linear, 5–15 × ca. 1 mm, margin entire. Peduncles ca. 1 mm in diam. Capitula erect or almost so. Involucre ovoid, 0.9–1.5 cm in diam., base truncate to obtuse. Phyllaries imbricately appressed, in many rows, lanceolate-subulate, 2–12 × 0.5–1 mm, apex acuminate with tip somewhat deflexed; outer and middle phyllaries glabrous or slightly tomentose; inner phyllaries appressed pubescent toward apex. Corolla pink, 1.3–1.6 cm, glabrous; lobes glabrous. Achene brown, oblong, smooth. Pappus elements white, decreasing in length outward, scabrid; innermost pappus elements 12–13 × 0.2–0.3 mm, flattened.

Dry rocky slopes. Xizang [Afghanistan, Kashmir, Pakistan].

No material from China was seen by the present authors, and the description here is based on the original publication and specimens from Kashmir.

40. AMBERBOA Vaillant, Königl. Akad. Wiss. Paris 5: 182. 1754 [*"Amberboi"*], nom. cons.

珀菊属 po ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, annual or biennial. Stem erect, branched or unbranched. Leaves undivided, lyrate, or pinnatipartite, margin entire or toothed. Capitula heterogamous, solitary at end of stem and branches, sometimes additionally 1 or few subbasal. Involucre glabrous or sparsely arachnoid. Phyllaries imbricate, rigid to subrigid; middle phyllaries broadly rounded; inner phyllaries with scarious apical appendage. Outer florets in 1 row, sterile, with corollas 5–20-cleft; inner florets many, bisexual, in many rows. Corolla yellow or purple. Stigmatic branches long. Achene sericeous-villous, apex with denticulate rim; attachment scar surrounded by conspicuously thickened rim. Pappus elements of one type, scalelike, wider toward apex, scabridulous, rarely absent.

Seven species: C and SW Asia; two species (one introduced) in China.

1a. Corolla yellow; corolla of radiant florets 5–10-cleft; usually at least 1 subbasal capitulum present ..... 1. *A. turanica*
1b. Corolla purplish red or white; corolla of radiant florets 10–20-cleft; all capitula terminal on long peduncles ..... 2. *A. moschata*

1. Amberboa turanica Iljin, Izv. Glavn. Bot. Sada S.S.S.R. 30: 110. 1932.

黄花珀菊 huang hua po ju

Herbs 15–35 cm tall, annual. Main stem very short, usually surmounted by side branches; stem and branches floccose. Leaves glabrous. Basal and lower stem leaves petiolate; petiole to 4.5 cm; leaf blade elliptic to lanceolate, undivided, margin denticulate to almost entire, 4–6 × 1.2–2.5 cm. Middle and upper stem leaves sessile or shortly petiolate, pinnatilobed or pinnatipartite; lateral lobes 3 or 4 pairs, lanceolate, margin sparsely toothed or entire. Involucre ovoid, bowl-shaped, or hemispheric, 1–1.7 cm in diam. Phyllaries in ca. 4 rows, lanate-pubescent, glabrescent; outer phyllaries broadly ovate to ovate-elliptic, 4–7 × 4–6 mm, apex obtuse-rounded; middle phyllaries elliptic, 8–12 × ca. 6 mm; inner phyllaries spatulate-elliptic to broadly linear, ca. 12 × 2–4 mm, with triangular to lanceolate apical appendage. Corolla yellow to yellowish; corolla of marginal florets scarcely longer than disk florets, 5–10-cleft, white pubescent at middle. Achene dark brown, cylindric, ca. 5 mm, densely white villous. Pappus ca. 4 mm. Fl. and fr. May–Sep. $2n = 64$.

Sandy areas, wastelands, farmlands; ca. 400 m. Xinjiang (Junggar Pendi) [Afghanistan, Kazakhstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

2. Amberboa moschata (Linnaeus) Candolle, Prodr. 6: 560. 1838.

珀菊 po ju

Centaurea moschata Linnaeus, Sp. Pl. 2: 909. 1753.

Herbs 30–50 cm tall, annual or biennial. Stem solitary, branched or unbranched; stem and branches sparsely cobwebby floccose. Leaves glabrous or sparsely floccose. Lower stem leaves petiolate; leaf blade spatulate to elliptic, 6–7 × 1.5–2 cm, base attenuate, margin serrulate, apex obtuse to acute. Middle and upper stem leaves shortly petiolate; leaf blade elliptic to narrowly elliptic, lyrately pinnatipartite. Uppermost leaves sessile or subsessile, margin serrulate. Involucre ovoid, 1.2–2 cm in diam. Phyllaries in 3 or 4 rows, sparsely villous; outer phyllaries ovate, ca. 4 × 1.8 mm; middle phyllaries ovate to broadly ovate, 5–10 × 3–7 mm; inner phyllaries spatulate-elliptic to broadly linear, ca. 10 × 3–4 mm, with ovate to orbicular apical appendage. Corolla purple, 10–20-cleft, white villous; corolla of marginal florets much longer than inner ones. Achene brown, cylindric, ca. 5 mm, densely white villous. Pappus ca. 5 mm, rarely absent. $2n = 32$.

Naturalized in Gansu [native to SW Asia].

Amberboa moschata is also grown as a garden ornamental.

41. PLAGIOBASIS Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 3: 108. 1845.

斜果菊属 xie guo ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, perennial. Stem branched. Capitula heterogamous, rarely homogamous. Phyllaries imbricate, broadly rounded. Outer florets female or sterile; inner florets bisexual; rarely all florets bisexual. Corolla pink to purple. Stigmatic branches long, divergent. Achene ellipsoid-cylindric, without a rim; attachment scar without a thickened margin. Pappus elements in many rows, bristlelike, not connate into a ring.

One species: China, Kazakhstan, Kyrgyzstan.

1. Plagiobasis centauroides Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 3: 109. 1845.

斜果菊 xie guo ju

Plagiobasis dshungarica Iljin.

Herbs 20–60(–80) cm tall. Stem erect, sparsely branched above middle, striate, glabrous. Leaves thick, glabrous, margin sharply toothed. Basal leaves petiolate; petiole 2–5 cm; leaf blade elliptic to obovate, 4–6 × 1.5–2 cm, base attenuate, apex obtuse to acute. Stem leaves sessile, oblong to lanceolate, base

cuneate to rounded and sometimes semiamplexicaul, apex acute. Capitula few, corymbose to laxly paniculate. Involucre globose to ovate, 1–2.5 cm in diam. Phyllaries in 4 or 5 rows, green to yellow-green, leathery, apex sometimes with purple tinge or with dark triangular or semilunar spot; outer and middle phyllaries suborbicular, ovate, or oblong, 5–15 × 4–7 mm, with a narrow faintly delimited membranous margin, apex rounded; inner and innermost phyllaries elliptic to linear-lanceolate, 15–19 × 1.5–5 mm, apically hyaline to scarious, apex obtuse. Corolla 1.6–2 cm. Achene brown, narrowly ellipsoid-cylindric, 5–6 × 1–1.5 mm, sparsely pubescent and early glabrescent, not ribbed, apex rounded. Pappus elements white, 5–7 mm, serrulate, easily falling off. Fl. and fr. Jul–Oct.

Arid areas, gravel areas; ca. 800 m. Xinjiang (Junggar Pendi, Tian Shan) [Kazakhstan, Kyrgyzstan].

42. RUSSOWIA C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 281. 1890.

纹苞菊属 wen bao ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, annual. Stem richly branched, glabrous. Leaves pinnatisect. Capitula homogamous, at end of stem and branches, laxly paniculate to corymbose-paniculate. Phyllaries imbricate, in ca. 4 rows, without appendage. Florets bisexual. Corolla pale pink to purple. Achene sericeous; attachment scar surrounded by a thickened whitish rim; apex with a denticulate corona. Pappus elements white, in many rows, of one type, serrulate.

One species: Afghanistan, China, Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan.

1. Russowia sogdiana (Bunge) B. Fedtschenko, Consp. Fl. Turkestan. 4: 267. 1911.

纹苞菊 wen bao ju

Plagiobasis sogdiana Bunge, Beitr. Fl. Russl. 361. 1852; *Russowia crupinoides* C. Winkler.

Herbs 20–60 cm tall. Stem erect, branched from base or above middle; branches slender. Leaves thin. Basal leaves spatulate; leaf blade lanceolate, base attenuate into a long petiole, margin entire or denticulate. Lower stem leaves lyrate or pinnatisect; lateral segments 2–5 pairs, oblong to linear; terminal segment longest. Middle and upper stem leaves diminished, sessile, pinnatisect; segments often thickened at apex; lateral segments 1–3 pairs, linear, 3–30 × 0.3–1 mm. Capitula few to many. Involucre cylindric to ovoid-cylindric, 3–8 mm in diam. Phyllaries green with purple tinge, 3- or 5-striate, apex obtuse; outer and middle phyllaries ovate to elliptic, 2–3.5 × ca. 2 mm, margin narrow and membranous; inner and innermost phyllaries elliptic-lanceolate to elliptic-oblanceolate, 6–10 × 2–2.5 mm. Florets few. Corolla ca. 1 cm, sparsely villous above middle. Achene yellowish brown, narrowly ellipsoid, 3.5–4 mm, sparsely white sericeous. Pappus elements white, 5–7 mm, serrulate. Fl. and fr. Jun–Oct.

Deserts; 800–1000 m. Xinjiang (Junggar Pendi, Tian Shan) [Afghanistan, Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan].

43. SCHISCHKINIA Iljin, Repert. Spec. Nov. Regni Veg. 38: 73. 1935.

白刺菊属 bai ci ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, dwarf, annual. Stem branched from base. Leaves undivided, margin with rigid white spines. Uppermost leaves concealing capitula. Capitula heterogamous, clustered. Phyllaries imbricate, herbaceous. Receptacle with setae few, rather short. Florets few; outer florets sterile; inner florets bisexual. Corolla yellow or pink, of even thickness, not divided into tube and limb. Style branches short. Achene with a denticulate rim at apex. Pappus elements of two types; outer pappus of scabrid bristles; inner pappus of an annulus bearing 1 rigid basally widened bristle.

One species: Afghanistan, China, Kazakhstan, Pakistan, Tajikistan, Uzbekistan; SW Asia.

1. Schischkinia albispina (Bunge) Iljin, Repert. Spec. Nov. Regni Veg. 38: 73. 1935.

白刺菊 bai ci ju

Microlonchus albispinus Bunge, Del. Sem. Hort. Dorpat. 8. 1843; *Centaurea albispina* (Bunge) B. Fedtschenko; *Oligochaeta leucosmerinx* K. H. Rechinger & Köie.

Herbs, annual. Stem very short; stem and branches white, puberulent. Leaves shortly petiolate; leaf blade elliptic, oblanceolate, linear-oblanceolate, or spatulate, 2–6 × 0.3–0.7(–1.5) cm, glabrous or abaxially sparsely shortly strigose, base cuneate-attenuate, apex acute; marginal spines simple or 2–6-digitate, white, 1–5 mm. Capitula few to many congested at end of a branch. Involucre narrowly ovoid-ellipsoid, 12–14 × 4–5 mm. Phyllaries in ca. 5 rows, glabrous, apex acuminate and tipped with a short spine; outer phyllaries ovate, 5–6 × 2–3 mm; middle phyllaries elliptic to elliptic-lanceolate, 8–10 × 2–3 mm; inner phyllaries elliptic to linear, ca. 12 × 1.5 mm, scarious, apex often purple tinged. Corolla yellow or pink, 5–6 mm. Achene pale, ellipsoid-obovoid, compressed, ca. 4 × 2 mm, glabrous, shiny; lateral attachment scar almost 1/2 as long as achene; apical rim regularly denticulate. Pappus absent in sterile florets; pappus elements of fertile florets white but inner ones darker at base; outer pappus bristlelike, to 7 mm; inner pappus a single bristle, 8–9 mm, ca. 0.5 mm wide at base. Fl. and fr. Jun.

Sandy areas; ca. 600 m. Xinjiang (Junggar Pendi) [Afghanistan, Kazakhstan, Pakistan, Tajikistan, Uzbekistan; SW Asia].

44. SERRATULA Linnaeus, Sp. Pl. 2: 816. 1753.

伪泥胡菜属 wei ni hu cai shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Mastrucium Cassini.

Herbs, perennial. Stems erect, usually branched in upper half. Leaves pinnatisect or pinnate, rarely undivided, margin dentate or serrate. Capitula heterogamous [or homogamous and plants gynodioecious], few to many, paniculate or corymbose. Involucre ovoid, hemispheric, or bowl-shaped. Phyllaries usually darker toward apex, imbricate, apex acute; inner phyllaries longest. Marginal florets female, scarcely longer than bisexual ones, with staminodes. Corolla purple to pink. Stigmatic branches slender. Achene glabrous, apex rounded. Pappus elements of one type, in several rows, finely serrulate or scabrid.

Two species: Asia, Europe; one species in China.

1. Serratula coronata Linnaeus, Sp. Pl., ed. 2, 2: 1144. 1763.

伪泥胡菜 wei ni hu cai

Mastrucium pinnatifidum Cassini ex Candolle; *Serratula coronata* var. *manshurica* (Kitagawa) Kitagawa; *S. manshurica* Kitagawa.

Herbs 0.6–1.5 m tall. Rhizomes stout, procumbent. Stems erect, apically branched, rarely unbranched, glabrous. Basal and lower stem leaves petiolate, strigose to glabrescent; petiole 5–16 cm; leaf blade oblong to elliptic in outline, to 40 × 12 cm, pinnatisect or pinnate; segments narrowly elliptic, margin dentate or serrate; lateral segments 3–8 pairs, asymmetrical, decurrent on rachis. Middle and upper stem leaves sessile, similar in form and same in division as basal and lower stem leaves but smaller. Capitula heterogamous, few or rarely 1. Involucre bowl-shaped to campanulate, 1.2–2.5 cm in diam., with brownish lanate to velvety pubescence, rarely glabrescent. Phyllaries imbricate, in 6 or 7 rows, abaxially purplish red; outer phyllaries triangular to ovate, 3–7 × 1.5–4 mm, apex acute and with a spinule; middle and inner phyllaries elliptic, narrowly elliptic, or lanceolate, 10–18 × 3–4 mm, apex acuminate to acute; innermost phyllaries linear, ca. 20 × 1 mm. Corolla purple, 2–2.8 cm in female florets, ca. 2 cm in bisexual florets. Achene oblanceolate-ellipsoid, ca. 7 mm, many striate. Pappus elements yellowish brown, to ca. 1.2 cm, scabrid. Fl. and fr. Jul–Oct. $2n = 22$.

Forests, forest margins on mountain slopes, steppes, meadows, riverbanks; 100–1600 m. Anhui, SE Gansu, Guizhou, Hebei, Heilongjiang, W Henan, NW Hubei, NW Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, S Shaanxi, E Shandong, Shanxi, N Xinjiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia; Europe].

45. RHAPONTICOIDES Vaillant, Königl. Akad. Wiss. Paris 5: 165. 1754.

欧亚矢车菊属 ou ya shi che ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Bielzia Schur.

Herbs, perennial. Rhizome woody. Stem usually solitary, glabrous, covered with ± lanate remains of old leaves at base. Leaves pinnate, pinnatisect, or bipinnatisect, glabrous, margin argutely toothed; teeth white cartilaginous at apex; leaf segments usually strongly asymmetric at base, decurrent on rachis. Capitula heterogamous, solitary at end of stem and branches. Phyllaries broadly ovate, glabrous, base rounded. Corolla yellow or sulfureous; corolla of marginal florets not or scarcely radiant, sterile, with staminodes. Achene brown, yellowish near base, blackish near apex. Pappus elements of two types; outer pappus elements in many rows, bristlelike, scabrid; inner pappus elements in 1 row, scalelike, much shorter than to almost as long as outer ones, sometimes excurrent into a longer bristle.

About 30 species: N Africa, C and SW Asia, Europe; three species in China.

1a. Middle phyllaries with very narrow (ca. 0.2 mm wide) inconspicuous hyaline margin, without apical appendage ..... 1. *R. ruthenica*

1b. Middle phyllaries appendaged or with more than 1 mm wide hyaline margin.

2a. Primary segments of lower leaves undivided, oblong to narrowly elliptic ..... 2. *R. kasakorum*

2b. Primary segments of lower leaves irregularly pinnatipartite to pinnatisect ..... 3. *R. dschungarica*

1. Rhaponticoides ruthenica (Lamarck) M. V. Agababjan & Greuter, Willdenowia 33: 61. 2003.

欧亚矢车菊 ou ya shi che ju

Centaurea ruthenica Lamarck, Encycl. 1: 663. 1785; *C. modestii* Fedorov; *Centaurium ruthenicum* (Lamarck) Cassini.

Herbs 40–110 cm tall. Stem usually solitary, erect, apically few branched. Leaves green. Basal and lower stem leaves petiolate; petiole 4–9 cm, lanate; leaf blade oblanceolate in outline, pinnatisect to pinnate, ca. 18 × 8 cm; lateral segments 8–14 pairs. Middle and upper stem leaves sessile, similar in shape and same in division to basal and lower stem leaves, decreasing in size upward; lateral segments 4–10 pairs, elliptic to linear; basal lateral segments much diminished. Capitula few to several, rarely 1. Involucre ovoid, 1.8–2.5 cm in diam. Phyllaries in

4–6 rows, apex obtuse to rounded; middle phyllaries elliptic to ovate-elliptic, 9–10 × ca. 5 mm, unappendaged, margin ca. 0.2 mm wide and hyaline; inner phyllaries elliptic-lanceolate to lanceolate, 14–18 × 3–5 mm, apical appendage brownish and scarious. Achene narrowly ellipsoid, ca. 7 mm, apically rugulose. Outer pappus elements ca. 4 mm; inner pappus elements 0.8–3.5 mm. Fl. and fr. Jul–Sep. $2n = 30$.

Mountain slopes, meadows; 1200–1900 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Uzbekistan; SW Asia, Europe].

2. Rhaponticoides kasakorum (Iljin) M. V. Agababjan & Greuter, Willdenowia 33: 60. 2003.

天山矢车菊 tian shan shi che ju

Centaurea kasakorum Iljin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 66. 1937.

Herbs ca. 30 cm tall. Stem usually solitary, erect, apically few branched or unbranched. Leaves green or grayish green. Basal leaves petiolate; petiole to 13 cm; leaf blade elliptic to oblanceolate, 14–22 × 5–8 cm, pinnatisect to pinnate; lateral segments 6–12 pairs, oblong to narrowly elliptic, sometimes with 1 or 2 accessory segments near base; terminal segment elliptic, equal to lateral segments or smaller. Stem leaves several, sessile or shortly petiolate, similar to basal leaves but smaller. Capitula few to several, rarely 1. Involucre ovoid to campanulate, ca. 1.5 cm in diam. Phyllaries in 5 or 6 rows, apex obtuse to rounded; middle phyllaries elliptic to ovate-elliptic, 7–12 × ca. 5 mm, unappendaged, margin ca. 1 mm wide, hyaline, and often lacerate; inner phyllaries elliptic-lanceolate to lanceolate, ca. 15 × 3 mm, apical appendage white, hyaline, and scarious. Achene 6–8 mm. Outer pappus elements to 7 mm; inner pappus elements short. Fl. and fr. May–Aug.

Mountain slopes; ca. 2300 m. Xinjiang (Xinyuan) [Kazakhstan, Russia].

3. Rhaponticoides dschungarica (C. Shih) L. Martins, **comb. nov.**

准噶尔矢车菊 zhun ga er shi che ju

Basionym: *Centaurea dschungarica* C. Shih, Bull. Bot. Res., Harbin 4(2): 65. 1984.

Herbs 40–80 cm tall. Stem usually solitary, erect, apically few branched or unbranched. Leaves green. Basal leaves petiolate; petiole 2.5–6 cm, lanate at base; leaf blade oblanceolate, elliptic, or obovate in outline, 10–15 × 6–7 cm, bipinnatisect or pinnate and lateral segments irregularly pinnatipartite to pinnatisect; primary segments ca. 10 pairs, lanceolate to obliquely lanceolate, decreasing in size toward apex; ultimate segment narrowly elliptic. Stem leaves sessile or shortly petiolate, similar in shape and same in division as basal leaves. Capitula few to several, rarely 1. Involucre ovoid to bowl-shaped, 1.2–2.5 cm in diam. Phyllaries in 5 or 6 rows; middle phyllaries elliptic to ovate-elliptic, 7–12 × ca. 6 mm, apical appendage white hyaline to scarious, 2–5 mm, and narrowly decurrent on phyllary; inner phyllaries elliptic-lanceolate to linear-lanceolate, 15–16 × 3–6 mm, gradually transitioning into a scarious white or pale brown appendage. Achene 6–7 mm. Outer pappus elements to 6 mm; inner pappus elements very short. Fl. and fr. Jul–Aug.

Mountain slopes; 1600–2000 m. Xinjiang (Tian Shan) [Kyrgyzstan].

Centaurea ruthenica Lamarck var. *bipinnatifida* Trautvetter, described from Kazakhstan, is possibly a synonym of *Rhaponticoides dschungarica*.

46. PSEPHELLUS Cassini in F. Cuvier, Dict. Sci. Nat. 43: 488. 1826.

矮小矢车菊属 ai xiao shi che ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, perennial. Leaves tomentose, not decurrent. Capitula heterogamous, solitary at end of stem and branches. Phyllaries with apical appendage; appendage not or shortly decurrent, scarious, not spiny. Marginal florets sterile, radiant, with minute staminodes enclosed in corolla tube. Style branches of bisexual florets connate, divergent only in uppermost part. Achene narrowly ovoid, sparsely pilose. Pappus elements indistinctly of two types, shorter than achene; outer pappus elements in several rows, scabrid; inner pappus elements similar to outer ones, but somewhat wider and shorter than innermost row of outer pappus elements.

About 75 species: C and SW Asia, Europe, Russia; one species in China.

1. Psephellus sibiricus (Linnaeus) Wagenitz, Willdenowia 30: 38. 2000.

矮小矢车菊 ai xiao shi che ju

Centaurea sibirica Linnaeus, Sp. Pl. 2: 913. 1753; *Heterolophus sibiricus* (Linnaeus) Cassini.

Herbs 5–15(–30) cm tall. Stems 2 or 3, grayish white, erect or procumbent, simple or with 1 or 2 branches, tomentose to villous. Leaves grayish white, densely tomentose especially on abaxial side. Basal leaves petiolate; leaf blade elliptic, ca. 5 × 2–3 cm, pinnatisect; lateral segments 2–5 pairs, elliptic to ovate, margin entire; terminal segment ovate, larger than lateral segments. Stem leaves few, similar to basal leaves or undivided, narrowly elliptic to spatulate, margin entire. Capitulum 1(or 2). Involucre campanulate to obconic, 1–2 cm in diam. Phyllaries in ca. 6 rows, appendage yellowish brown; outer phyllaries triangular to lanceolate, arachnoid; middle phyllaries ovate, narrowly ovate to lanceolate, 4–10 × ca. 3 mm, glabrous; appendage of middle phyllaries broadly ovate, elliptic, or suborbicular, scarious, with 4–12 fimbriae on each side; inner phyllaries linear-lanceolate, ca. 11 × 1.5–2 mm; appendage of inner phyllaries suborbicular to spoon-shaped, lacerate. Outer florets ster-

ile, radiant, longer than inner florets. Corolla purple to pink. Achene whitish, obliquely oblong, ca. 6 mm, with an entire apical rim. Outer pappus elements in several rows, bristlelike, to ca. 2 mm, scabrid to serrulate; inner pappus elements bristlelike to narrowly scalelike, ca. 1.5 mm, scabrid. Fl. and fr. Jul–Aug. $2n = 30$.

Dry mountain slopes; ca. 1200 m. N Xinjiang [Kazakhstan, Russia].

47. CRUPINA (Persoon) Candolle, Ann. Mus. Natl. Hist. Nat. 16: 157. 1810.

半毛菊属 ban mao ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Centaurea subg. *Crupina* Persoon, Syn. Pl. 2: 488. 1807.

Herbs, annual. Stem slender, erect, apically corymbosely to paniculately branched. Leaves unarmed. Basal leaves simple. Stem leaves pinnatisect to pinnate. Capitula heterogamous. Phyllaries imbricate. Florets few; outer florets sterile or functionally male; inner florets 1 to few and bisexual. Achene dark brown, subcylindric to compressed, villous toward apex, apex truncate and with a rim. Pappus elements of two types; outer pappus elements in several rows, bristlelike, scabridulous; inner pappus elements few, in 1 row, scalelike, short.

Two or three species: N Africa, C and SW Asia, Europe; one species in China.

1. Crupina vulgaris Persoon ex Cassini in F. Cuvier, Dict. Sci. Nat. 12: 68. 1819.

半毛菊 ban mao ju

Centaurea crupina Linnaeus, Sp. Pl. 2: 909. 1753; *Serratula crupina* (Linnaeus) Villars.

Herbs 20–60 cm tall. Stem solitary, basally pubescent, apically glabrous. Leaves green, with few glochidiate hairs at margin and sometimes sparsely lanate pubescent on adaxial side of rachis. Basal leaves soon decaying, sessile, obovate, scabrid, margin entire or toothed, apex obtuse. Stem leaves sessile; lateral segments 3–5 pairs, linear to broadly linear, 1.4–4 mm wide, margin entire or sparsely minutely denticulate. Capitula 3–6(–15), laxly corymbose. Involucre at anthesis fusiform to narrowly ellipsoid and 4–6 mm in diam., expanding in fruit to obconic and 7–12 mm in diam. Phyllaries pale green sometimes with purple tinge, in ca. 6 rows, herbaceous, striate, margin narrowly white scarious, apex acute; outer phyllaries broadly ovate to elliptic, 1.5–2.1 mm; middle and inner phyllaries elliptic-lanceolate, 5–11 × 1.5–2.5 mm. Corolla purple, filiform, ca. 1.1 cm, pubescent with richly branched hairs. Achene subcylindric, 3–5 mm, base rounded, villous toward apex; attachment scar basal, suborbicular. Outer pappus elements to ca. 6 mm, very unequal, scabridulous; inner pappus elements 5 or 6(–12), very short. Fl. and fr. Jul. $2n = 30$.

Slopes; ca. 1100 m. NW Xinjiang (Ili Kazak Zizhizhou) [Afghanistan, India, Kashmir, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan; Africa, SW Asia, Europe].

Crupina vulgaris is naturalized in North America.

48. CARTHAMUS Linnaeus, Sp. Pl. 2: 830. 1753.

红花属 hong hua shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Kentrophyllum Necker ex Candolle.

Herbs, annual or perennial. Leaves pinnatilobed, pinnatisect, or undivided, margin usually spiny. Capitula homogamous, 1 to several at end of stem and branches. Involucre ovoid or narrowly ellipsoid. Outer phyllaries leaflike, rigid, spinosely toothed; inner phyllaries thin, sometimes with apical appendages. Florets bisexual. Stigmatic branches short. Achene ivory, ovoid, oblanceolate, or obpyramidal, 4-angled, glabrous, usually rugose toward apex, apex with a rim; outer achenes often without pappus; inner achenes usually with a persistent or connate and deciduous pappus. Pappus elements in many rows or absent.

About 47 species: C and SW Asia, Europe, Mediterranean region; one species (introduced) in China.

Carthamus lanatus Linnaeus is cultivated as an ornamental in the Beijing area and Shaanxi.

1. Carthamus tinctorius Linnaeus, Sp. Pl. 2: 830. 1753.

红花 hong hua

Herbs (20–)50–100(–150) cm tall, annual. Stem erect, apically branched; stem and branches white or whitish, smooth, glabrous. Leaves rigid, leathery, glabrous. Lower and middle stem leaves sessile, lanceolate, ovate-lanceolate, or elliptic, simple, 7–15 × 2.5–6 cm, base attenuate and semiamplexicaul, margin spinosely toothed or entire, apex acute; teeth very rarely pinnatipartite, apically with 1–1.5 mm spinules. Upper stem leaves lanceolate, decreasing in size upward, margin spinosely toothed; teeth apically with a ca. 3 mm spine. Capitula few to many, in a corymbose synflorescence, rarely 1. Involucre ovoid, ca. 2.5 cm in diam. Phyllaries in ca. 5 rows; outer phyllaries leaflike, ovate-lanceolate, 2–4 × ca. 1 cm, spiny; middle phyl-

laries 6–20 × 4–7 mm, constricted between pale parallel-veined basal part and leaflike apical part with green reticulate veins; inner phyllaries oblanceolate-elliptic to oblanceolate, ca. 22 × 5 mm, rigidly scarious, apex attenuate. Corolla red to orange, ca. 2.8 cm. Achene ovoid to ellipsoid, ca. 5.5 mm, 4-angled. Pappus absent. Fl. and fr. May–Aug. $2n = 24$*.

Widely cultivated in China and occasionally naturalized in saline and alkaline soils in dry and cold conditions in Gansu, Guizhou, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Zhejiang [native origin unknown; widely cultivated].

The seeds of *Carthamus tinctorius* yield edible oil, and the florets are used medicinally or for extracting a red pigment used as dye. Because of its long cultivation, the precise origin is uncertain although it is probably SW Asia.

49. CYANUS Miller, Gard. Dict. Abr., ed. 4, [422]. 1754.

蓝花矢车菊属 lan hua shi che ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Herbs, annual [or perennial]. Leaves arachnoid tomentose, often decurrent on stem. Capitula heterogamous, at end of stem and branches. Involucre ovoid. Phyllary appendages long decurrent, margin ciliate or dentate. Florets usually blue, rarely white, cream-colored, pink, or purple; marginal florets sterile, usually without staminodes, radiant, much enlarged. Achene pilose; attachment scar with a tuft of hairs at base. Pappus elements of two types; inner pappus elements similar to outer ones but distinctly shorter than innermost row of outer pappus elements.

About 25–30 species: SW Asia, Europe, Mediterranean region; one species (introduced) in China.

1. Cyanus segetum Hill, Veg. Syst. 4: 29. 1762.

蓝花矢车菊 lan hua shi che ju

Centaurea cyanus Linnaeus, Sp. Pl. 2: 911. 1753; *C. cyanocephala* Velenovský.

Herbs 30–70 cm tall, annual or rarely biennial. Stem erect, branched from middle, rarely unbranched; stem and branches grayish white, thinly arachnoid floccose. Leaves abaxially grayish white and sparsely tomentose, adaxially green to grayish green and sparsely arachnoid. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic-oblanceolate to lanceolate, undivided or lyrately pinnatisect; lateral segments 1–3 pairs, narrowly elliptic-lanceolate, linear-lanceolate, or linear, margin entire; terminal segment narrowly elliptic-oblanceolate, margin serrulate. Middle stem leaves sessile, broadly linear to linear-lanceolate, rarely with lateral laciniae near base, 4–9 × 0.3–0.8 cm, base attenuate, margin entire, apex acute. Upper stem leaves similar in shape to middle stem leaves, decreasing in size upward. Capitula few to many, corymbose or paniculate. Involucre ellipsoid, 5–13 mm in diam., sparsely arachnoid. Phyllaries in ca. 6 rows, appendaged; appendage brownish or white, scarious, fimbriate; outer and middle phyllaries elliptic to narrowly elliptic, 3–6 × 2–4 mm; inner phyllaries elliptic, 10–11 × 3–4 mm. Outer florets blue, white, red, or purple, longer than inner florets; inner florets bluish violet. Achene ellipsoid, ca. 3 mm, striate, sparsely pilose-pubescent. Pappus elements in several rows, scabrid; outer pappus elements bristlelike, 2–3 mm; inner pappus elements bristlelike to narrowly scalelike, 1–2 mm. Fl and fr. Feb–Aug. $2n = 24, 48$*.

Occasionally naturalized in at least Qinghai and Xinjiang [native to Europe].

Cyanus segetum is widely grown in China as an ornamental. The whole plant is used medicinally, and the seed oil can be used for soap making.

50. CENTAUREA Linnaeus, Sp. Pl. 2: 909. 1753, nom. cons.

矢车菊属 shi che ju shu

Shi Zhu (石铸 Shih Chu); Ludwig Martins

Calcitrapa Vaillant; *Centaurea* sect. *Hyalaea* Candolle; *Chartolepis* Cassini; *Cnicus* Linnaeus, nom. cons.; *Hyalea* Jaubert & Spach; *Jacea* Miller.

Herbs, annual, biennial, or perennial. Leaves concolorous. Capitula heterogamous, 1 to numerous or paniculate-corymbose or paniculate-racemose. Involucre globose, ovoid, campanulate, or bowl-shaped. Phyllaries imbricate; apical appendage fimbriate, spiny, or scarious. Florets few to many; outer florets sterile, enlarged and radiant or ± as long as inner ones, without staminodes; inner florets bisexual. Corolla yellow, white, pink, or purple. Stigmatic branches short. Achene sparsely pubescent to glabrescent or glabrous, apical rim denticulate or smooth. Pappus usually present, of two types of elements; outer pappus elements bristlelike, usually in many rows, rarely in 1 row, persistent or caducous, scabrid; inner pappus elements short, usually scalelike.

About 300–450 species: most in C and SW Asia and Mediterranean region; seven species (one introduced) in China.

All of the native species in China occur in Xinjiang. *Centaurea nigrescens* Willdenow, native to Europe, is grown as a garden plant at the Summer Palace in Beijing.

1a. Capitula concealed by uppermost leaves; uppermost leaves large ..... 1. *C. benedicta*
1b. Capitula visible; uppermost leaves diminished.

2a. Appendage of middle phyllaries unarmed, hyaline, margin entire or slightly lacerate.
3a. Involucre 12–18 mm in diam.; stem leaves decurrent ..... 2. *C. glastifolia*
3b. Involucre 4–6 mm in diam.; stem leaves sessile ..... 3. *C. pulchella*
2b. Appendage of middle phyllaries fimbriate or spiny.
4a. Appendage of middle phyllaries fimbriate, blackish ..... 4. *C. scabiosa*
4b. Appendage of middle phyllaries spiny, pale.
5a. Terminal spine of middle phyllaries straight, (3–)10–25 mm ..... 7. *C. iberica*
5b. Terminal spine of middle phyllaries arcuate, 1–4 mm.
6a. Bisexual florets 3–7; pappus present ..... 5. *C. virgata*
6b. Bisexual florets ca. 12; pappus absent ..... 6. *C. diffusa*

1. Centaurea benedicta (Linnaeus) Linnaeus, Sp. Pl., ed. 2, 2: 1296. 1763.

藏掖花 cang ye hua

Cnicus benedictus Linnaeus, Sp. Pl. 2: 826. 1753.

Herbs 5–50 cm tall, annual. Stem erect, usually divaricately branched; stem and branches densely setiferous. Leaves setiferous pubescent with multicellular hairs, pinnatilobed or pinnatifid, prominently reticulate-veined especially on abaxial side, margin spinose to spinosely toothed. Basal leaves petiolate; leaf blade oblong, ca. 30 × 8 cm, runcinate to pinnatifid, often withered at anthesis. Lower and middle stem leaves petiolate; petiole winged; leaf blade narrowly elliptic, decreasing in size upward, pinnatilobed or pinnatipartite, base attenuate; lobes triangular, narrowly elliptic-triangular, or narrowly elliptic. Upper stem leaves sessile, base amplexicaul and shortly decurrent onto stem. Uppermost leaves exceeding capitula. Capitula few to several, rarely 1, solitary at end of stem and branches, concealed by subtending leaves. Involucre ovoid, ca. 2 cm in diam. Phyllaries imbricate, in 4 or 5 rows; outer phyllaries ovate, ca. 10 × 5 mm, leaflike, apex acute and tipped with a 3–6 mm spine; middle phyllaries elliptic, elliptic-lanceolate, or lanceolate, ca. 15 × 3–6 mm, apex with a rigid pectinately divided spine; inner phyllaries broadly linear, ca. 20 × 2.5 mm. Sterile florets filiform. Corolla pale yellow. Achene cylindric, ca. 8 mm, conspicuously many ribbed, glabrous, apex with a denticulate rim. Outer pappus elements in 1 row, ca. 1 cm, rigid, scabridulous; inner pappus elements much shorter, ciliate to inconspicuously arachnoid. Fl. and fr. Jun–Jul. $2n = 22$.

Mountain slopes; ca. 2300 m. Xinjiang (Tian Shan) [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].

Centaurea benedicta is native to N Africa, C and SW Asia, and Europe but has become naturalized in other areas.

This species is cultivated in Chinese gardens. The whole plant is used medicinally.

2. Centaurea glastifolia Linnaeus subsp. **intermedia** (Boissier) L. Martins, **comb. et stat. nov.**

薄鳞菊 bao lin ju

Basionym: *Chartolepis intermedia* Boissier, Diagn. Pl. Orient., ser. 2, 3: 64. 1856; *Centaurea chartolepis* Greuter.

Herbs 40–100 cm tall, perennial. Stem erect, winged, sparingly branched. Leaves shortly strigose and gland-dotted, margin entire or inconspicuously serrulate. Basal leaves petiolate; petiole 4–20 cm; leaf blade elliptic to elliptic-oblanceolate, 6–10 × 2–6 cm. Lower stem leaves similar to basal leaves, base decurrent. Middle and upper stem leaves narrowly elliptic, elliptic-lanceolate, or linear-elliptic, decreasing in size upward, base long decurrent. Capitula few to several, in a laxly racemose-corymbose synflorescence. Involucre narrowly ellipsoid to ovoid, 1.2–1.8 cm in diam. Phyllaries in 6 or 7 rows, with an apical membranous appendage; outer and middle phyllaries ovate, 4–10 × 2.5–5 mm; appendage of outer and middle phyllaries ovate to lanceolate, ca. 5 mm wide, white hyaline except for a pale brown triangular area at base; inner phyllaries ovate-lanceolate, much longer than others. Corolla yellow, ca. 2.7 cm; corolla of outer florets 4- or 5-cleft, as long as or slightly shorter than inner ones. Achene ellipsoid, 5–6 mm, sparsely pilose. Outer pappus elements in many rows, bristlelike, to 1 cm, shortly plumose; inner pappus elements scalelike, oblong, very short. Fl. and fr. Jun–Aug.

Lakesides, thickets; ca. 800 m. Xinjiang (Junggar Pendi) [Kazakhstan, Russia; Europe].

3. Centaurea pulchella Ledebour, Icon. Pl. 1: 22. 1829.

琉苞菊 liu bao ju

Hyalea pulchella (Ledebour) K. Koch.

Herbs (10–)20–70 cm tall, annual. Stem erect, branched, pubescent near base; branches ivory-white or straw-colored, ascending, slender, glabrous. Leaves arachnoid, glabrescent. Basal leaves withered at anthesis, shortly petiolate; leaf blade narrowly elliptic-lanceolate, margin repandly denticulate and sometimes pinnatilobed near base. Lower and middle stem leaves sessile, lanceolate to linear-lanceolate, 2–3 × 0.2–0.3 cm, base cuneate-attenuate, margin entire or minutely serrulate, apex acute. Upper stem leaves similar to lower and middle stem leaves, decreasing in size upward. Capitula many, in a corymbose to paniculate synflorescence. Involucre narrowly ellipsoid to obconic, 4–6 mm in diam. Phyllaries in ca. 6 rows, glabrous, with distinct blackish longitudinal line; outer and middle phyllaries ovate to narrowly ovate, 1–5 × 0.7–1.5 mm excluding appendage; appendage of outer and middle phyllaries with a median brown stripe, spoon-shaped, suborbicular, or ovate, hyaline, decurrent on margin of phyllary, margin entire or slightly lacerate, almost completely concealing herbaceous part of phyllaries; inner phyllaries linear-lanceolate to linear, ca. 10 × 1.5 mm excluding appendage. Sterile florets not radiant. Corolla pink or white, ca. 1 cm, of even thickness. Achene obovoid, ca. 3 mm, sparsely pilose to glabrescent, with a shallowly denticulate rim. Outer pappus elements white, to 5 mm, scabridulous; inner pappus elements scalelike, 1–1.5 mm, ciliate and with a tuft of hairs at apex. Fl. and fr. Jun–Sep.

Mountain slopes, sandy areas, deserts; 700–2400 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

4. Centaurea scabiosa Linnaeus subsp. **adpressa** (Ledebour) Gugler, Ann. Hist.-Nat. Mus. Natl. Hung. 6: 132. 1907.

糙叶矢车菊 cao ye shi che ju

Centaurea adpressa Ledebour, Index Sem. Horti Dorpat. 1824, Suppl. 2: 3. 1824; *C. apiculata* Ledebour subsp. *adpressa* (Ledebour) Dostál; *C. scabiosa* var. *adpressa* (Ledebour) Candolle.

Herbs 50–100 cm tall, perennial. Stems solitary or few, erect, branched above middle; stem and branches sparsely floccose or arachnoid pubescent. Leaves scabrid, sparsely arachnoid. Basal leaves petiolate; petiole brown, fibrous, 5–8 cm; leaf blade oblanceolate to elliptic in outline, 15–20 × ca. 8 cm, pinnatisect; lateral segments 8–11 pairs, narrowly elliptic, broadly linear, narrowly oblanceolate, or spatulate, margin entire; terminal segment usually larger than lateral segments, margin entire or sometimes toothed. Stem leaves similar to basal leaves, decreasing in size upward; lower stem leaves shortly petiolate. Capitula few to many, corymbose or corymbose-paniculate at end of stem and branches. Involucre ovoid to campanulate, 1.2–2 cm in diam. Phyllaries imbricate, in 6 or 7 rows, appendaged; outer and middle phyllaries broadly to narrowly ovate, 4–13 × 3–5 mm, abaxially arachnoid, somewhat glabrescent; appendage of outer and middle phyllaries brown to blackish brown, small, fimbriate, narrowly decurrent on margin of phyllary, apex acute; inner phyllaries broadly linear, ca. 15 × 3 mm; appendage of inner phyllaries brown, scarious, fimbriate. Sterile florets as long as or slightly longer than bisexual ones. Corolla purple. Achene pale brown, ellipsoid, 4–7 mm, sparsely pubescent, with a subentire rim at apex. Outer pappus elements in several rows, bristlelike, to 6 mm, scabrid to serrulate; inner pappus elements scalelike, ca. 1 mm. Fl. and fr. Jun–Sep. $2n$ = 20.

Deserts, steppes, flooded lands, farmlands; 400–1400 m. Nei Mongol, N Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Uzbekistan; Europe].

5. Centaurea virgata Lamarck subsp. **squarrosa** (Boissier) Gugler, Ann. Hist.-Nat. Mus. Natl. Hung. 6: 248. 1907.

小花矢车菊 xiao hua shi che ju

Centaurea virgata var. *squarrosa* Boissier, Fl. Orient. 3: 651. 1875, based on *C. squarrosa* Willdenow, Sp. Pl. 3: 2319. 1803, not Roth (1800).

Herbs 25–70 cm tall, perennial. Stems few to several, erect, branched from above middle; branches spreading, rigid; stem and branches grayish green, arachnoid tomentose. Leaves densely minutely gland-dotted, arachnoid tomentose. Basal and lower stem leaves petiolate; petiole 3–7 cm; leaf blade elliptic in outline, 5–8 × 2–4 cm, pinnatipartite to bipinnatipartite; ultimate segments linear to narrowly elliptic, 0.7–3 mm wide. Middle stem leaves sessile, pinnatipartite. Upper leaves diminished, undivided. Capitula many, laxly and broadly paniculate, solitary or in pairs, easily detaching from peduncle after anthesis. Involucre ovoid, ellipsoid-ovoid, or cylindric, 2.5–3.5 mm in diam. Phyllaries in ca. 6 rows; outer and middle phyllaries elliptic, narrowly elliptic, or linear-lanceolate, 2–8 × 1–1.8 mm, puberulent; appendage of outer and middle phyllaries straw-colored or with a purple tinge, with 4–8 pectinately arranged 1–1.8 mm spinules on each side ending in a 1–2 mm arcuate-recurved spine; inner phyllaries linear-lanceolate, ca. 8 × 1.5 mm; appendage of inner phyllaries triangular to subulate, scarious. Sterile florets few, as long as bisexual ones, not or scarcely radiant; bisexual florets 3–7. Corolla purple to pink. Achene grayish, ovoid, 3–3.5 mm, pilose to subglabrous, apex with an almost smooth inconspicuous rim. Outer pappus elements in few rows, longest ca. 2 mm, scabridulous; inner pappus elements ca. 0.7 mm. Fl. and fr. Jun–Sep. $2n$ = 36.

Mountain slopes, wastelands; 500–1500 m. Xinjiang (Tian Shan) [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

6. Centaurea diffusa Lamarck, Encycl. 1: 675. 1785.

铺散矢车菊 pu san shi che ju

Herbs 15–50 cm tall, biennial. Stems erect or diffuse, branched from base; stem and branches densely strigose and sparsely arachnoid. Leaves adaxially scabrous. Basal and lower stem leaves petiolate; leaf blade bipinnatisect. Middle stem leaves sessile. Upper leaves sessile, linear, margin entire. Capitula numerous, paniculate at end of stem and branches. Involucre ovoid-cylindric to cylindric, 3–5 mm in diam. Phyllaries in 5 or 6 rows; outer and middle phyllaries lanceolate to elliptic, 3–7 × ca. 1.5 mm; appendage of outer and middle phyllaries straw-colored, with 1–5 pectinately arranged spines on each side ending in a 2–4 mm arcuate-patent spine; inner phyllaries linear, ca. 8 × 1 mm; appendage of inner phyllaries scarious. Sterile florets few, as long as bisexual ones, not radiant; bisexual florets ca. 12. Corolla white. Achene dark brown with paler stripes, narrowly ovoid, ca. 2 mm, sparsely pilose, apex with a minute inconspicuous smooth apical rim. Pappus absent. Fl. and fr. Sep. $2n$ = 18, 36.

Collected from Liaoning (Lüshun) but of unknown status as to being cultivated, escaped, or naturalized [native to SW Asia and Europe].

7. Centaurea iberica Treviranus ex Sprengel, Syst. Veg., ed. 16, 3: 406. 1826.

镇刺矢车菊 zhen ci shi che ju

Calcitrapa iberica (Treviranus ex Sprengel) Schur.

Herbs 20–100 cm tall, annual or biennial. Stem erect, divaricately branched; stem and branches sparsely setiferous; branches exceeding main axis. Leaves sparsely strigose and gland-dotted. Basal leaves petiolate; leaf blade lyrately pinnatipartite or lyrately pinnatisect. Middle stem leaves sessile, pinnatipartite or pinnatisect; lateral lobes or segments ca. 4 pairs, narrowly elliptic, oblanceolate, or linear-oblanceolate, margin inconspicuously denticulate, apex rounded, obtuse, acute, or mucronulate. Upper leaves decreasing in size upward, narrowly elliptic, lanceolate, oblanceolate, or elliptic-oblanceolate, margin denticulate or entire. Capitula in a corymbose-paniculate synflorescence. Involucre ovoid, 1–1.8 cm in diam. excluding spines. Phyllaries in 4–6 rows; outer and middle phyllaries

ovate, broadly ovate, or ovate-elliptic, 5–7 × 4–8 mm, with scarious margin and an apical spine; spine of outer and middle phyllaries straw-colored, (0.3–)1–2.5 cm, patent, sulcate, with 1 or 2 pairs of small accessory spines at base, apex pungent; inner phyllaries narrowly to broadly linear, 10–15 × 3–6 mm; appendage of inner phyllaries white or pale brown, scarious, margin entire or irregularly and coarsely dentate. Sterile florets not exceeding bisexual ones. Corolla pink to purple. Achene grayish brown, ellipsoid, 3–4 mm, sparsely pubescent, apex subentire with an inconspicuous rim. Outer pappus elements in few rows, white, bristlelike, to 2 mm, scabrid; inner pappus elements scalelike, ca. 0.5 mm. Fl. and fr. Jun–Sep. $2n = 20$.

Mountain slopes; 500–900 m. NW Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia, Europe].

5. Tribe **CICHORIEAE**

菊苣族 ju ju zu

Shi Zhu (石铸 Shih Chu), Ge Xuejun (葛学军);
Norbert Kilian, Jan Kirschner, Jan Štěpánek, Alexander P. Sukhorukov, Evgeny V. Mavrodiev, Günter Gottschlich

Annual to perennial, acaulescent, scapose, or caulescent herbs, more rarely subshrubs, exceptionally scandent vines, latex present. Leaves alternate, frequently rosulate. Capitulum solitary or capitula loosely to more densely aggregated, sometimes forming a secondary capitulum, ligulate, homogamous, with 3–5 to ca. 300 but mostly with a few dozen bisexual florets. Receptacle naked, or more rarely with scales or bristles. Involucre cylindric to campanulate, ± differentiated into a few imbricate outer series of phyllaries and a longer inner series, rarely uniseriate. Florets with 5-toothed ligule, pale yellow to deep orange-yellow, or of some shade of blue, including whitish or purple, rarely white; anthers basally calcarate and caudate, apical appendage elongate, smooth, filaments smooth; style slender, with long, slender branches, sweeping hairs on shaft and branches; pollen echinolophate or echinate. Achene cylindric, or fusiform to slenderly obconoidal, usually ribbed, sometimes compressed or flattened, apically truncate, attenuate, cuspidate, or beaked, often sculptured, mostly glabrous, sometimes papillose or hairy, rarely villous, sometimes heteromorphic; pappus of scabrid [to barbellate] or plumose bristles, rarely of scales or absent.

About 95 genera and ca. 2,500 species (and at least 8,000 apomictic and hybrid taxa): chiefly in the temperate to subtropical zones of the N Hemisphere, and extending to tropical and S Africa, tropical Asia, Australia and New Zealand, and South America, also on SE Pacific and mid-Atlantic archipelagos; 35 genera (two endemic, one introduced) and 388 species (190 endemic, 12 introduced) in China.

1a. Pappus absent in all or in outer achenes, or in all achenes present but of minute (≤ 0.3 mm) scales or very short (≤ 1.5 mm) bristles.
2a. Pappus a tiny crown of fimbriate 0.1–0.3 mm scales; florets blue ..... 83. *Cichorium*
2b. Pappus absent in all or in outer achenes, or of very short (≤ 1.5 mm) bristles; florets yellow.
3a. Achene dimorphic, outer achenes apically attenuate or shortly beaked, inner ones with a long slender beak strongly exceeding involucre; pappus in all or in inner achenes present.
4a. Outer achenes columnar, curved, with appressed hairs, apically attenuate; pappus of smooth to scabrid 0.2–1.5 mm bristles, shorter in outer, longer in inner achenes; inner phyllaries hardened in fruit ..... 70. *Garhadiolus*
4b. Outer achenes broadly obconical, compressed, lateral ribs strongly winglike and enlarged, shortly beaked; pappus absent in outer achenes, mostly present and of 3–5 mm bristles in inner ones; inner phyllaries not hardened in fruit ..... 69. *Heteracia*
3b. Achene homomorphic, never beaked; pappus in all achenes absent.
5a. Achene body columnar-scorpioid, ca. 1 cm, abaxially with antrorse and apically with retrorse rigid hooked needlelike spines; leaves undivided, narrowly grasslike ..... 53. *Koelpinia*
5b. Achene body narrowly ellipsoid, subcompressed, to ca. 5 mm, with 0 or (1 or)2–4 main ribs apically prolonged into 0.2–2.2 mm slender hooked appendages; leaves pinnatipartite or pinnatisect ..... 67. *Lapsanastrum*
1b. Pappus well developed in all achenes, of soft or stiff bristles, usually more than 1/2 as long as achene.
6a. Pappus bristles all or at least inner ones plumose but often apically scabrid.
7a. Plumose bristles stiffly fimbriately plumose, fimbriae not intertwining; florets yellow or white; leaves never grasslike.
8a. Receptacle with linear scarious scales ± as long as involucre and enclosing base of florets; stem, leaves, and involucre with rigid simple hairs ..... 81. *Hypochaeris*
8b. Receptacle naked; stem, leaves, and involucre with simple and 2-hooked hairs ..... 82. *Picris*
7b. Plumose bristles softly or lanately fimbriately plumose, fimbriae conspicuously intertwining; florets of some shade of yellow, white, blue, or purple; leaves often grasslike.
9a. Phyllaries in 1(or 2) series, outer series if present never leaflike ..... 55. *Tragopogon*
9b. Phyllaries in several series, or in 2 series but then outer series leaflike and longer than inner series.
10a. Phyllaries in 2 series, outer phyllaries herbaceous, leaflike, usually longer than inner phyllaries, inner usually 5 ..... 54. *Epilasia*
10b. Phyllaries in several series, outer phyllaries never leaflike and longer than inner ones.
11a. Leaves undivided, parallel-veined, grasslike or more rarely also lanceolate to ovate ..... 51. *Scorzonera*
11b. Leaves pinnately divided ..... 52. *Podospermum*
6b. Pappus bristles never plumose, all smooth to scabrid.
12a. Pappus white, of numerous fine cottony outer bristles intermixed with some thicker inner ones ..... 63. *Sonchus*
12b. Pappus white or grayish, yellowish, straw-colored, brownish, or reddish brown, of bristles ± equal in diam. and stiffness.
13a. Leaves, axes, or involucres with various types of hairs, but including stellate hairs and/or multiseriate hairs with projecting cell apices.
14a. Achene 2.5–5 mm, with 8–10 equal ribs apically confluent in an obscure ring ..... 84. *Hieracium*

14b. Achene 1–2 mm, with apically distinct ribs not confluent in an obscure ring ..... 85. *Pilosella*
13b. Leaves, axes, or involucres glabrous or hairy, but never with stellate hairs or multiseriate hairs with projecting cell apices.
15a. Capitulum solitary on a hollow scape (without nodes, leaves, or bracts) single or few from a leaf rosette; achene beak usually longer than achene body, body at least apically mostly spinulose, scaly, and/or tuberculate and usually with an apical cone ..... 71. *Taraxacum*
15b. Capitula usually few to numerous, either fascicled or aggregated amid a leaf rosette, or on a branched stem; if capitulum rarely solitary then not on a hollow scape and achene not as above.
16a. Rosulate herbs with several to many capitula either on short, wiry unbranched axes (peduncles) directly from and fasciculate amid leaf rosette, or sessile to very shortly pedunculate and densely aggregated on an apically ± inflated, flat, convex, or more rarely cylindrically elongate rosette shoot.
17a. Capitula with 3–6 florets, sessile or on peduncle shorter than involucre; phyllaries in 1 series, hardened in fruit, outer phyllaries absent, inner ones connate in basal part.
18a. Florets yellow or pale to medium purplish; achene obconical, compressed, with 5 ribs, apex truncate; pappus bristles caducous ..... 77. *Syncalathium*
18b. Florets purplish red to blue; achene obovoid, compressed, with winglike lateral ribs and 1 slender rib on either side, apex constricted into a ca. 0.5 mm fragile thin beak; pappus caducous with pappus disk (*M. souliei*) ..... 58. *Melanoseris*
17b. Capitula with 4–30 florets, peduncle shorter or longer than involucre; phyllaries in more than 1 series, herbaceous in fruit, outer phyllaries 2 or more, inner ones basally connate or free.
19a. Florets blue to bluish purple (*D. amoena* and *D. gombalana*) ..... 76. *Dubyaea*
19b. Florets yellow or rarely white.
20a. Capitula with 4 or 5 florets, with a peduncle shorter than to ± as along as involucre and from an apically ± inflated, flat, convex, or more rarely cylindrically elongate rosette shoot (*Soroseris* spp. 3–7) ..... 80. *Soroseris*
20b. Capitula with 12–30 florets, with a peduncle usually longer than involucre, from a non-inflated rosette shoot.
21a. Synflorescence hemispheric, of many densely crowded capitula surrounded by a rosette of orbicular to ovate leaves abruptly contracted into an unwinged petiole-like basal portion; florets yellow or white (*Soroseris* spp. 1 and 2) ..... 80. *Soroseris*
21b. Synflorescence loosely corymbiform with few to several capitula amid a rosette of ± spatulate leaves very gradually attenuate toward base; florets yellow ..... 66. *Youngia*
16b. Capitula few to numerous on a branched stem a few cm to more than 2 m tall; rarely capitulum solitary on an unbranched stem.
22a. Achene isodiametric and with ribs of ± equal shape and size; pappus white, rarely pale yellowish.
23a. Achene with 10 very prominent ± winglike ribs ..... 74. *Ixeris*
23b. Achene with 10–20 ± prominent but never winglike ribs.
24a. Plants delicate; involucre narrowly cylindric, longest outer phyllary ≤ 1/4(–1/3) of inner ones, inner phyllaries abaxially glabrous; capitula with 5–15 florets; achene pale brown, with 10 ribs ..... 72. *Askellia*
24b. Plants usually robust; involucre cylindric to campanulate, longest outer phyllary 1/4–2/3 or more of inner ones, inner phyllaries abaxially usually with simple and/or glandular hairs along midvein; capitula with (8–)20–70 (and more) florets; achene of some shade of brown, with 10–20 ribs ..... 65. *Crepis*
22b. Achene (sometimes except inner ones) somewhat to distinctly compressed and/or with ± unequal ribs; pappus white, yellowish, or brownish.
25a. Pappus yellowish, straw-colored, brownish, or grayish and achene never strongly compressed with dominant lateral ribs and/or with capillaceous beak.
26a. Florets reddish to bluish purple, or blue.
27a. Involucre broadly campanulate; capitula with many (usually 50–70) florets; stem in upper half and peduncles often with long stiff blackish hairs ..... 76. *Dubyaea*
27b. Involucre narrowly cylindric to narrowly campanulate; capitula with 5–30 florets; stem in upper half and peduncles glabrous ..... 56. *Faberia*
26b. Florets yellow, or rarely whitish to pale purplish or pale greenish.
28a. Involucre 4.5–8 mm; capitula erect.
29a. Achene with short slender beak; pappus yellowish to yellowish brown ..... 73. *Ixeridium*
29b. Achene apically attenuate but not beaked; pappus ash-gray or yellowish brown ..... 66. *Youngia*
28b. Involucre 10–20 mm; capitula often nodding at anthesis.
30a. Synflorescence secundly racemiform (*Y. racemifera*) ..... 66. *Youngia*
30b. Synflorescence corymbiform or paniculiform, or capitula 1 or 2.

31a. Stem, branches, and phyllaries with conspicuous stiff yellowish brown, reddish, purplish brown, or blackish mostly glandular hairs, or glabrous and stem with 1 or 2 nodding capitula only ..... 76. *Dubyaea*

31b. Stem, branches, and phyllaries glabrous and stem with some to many capitula, or ± hairy but never with conspicuous stiff mostly glandular hairs.

32a. Leaves grasslike ..... 78. *Hololeion*

32b. Leaves pinnately lobed or, if undivided, ovate to triangular-ovate ..... 79. *Nabalus*

25b. Pappus white, exceptionally faintly yellowish or brownish but then achene strongly compressed with dominant lateral ribs and/or with capillaceous beak.

33a. Plants broomlike and/or achene with body apically scaly and/or tuberculate and beaked (sometimes very shortly) ..... 64. *Chondrilla*

33b. Plants never broomlike, achene beaked or not but body never scaly or tuberculate.

34a. One of following features applies: 1) achene ± compressed with ± dominating or broadened lateral ribs; 2) pappus double and additionally with an outer series of minute hairs (usually ≤ 0.3 mm); 3) florets purplish, bluish, or exceptionally white.

35a. Achene black or reddish-purplish (if rarely pale then plant scandent), fusiform to cylindric, without dominating lateral ribs, and apex truncate, attenuate, or shortly (ca. 1 mm) beaked; florets some shade of purple or blue; pappus simple; involucre narrowly cylindric.

36a. Achene black, fusiform, weakly compressed, apex attenuate to shortly beaked and often pale ..... 59. *Paraprenanthes*

36b. Achene reddish-purplish (rarely pale and plant scandent), fusiform to cylindric, compressed, apex truncate ..... 60. *Notoseris*

35b. Achene pale to dark brown, more rarely blackish or reddish brown, gray, or olive green, subcylindric, ± ellipsoid to obovoid, or ± fusiform, usually with, rarely without, dominating or broadened (sometimes winglike) lateral ribs and apex truncate to long filiform beaked; pappus simple or double; florets yellow, bluish, or purplish, rarely white; involucre narrowly cylindric, cylindric, campanulate, or broadly campanulate.

37a. Achene always strongly compressed, ellipsoid to obovoid, dominating lateral ribs sometimes even winglike, apex with a short stout or with a long filiform beak; pappus always simple; involucre narrowly cylindric at anthesis, inner phyllaries 5 or 8, or if 3 or 4 then plant a subshrub with whitish, rigid, intricately and divaricately branched stems; stems and branches usually glabrous, at least in upper half; capitula always erect; florets some shade of yellow, or blue, bluish purple, purple, or white ..... 61. *Lactuca*

37b. Achene ± compressed, dominating lateral ribs never winglike, apex truncate, attenuate, or with a short stout or slender but never long filiform beak; pappus usually double, more rarely outer series with minute hairs indistinct or missing; involucre narrowly cylindric to broadly campanulate, inner phyllaries 3 to many; capitula erect or nodding; stems and branches glabrous, or hispid, hirsute, or otherwise hairy; florets mostly some shade of blue or purple, exceptionally white, very rarely yellow.

38a. Involucre with 5–10 inner phyllaries, 6–10(–12) mm and narrowly cylindric, or cylindric, 11–13 mm, and with longest outer phyllary 1/2–3/4 of inner ones, or to 15 mm, broadly cylindric to campanulate, and herb tall with many-capitellate narrowly racemiform synflorescence to 50 cm; florets always bluish or purplish; achene 4–5 mm ..... 57. *Cicerbita*

38b. Involucre broadly cylindric to broadly campanulate, mostly exceeding 15 mm and never with many-capitellate narrowly racemiform synflorescence to 50 cm, or rarely narrowly cylindric but then with either only 3 or 4 inner phyllaries, or > 13 mm, or strongly hirsute, or florets yellow, or achene ≥ 6 mm, or, if rather cylindric, longest outer phyllary to ca. 1/2 of inner ones ..... 58. *Melanoseris*

34b. Achene ± isodiametric or ± compressed but not with ± dominating or broadened lateral ribs; pappus always single; florets always of some shade of yellow.

39a. Achene apex ± truncate (at least before shedding of pappus disk if pappus disk caducous).

40a. Longest outer phyllary ≤ 1/3 of inner ones; stem stiff erect; synflorescence narrowly racemiform or paniculiform; pappus caducous (without pappus disk) ..... 75. *Sonchella*

40b. Longest outer phyllary 1/2–3/4 of inner ones; stem weak and procumbent to ascending, or long creeping, or if stiff erect then hardened and densely divaricately and intricately branched; synflorescence corymbose to divaricately paniculiform, or capitulum solitary; pappus persistent or caducous together with pappus disk ..... 62. *Launaea*

39b. Achene apex distinctly attenuate to beaked.
41a. Stem leaves well developed and at least upper ones conspicuously clasping stem, or plant stoloniferous (*Crepidiastrum* spp. 1–6) ..... 68. *Crepidiastrum*
41b. Stem leaves absent or present but not clasping stem and plant not stoloniferous.
42a. Stems herbaceous to hardened, several to numerous, more rarely only 1, erect, with some to many heads, from a stout woody caudex and plant often caespitose; basal leaves and stem leaves (if present) pinnate to bipinnate with linear, lanceolate, or filiform lobes; involucre 8–12 mm, most phyllaries subapically crested or corniculate (*Crepidiastrum* spp. 7–9) ..... 68. *Crepidiastrum*
42b. Stems usually 1 or 2, of various kind, either from an inconspicuous caudex and plant never caespitose, or plants annual; involucre ≤ 7 mm and phyllaries subapically all strictly plane, or involucre to 13 mm and either some phyllaries crested or corniculate but then leaves never pinnate with linear, lanceolate, or filiform lobes, or all strictly plane.
43a. Involucre narrowly cylindric, 7–8 mm, all phyllaries subapically plane; perennial rosulate herbs, stem solitary; either stem, branches, and phyllaries white echinulate, or rosette leaves with a pentagonal or triangular lamina and a petiole as long as or longer than lamina (*Ixeridium* spp. 7 and 8) ..... 73. *Ixeridium*
43b. Involucre 4–13 mm, phyllaries all subapically plane or some crested or corniculate; annual herbs, or if perennial herbs and rosulate then stem, branches, and phyllaries never white echinulate and leaves never as above ..... 66. *Youngia*

51. SCORZONERA Linnaeus, Sp. Pl. 2: 790. 1753.

鸦葱属 ya cong shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Lasiospora Cassini; *Takhtajaniantha* E. A. Nazarova.

Herbs, perennial [or annual], rarely subshrubs, often with woody caudex and rosulate. Leaves usually linear to linear-elliptic or lanceolate, more rarely also ovate, with parallel veins, not divided, base with semiamplexicaul usually persistent sheath, margin entire, flat, or sometimes undulate. Involucre cylindric to campanulate, usually very conspicuously prolonged toward fruiting. Phyllaries in few to several series, imbricate, often (especially inner phyllaries) with scarious margin; longest outer phyllaries usually to more than 1/2 as long as and often ± approaching inner phyllaries in length; inner phyllaries lanceolate to linear-lanceolate. Receptacle naked. Florets yellow (and often pinkish on drying) or rarely orange or pale purple, 1.1–2 × as long as involucre. Achene ± cylindric to columnar, with numerous smooth or tuberculate longitudinal ribs, glabrous, puberulent, or villous along entire length or apically only, apex truncate or more rarely attenuate. Pappus of strong bristles, persistent or caducous, a few often distinctly longer than remainder; bristles softly fimbriately plumose for most of length and apically scabrid.

About 180 species: N Africa, Asia, Europe; 24 species (four endemic) in China.

Even after exclusion of *Podospermum* and *Epilasia*, *Scorzonera* is still polyphyletic (Mavrodiev et al., Taxon 53: 699–712. 2004). Because a more detailed phylogenetic study and revision of *Scorzonera* s.l. is not yet available, and the circumscription of its diverse elements therefore not clear, the genus is treated here in this wider sense still including *Takhtajaniantha* and *Lasiospora*.

1a. Perennial herbs or subshrubs, often hemispheric; stems usually basally woody, virgate, repeatedly divaricately branched; basal leaves early deciduous; stem leaves linear to filiform and small, or larger and spreading.
2a. Caudex with scarious leaf sheath residues; stem leaves inconspicuous, to 10 mm; capitula with 4 or 5 florets ..... 1. *S. divaricata*
2b. Caudex with fibrous and lacerate leaf sheath residues; stem leaves conspicuous, horizontally spreading to spreading-erect, 1–9 cm; capitula with 7–12 florets ..... 2. *S. pseudodivaricata*
1b. Perennial herbs, never hemispheric; stems herbaceous, unbranched or rather weakly branched; basal leaves usually present; stem leaves present or absent, of various shapes.
3a. Caudex with conspicuous dark brown fibrous and lacerate leaf sheath residues.
4a. Leaves filiform to filiform-linear, 1–1.5 mm wide, almost somewhat curled, glaucous ..... 10. *S. curvata*
4b. Leaves not filiform to filiform-linear, 2 mm or more wide, ± straight, green.
5a. Ovary and achene shortly villous along their entire length.
6a. Leaves 2–15 mm wide, margin undulate; plants glabrous; achene ca. 10 mm ..... 11. *S. ikonnikovii*
6b. Leaves 3–4 mm wide, margin flat; leaves, stems, and phyllaries floccose or lanate when young, soon glabrescent; achene 7–8 mm ..... 12. *S. manshurica*
5b. Ovary and achene glabrous.

7a. Stem (especially apically) and involucre basally floccose arachnoid hairy; leaves 2–4 mm wide ..... 9. *S. subacaulis*
7b. Plants usually glabrous (occasionally leaf sheath margin or apical phyllary margin arachnoid hairy); leaves sometimes as narrow as 2 mm wide, otherwise 0.5–3(–4.5) cm wide.
8a. Basal leaves often rather narrow (linear, linear-lanceolate, or linear-elliptic), margin usually flat ..... 7. *S. austriaca*
8b. Basal leaves often rather broad (broadly ovate, ovate-lanceolate, oblanceolate, elliptic-lanceolate, linear-elliptic, or linear), margin undulate ..... 8. *S. sinensis*
3b. Caudex with smooth, usually scarious, rarely with age lacerate or somewhat fibrous but never dark brown fibrous leaf sheath residues, or without leaf sheath residues.
9a. Ovary and achene densely villous along their entire length.
10a. Leaves usually 0.8–1.5 cm wide, leaf blade margin densely undulate; plants with globose tuber some cm below surface ..... 24. *S. circumflexa*
10b. Leaves usually 2–8 mm wide, leaf blade margin flat; plants with or without globose tuber.
11a. Plants without tuber, to 40 cm tall; pappus 2–2.5 cm ..... 22. *S. ensifolia*
11b. Plants with tuber some cm below surface, to 20 cm tall; pappus less than 1.5 cm ..... 23. *S. sericeolanata*
9b. Ovary and achene glabrous or at most ± villous at pappus disk.
12a. Stems leafless, sparsely leaved, or with reduced leaves, with 1 or few single-capitellate branches, or plants subacaulescent.
13a. Caudex conspicuously dirty white lanate of adaxially thickly lanate leaf sheath residues; leaves broadly lanceolate to ovate, at least in part usually more than 2 cm wide ..... 3. *S. capito*
13b. Caudex not lanate, leaf sheaths adaxially glabrous; leaves at most ca. 1.5 cm wide.
14a. Involucre, base of involucre, and sometimes leaves somewhat arachnoid hairy; florets ca. 2 × as long as involucre ..... 6. *S. radiata*
14b. Plants entirely glabrous; florets less than 1.5 × as long as involucre.
15a. Leaves lanceolate, or narrowly elliptic to linear, 2–15 mm wide ..... 4. *S. parviflora*
15b. Leaves linear, 1–2 mm wide ..... 5. *S. luntaiensis*
12b. Stems leafy, well developed, and usually branched at least basally.
16a. Plants of saline soil, glabrous (but leaf sheaths adaxially often lanate) and grayish to glaucous green; leaves ± fleshy, narrowly elliptic to lanceolate; stem leaves often partly opposite ..... 21. *S. mongolica*
16b. Plants not of saline soil, glabrous and fresh green or with indumentum; leaves not fleshy, variously shaped; stem leaves always alternate.
17a. Plants with tuber some cm below surface, to 20(–40) cm tall; leaves 1–3 mm wide.
18a. Plants 30–40 cm tall; involucre 2–2.4 cm at anthesis ..... 20. *S. aniana*
18b. Plants to 20 cm tall; involucre 1.3–1.8 cm at anthesis.
19a. Caudex with adaxially lanate leaf sheath residues; involucre ca. 1.8 cm at anthesis; pappus bristles plumose for most of length ..... 18. *S. pusilla*
19b. Caudex with glabrous leaf sheath residues; involucre 1.3–1.5 cm at anthesis; pappus bristles scabrid for most of length ..... 19. *S. pamirica*
17b. Plants without tuber, taller than above; leaves usually wider than above.
20a. Involucre from at least 2 cm at anthesis, to 4 cm in fruit; achene 1.7–2.3 cm, apically conspicuously long attenuate; pappus caducous as an entity ..... 13. *S. albicaulis*
20b. Involucre to 2 cm at anthesis, not more than ca. 3 cm in fruit; achene not more than 1.5 cm, apically not conspicuously attenuate; pappus persistent.
21a. Florets slightly longer than involucre; plants entirely glabrous; achene 7–9 mm ..... 4. *S. parviflora*
21b. Florets distinctly longer than involucre (usually ca. 1.5 × as long as involucre); stem, leaves, or involucre with short branched, dendritic or stellate hairs; achene 1–1.5 cm.
22a. Plants with weak, ascending-erect stems to at most 30 cm tall, usually branched already near base; achene with tuberculate ribs.
23a. Plants with conspicuous gray indumentum; leaves linear, 1–5 mm wide, with flat margin ..... 16. *S. pubescens*
23b. Plants stellate puberulent, glabrescent; leaves narrowly lanceolate or narrowly elliptic, 4–7 mm wide, with mostly undulate margin ..... 17. *S. inconspicua*
22b. Plants with strong erect stems to 75 cm tall, usually branched apically; achene with smooth ribs.

24a. Florets yellow ..... 14. *S. iliensis*
24b. Florets deep orange ..... 15. *S. transiliensis*

1. Scorzonera divaricata Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 200. 1832.

拐轴鸦葱 guai zhou ya cong

Subshrubs or perennial herbs, 20–40 cm tall. Rootstock 4–10 mm in diam. Caudex branched, with smooth scarious leaf sheath residues. Stems some to many, grayish green, slender, erect, repeatedly divaricately and intricately branched from base, pubescent or glabrous, basally woody; branches slender, ascending-erect. Basal leaves few, distant, linear, early deciduous. Stem leaves linear to filiform, 2–10 × 1–3 mm, apex usually hooked; upper stem leaves bractlike, inconspicuous. Capitula many, terminal, with 4 or 5 (to 12–15 in var. *sublilacina*) florets. Involucre narrowly cylindric, ca. 1 cm at anthesis, 1.5–1.7 × 0.3–0.4 cm in fruit. Phyllaries puberulent, pubescent, or sparsely pubescent in fruit; outer phyllaries few, ovate to lanceolate, longest ca. 1/2 as long as inner phyllaries; inner phyllaries usually ca. 4. Florets yellow (or pale purple in var. *sublilacina*). Achene pale yellow to yellowish brown, cylindric, 7–9 mm, with smooth ribs, glabrous or apically villous. Pappus straw-colored to brownish, ca. 1.5 cm. Fl. and fr. May–Sep.

Dry riverbeds, lowland sand dunes, gullies, valleys, hills, slopes, plains at base of mountains; 500–2000 m. Gansu, Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi [Mongolia].

1a. Florets yellow; achene glabrous ..... 1a. var. *divaricata*
1b. Florets pale purple; achene apically villous ..... 1b. var. *sublilacina*

1a. Scorzonera divaricata var. **divaricata**

拐轴鸦葱(原变种) guai zhou ya cong (yuan bian zhong)

Scorzonera divaricata var. *intricatissima* Maximowicz.

Florets yellow. Achene glabrous.

Dry riverbeds, lowland sand dunes, gullies, valleys; 500–2000 m. Gansu, Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi [Mongolia].

1b. Scorzonera divaricata var. **sublilacina** Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 494. 1888.

紫花拐轴鸦葱 zi hua guai zhou ya cong

Florets pale purple. Achene apically villous.

• Hills, slopes, plains at base of mountains; ca. 1500 m. Gansu, Nei Mongol (Hohhot).

Scorzonera divaricata var. *sublilacina*, originally described by Maximowicz from material from Nei Mongol and Gansu with capitula of up to 15 pale purple florets, was referred by Lipschitz (Fragm. Monogr. Scorzonera 2: 124. 1939) to this species rather than to *S. pseudodivaricata* as were the other varieties with more numerous florets than is usual in *S. divaricata*. A reassessment of this taxon and its affinity appears worthwhile considering the frequent confusion between plants of *S. divaricata* and *S. pseudodivaricata*. Because the yellow ligules of both *S. divaricata* and *S. pseudodivaricata* can become pinkish on drying, floret color needs to be established on living plants.

Scorzonera divaricata var. *sublilacina* is used medicinally for treating serious cases of boils.

2. Scorzonera pseudodivaricata Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 42: 158. 1933.

帚状鸦葱 zhou zhuang ya cong

Scorzonera divaricata Turczaninow var. *foliata* Maximowicz; *S. divaricata* var. *virgata* Maximowicz; *S. muriculata* C. C. Chang; *S. pseudodivaricata* var. *leiocarpa* C. H. An; *S. rugulosa* C. C. Chang.

Subshrubs or perennial herbs, 7–50 cm tall. Rootstock ca. 9 mm in diam. Caudex unbranched or more rarely branched, with somewhat fibrous and lacerate leaf sheath residues. Stems some to many, grayish green, rigid, herbaceous, sparsely to moderately divaricately branched in apical half, puberulent, glabrescent, or glabrous, leafy; branches virgate, slender, spreading-erect. Basal leaves crowded, linear, early deciduous. Stem leaves linear to filiform, usually 1–9 cm × 0.5–5 mm, horizontally spreading to spreading-erect, straight or somewhat hooked, often falcate, pubescent, glabrescent, or glabrous; upper stem leaves progressively smaller but mostly still leaflike. Capitula many, terminal, with usually 7–12 florets. Involucre cylindric, usually 1.5–1.8 cm at anthesis, 1.8–2.5 × 0.5–0.8 cm in fruit. Phyllaries puberulent; outer phyllaries triangular-ovate to linear-lanceolate, longest 1/2–2/3 as long as inner phyllaries; inner phyllaries usually 5 or 6. Florets yellow. Achene brownish, dark green, or blackish, cylindric, 7–8 mm, with elevated smooth or tuberculate ribs, glabrous. Pappus dirty white to straw-colored, 1.3–1.8 cm. Fl. and fr. May–Oct.

Gravelly deserts, dry slopes, along streams, sandy soils; 600–3100 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shaanxi, ?Sichuan, Xinjiang [Mongolia].

Scorzonera pseudodivaricata has often been confused with *S. divaricata*, hence the name, but both species are actually well distinct.

A report by Ostenfeld (in Hedin, S. Tibet 6(3): 29. 1922) of *Scorzonera divaricata* var. *virgata* Maximowicz (being a synonym of *S. pseudodivaricata*) was erroneously treated by Tzvelev (Rast. Tsentral. Azii 14b: 122. 2008) as "*S. divaricata* Turczaninow var. *virgata* (Candolle) Maximowicz" and, consequently, taken as a substantiation for the presence of the W Himalayan *S. virgata* Candolle in Xinjiang and C Asia, which is, however, clearly erroneous.

3. Scorzonera capito Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 491. 1888.

棉毛鸦葱 mian mao ya cong

Herbs 5–15 cm tall, perennial, rosulate. Rootstock dark brown, ca. 2 cm in diam. Caudex woody, globose to subglobose, simple or branched, densely covered with scarious entire adaxially abundantly dirty white lanate leaf sheath residues. Stems single or to 5(–7), ascending-erect, unbranched, arachnoid villous, glabrescent. Rosette leaves ovate to spatulate or elliptic, (3–)5–17 × (1–)2–3[–5] cm, somewhat arachnoid hairy, base attenuate, apex rounded, obtuse, or acute. Stem leaves 1–3, sessile, ovate to lanceolate, 0.5–2 × 0.3–1.5 cm, ± leathery, somewhat arachnoid hairy, glabrescent, or glabrous, base cordate and semiamplexicaul. Capitulum solitary. Involucre

broadly campanulate to subglobose, usually 1.6–2 × 1.2–1.5 cm at anthesis, to 2.5 × > 2 cm in fruit. Phyllaries abaxially arachnoid hairy; outermost phyllaries broadly ovate to broadly lanceolate. Florets yellow. Achene pale yellow, cylindric, 7–9 mm, with tuberculate ribs, apically sparsely villous. Pappus white, 1–1.5 cm. Fl. and fr. May–Aug.

Gravelly deserts, sandy soils, alluvial plains; 1100–1500 m. Nei Mongol, ?Ningxia [Mongolia].

4. Scorzonera parviflora Jacquin, Fl. Austriac. 4: 3. 1776.

光鸦葱 guang ya cong

Scorzonera caricifolia Pallas; *S. halophila* Fischer & C. A. Meyer ex Candolle.

Herbs 10–60 cm tall, perennial, rosulate, entirely glabrous. Rootstock creeping, ca. 1.5 cm in diam., usually branched. Caudex with or without scarious leaf sheath residues. Stems solitary or few, ascending to erect, unbranched or rarely sparsely branched. Rosette leaves lanceolate or narrowly elliptic to linear, 7–20 × 0.2–1.5 cm, often somewhat fleshy, base attenuate, apex acute to acuminate. Stem leaves few, smaller than rosette leaves, narrowly lanceolate. Capitulum solitary, rarely 2 or 3 per stem and distant. Involucre cylindric, usually 1.5–1.8 × 0.5–0.8 cm at anthesis, to 2.5–3 × 1–1.3(–1.5) cm in fruit. Phyllaries abaxially glabrous, apex acute to subobtuse; outermost phyllaries ovate to triangular-ovate. Florets yellow, slightly longer than involucre. Achene yellowish, cylindric, 7–9 mm, with smooth elevated ribs, glabrous. Pappus dirty white, 1.5–1.8 cm. Fl. and fr. Jun–Sep. $2n = 14$.

Wet subsaline meadows, riverbanks, at springs; 900–1700 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Russia (C, E, and S European parts), Turkmenistan, Uzbekistan; SW Asia, C and S Europe].

5. Scorzonera luntaiensis C. Shih, Acta Phytotax. Sin. 33: 197. 1995.

轮台鸦葱 lun tai ya cong

Herbs 12–14 cm tall, perennial, rosulate. Rootstock brown, ca. 5 mm in diam. Caudex with pale brown scarious leaf sheath residues. Stem solitary, ca. 1.5 mm in diam., erect, unbranched, subglabrous or glabrous. Rosette leaves linear, 6–10 × 0.1–0.2 cm, glabrous, base attenuate, margin flat, apex acuminate. Stem leaves very few, mostly on basal portion of stem, similar to rosette leaves but smaller, subulate to linear. Capitulum solitary. Involucre narrowly cylindric, ca. 1.4 × 0.5 cm at anthesis. Phyllaries abaxially glabrous; outermost phyllaries ovate, ca. 4 × 2.2 mm, apex acute. Achene when immature without tubercles, glabrous, not seen when mature. Pappus white, ca. 8 mm. Fl. Jul.

● Damp riverbanks; ca. 1500 m. Xinjiang (N Tarim Pendi).

6. Scorzonera radiata Fischer ex Ledebour, Fl. Altaic. 4: 160. 1833.

毛梗鸦葱 mao geng ya cong

Scorzonera radiata var. *rebunensis* (Tatewaki & Kitamura) Nakai; *S. radiata* var. *subacaulis* Lipschitz & Krascheninnikov; *S. rebunensis* Tatewaki & Kitamura.

Herbs (3–)15–30(–50) cm tall, perennial, rosulate. Rootstock ca. 1.5 cm in diam. Caudex with scarious leaf sheath residues. Stems solitary to few, erect, unbranched, arachnoid hairy especially under capitula, glabrescent with age. Rosette leaves linear, linear-lanceolate, or linear-elliptic, 5–30 × 0.3–1.5[–1.8] cm, sometimes sparsely arachnoid hairy, glabrescent, base attenuate, apex acuminate. Stem leaves 0–3, linear to linear-lanceolate, smaller than rosette leaves. Capitulum solitary. Involucre broadly cylindric to campanulate, 1.7–2.1 × 0.8–1 cm at anthesis, to 2.6 × 1.8 cm in fruit. Phyllaries abaxially sparsely arachnoid hairy, glabrescent, apex usually with a red spot; outermost phyllaries ovate to broadly lanceolate. Florets yellow, almost 2 × as long as involucre. Achene cylindric, 0.9–1.3 cm, with smooth elevated ribs, glabrous. Pappus dirty yellow, 1.1–1.4 cm. Fl. and fr. May–Jul. $2n = 14$.

Forest margins, forests, grasslands, gravelly riverbanks; 900–2600 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang [Kazakhstan, Russia (Asian part), Uzbekistan].

7. Scorzonera austriaca Willdenow, Sp. Pl. 3: 1498. 1803.

鸦葱 ya cong

Scorzonera austriaca var. *plantaginifolia* Kitagawa; *S. sinensis* (Lipschitz & Krascheninnikov) Nakai f. *plantaginifolia* (Kitagawa) Nakai.

Herbs 5–45 cm tall, perennial, rosulate. Rootstock dark brown. Caudex woody, densely covered with brown fibrous and lacerate leaf sheath residues. Stems solitary or few, erect, unbranched, glabrous. Rosette leaves narrowly linear, linear-lanceolate, linear-elliptic, or narrowly elliptic, usually 3–35 × 0.2–2.5 cm, glabrous or occasionally base and sheath marginally arachnoid hairy, base long attenuate, margin flat, apex acute to acuminate. Stem leaves 2 to several, scalelike, lanceolate to subulate-lanceolate, base semiamplexicaul. Capitulum solitary. Involucre cylindric, usually 2.1–2.8 × 0.6–1.2 cm at anthesis, to 3.3 × 1.5 cm in fruit. Phyllaries abaxially glabrous or occasionally inner ones apically arachnoid hairy at margin, apex acute, obtuse, or rounded; outermost phyllaries triangular to triangular-ovate. Florets yellow, usually to 1.5–1.7 × as long as involucre. Achene whitish to pale brown, cylindric, 1.2–1.5 cm, with smooth or sometimes tuberculate ribs, glabrous. Pappus dirty white, usually 1.5–1.7 cm. Fl. and fr. Apr–Jul. $2n = 14$*.

Slopes, floodplains, grassy riverbanks and lake shores; 400–2000 m. Gansu, Hebei, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Xinjiang [Kazakhstan, Mongolia, Russia; C and SE Europe].

Scorzonera austriaca is the widespread and name-giving taxon of the highly polymorphic *S. austriaca* complex, to which the following five species belong, and which is in need of a modern revision covering its entire distribution area. The following two species appear to lack clear morphological discontinuities and seem thus doubtfully distinct at species rank.

8. Scorzonera sinensis (Lipschitz & Krascheninnikov) Nakai, Rep. Inst. Sci. Res. Manchoukuo 1: 171. 1937.

桃叶鸦葱 tao ye ya cong

Scorzonera austriaca Willdenow subsp. *sinensis* Lipschitz & Krascheninnikov, Fragm. Monogr. Scorzonera 1: 120. 1935.

Herbs usually 5–50 cm tall, perennial, rosulate. Rootstock brown to dark brown, ca. 1.5 cm in diam. Caudex woody, often branched, densely covered with fibrous and lacerate leaf sheath residues. Stems solitary or few, erect, unbranched, glabrous. Rosette leaves broadly ovate, ovate-lanceolate, oblanceolate, elliptic-lanceolate, linear-elliptic, or broadly linear, usually 5–20(–30) × (0.5–)1–3(–4.5) cm, glabrous, base long attenuate, margin undulate, apex acute to acuminate. Stem leaves few to several, scalelike, lanceolate to subulate-lanceolate, base semi-amplexicaul. Capitulum solitary. Involucre cylindric, usually 1.8–2.5 × 0.7–1.3 cm at anthesis, to 3.5 × 1.8 cm in fruit. Phyllaries abaxially glabrous, apex obtuse to acute; outermost phyllaries triangular to sometimes obliquely triangular-ovate. Florets yellow, usually to 1.5–1.7 × as long as involucre. Achene whitish to pale brown, cylindric, 1.2–1.4 cm, with smooth ribs, glabrous. Pappus dirty white to dirty yellow, usually 1.5–1.8 cm. Fl. and fr. Feb–Sep.

Mountain slopes, hills, wastelands, thickets; 200–2500 m. Anhui, Gansu, Hebei, Henan, Jiangsu, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Mongolia].

Scorzonera sinensis is delimited from *S. austriaca* largely by its undulate leaves, which it shares, however, with *S. crispa* M. Bieberstein (*S. austriaca* subsp. *crispa* (M. Bieberstein) Lipschitz & Krascheninnikov) from Crimea and Kazakhstan. According to Lipschitz (Fragm. Monogr. Scorzonera 1: 121. 1935; Fl. URSS 29: 68–69. 1964), it differs from the latter by basally more shortly attenuate, green rosette leaves and undivided stems with more numerous bracts. See also note under *S. austriaca*.

9. Scorzonera subacaulis (Regel) Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 42: 160. 1933.

小鸦葱 xiao ya cong

Scorzonera austriaca Willdenow var. *subacaulis* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 323. 1880; *S. austriaca* var. *intermedia* Regel (1867), not Gaudin (1829).

Herbs, acaulescent or to 10 cm, perennial, rosulate. Rootstock dark brown, terete, ca. 8 mm in diam. Caudex woody, with fibrous and lacerate leaf sheath residues. Stems solitary or more rarely 2, unbranched, floccose arachnoid hairy especially apically. Rosette leaves linear, 8–10 × 0.2–0.4 cm, glabrous, apex acuminate. Stem leaves 1 or 2, scalelike, lanceolate. Capitulum solitary. Involucre broadly cylindric, 1–1.5 cm in diam. in fruit. Phyllaries glabrous or basally somewhat arachnoid hairy, apex acute; outermost phyllaries triangular to ovate. Florets yellow, ca. 1.5 × as long as involucre. Corolla ligule with dark red striae. Achene cylindric, 8–10 mm, with smooth ribs, glabrous. Pappus dirty white, ca. 1.2 cm. Fl. and fr. Jun–Jul.

Grassy mountain slopes; above 2600 m. Xinjiang [Kazakhstan, Kyrgyzstan].

The delimitation of *Scorzonera subacaulis* and subacaulescent forms of *S. radiata* (the latter without fibrous and lacerate leaf sheath residues and with the florets 2 × as long as the involucre) appears often somehow blurred in the literature (e.g., Lipschitz, Fl. URSS 29: 67–68. 1964). Regel (Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 170. 1867) considered even an intermediate position of this taxon between both species. See also note under *S. austriaca*.

10. Scorzonera curvata (Poplavskaja) Lipschitz, Fl. URSS 29: 72. 1964.

丝叶鸦葱 si ye ya cong

Scorzonera austriaca Willdenow var. *curvata* Poplavskaja, Trudy Bot. Muz. Imp. Akad. Nauk 15: 38. 1916; *S. angustifolia* Thomson; *S. humilis* Linnaeus var. *linearifolia* Candolle.

Herbs 4–7 cm tall, perennial, rosulate. Rootstock dark brown, cylindric, ca. 1.5 cm in diam. Caudex densely covered with fibrous and lacerate leaf sheath residues. Stems solitary or few, erect, glabrous. Rosette leaves filiform to filiform-linear, 3–10 cm × 1–1.5 mm, usually flat or twisted, glaucous, glabrous but margin basally arachnoid lanate, apex acuminate. Stem leaves absent or few, scalelike, subulate-lanceolate. Capitulum solitary. Involucre campanulate to narrowly campanulate, ca. 1 cm in diam. in fruit. Phyllaries abaxially glabrous, apex acute to subobtuse; outermost phyllaries triangular to triangular-lanceolate, 5–8 × 2–3 mm. Florets yellow. Achene cylindric, with smooth to tuberculate ribs, shortly villous. Pappus pale brown, ca. 1.2 cm. Fl. and fr. May–Jun.

Hills, dry mountain slopes; 500–2500 m. Heilongjiang, Nei Mongol, Qinghai [Mongolia, E Russia].

See note under *Scorzonera austriaca*.

11. Scorzonera ikonnikovii Lipschitz & Krascheninnikov in Lipschitz, Fragm. Monogr. Scorzonera 1: 109. 1935.

毛果鸦葱 mao guo ya cong

Scorzonera austriaca Willdenow var. *hebecarpa* C. H. An.

Herbs to 17 cm tall, perennial, rosulate. Rootstock yellow, obconic, ca. 2 cm in diam. Caudex densely covered with brown fibrous and lacerate leaf sheath residues. Stems few, unbranched, glabrous. Rosette leaves narrowly lanceolate, linear-lanceolate, linear-elliptic, or linear, to 15 × 0.2–0.6(–1.5) cm, glabrous, base attenuate, margin undulate, apex usually recurved and acuminate. Stem leaves 2 or 3, brown, scalelike, narrowly lanceolate to subulate-lanceolate. Capitulum solitary. Involucre campanulate to subglobose, to 2–2.5 × 1.5–2 cm in fruit. Phyllaries abaxially glabrous, apex acute to obtuse; outermost phyllaries triangular to ovate-triangular, to 7 × 2.5 mm. Florets yellow. Achene cylindric, ca. 1 cm, with smooth ribs, shortly villous. Pappus dirty yellow, ca. 1.2 cm. Fl. and fr. Apr–May. $2n = 14$.

Mountain slopes; 1300–1800 m. Liaoning, ?Nei Mongol, Xinjiang (Jinghe) [Mongolia].

Scorzonera ikonnikovii is very similar to *S. austriaca* (see also note there) but is distinguished by its villous achenes. Centered in Mongolia, it seems to be rare in China, reaching only into the NW and NE. Its delimitation from *S. manshurica* needs closer consideration.

12. Scorzonera manshurica Nakai, Rep. Inst. Sci. Res. Manchoukuo 1: 173. 1937.

东北鸦葱 dong bei ya cong

Scorzonera glabra Ruprecht var. *manshurica* (Nakai) Kitagawa.

Herbs to 14 cm tall, perennial, rosulate. Rootstock obconic, ca. 3 cm in diam. Caudex densely covered with brown fibrous and lacerate leaf sheath residues. Stems few, unbranched, conspicuously floccose or lanate when young, soon glabrescent. Rosette leaves linear, 8–10 × 0.3–0.4 cm, adaxially densely lanate when young, glabrescent, base attenuate, margin flat and basally lanate, apex acute to long acuminate. Stem leaves 1–3, scalelike, subulate-triangular, margin and adaxially lanate. Capitulum solitary. Involucre campanulate, to 2 × 1.8 cm in fruit. Phyllaries abaxially white puberulent and tinged with purple, apex obtuse to acute; outermost phyllaries triangular to ovate-triangular, largest ca. 7 × 3 mm. Achene dirty yellow, cylindric, 7–8 mm, with smooth ribs, sparsely to densely villous. Pappus dirty yellow, 1–1.5 cm. Fl. and fr. Apr–May.

• Dry mountain slopes. Heilongjiang, ?Jilin, Liaoning, Nei Mongol.

Scorzonera manshurica seems close to *S. ikonnikovii*, and the delimitation between the two species should be reassessed. See also note under *S. austriaca*.

13. Scorzonera albicaulis Bunge, Enum. Pl. China Bor. 40. 1833.

华北鸦葱 hua bei ya cong

Achyroseris albicaulis (Bunge) Kamelin & Tagaev; *A. macrosperma* Schultz Bipontinus; *Scorzonera albicaulis* f. *flavescens* Nakai; *S. albicaulis* subsp. *macrosperma* (Turczaninow ex Candolle) Voroschilov; *S. albicaulis* var. *macrosperma* (Turczaninow ex Candolle) Kitagawa; *S. albicaulis* f. *rosea* Nakai; *S. macrosperma* Turczaninow ex Candolle; *S. macrosperma* f. *angustifolia* Debeaux.

Herbs to 1.2 m tall, perennial. Rootstock cylindric to obconic, ca. 1.5 cm in diam. Caudex with brown scarious leaf sheath residues. Stem usually solitary, erect, branched apically, floccosely arachnoid hairy especially apically, glabrescent, leafy. Basal leaves rosulate, usually early deciduous, linear to linear-elliptic, to 40 × 0.3–2 cm, glabrous, margin entire, apex acuminate. Stem leaves similar to basal leaves but shorter. Synflorescence sparsely and usually laxly corymbiform, with usually 2–7 capitula. Involucre cylindric, 2–2.5 × 0.5–0.7 cm at anthesis, 3.5–4.2 × 0.8–1.3 in fruit. Phyllaries abaxially glabrous or thinly arachnoid hairy, glabrescent; outermost phyllaries triangular-ovate to ovate-lanceolate, 5–8 × 2–4 mm. Florets yellow, ca. 1.5 × as long as involucre. Achene pale brown, cylindric and from middle third distinctly tapering toward apex, usually 1.7–2.3 cm, with smooth ribs, glabrous. Pappus straw-colored, usually 2.2–2.8 cm, bristles basally connate and caducous as an entity. Fl. and fr. May–Sep. $2n = 14$.

Mountain valleys, forests, forest margins, scrub, feral fields, fields; 200–2500 m. Anhui, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan [Korea, Mongolia, Russia (SE Asian part)].

Achyroseris macrosperma Schultz Bipontinus (1845) and *Scorzonera macrosperma* Turczaninow ex Candolle (1838) are, in spite of having the same epithet, independently described heterotypic synonyms.

14. Scorzonera iliensis Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 178. 1933.

北疆鸦葱 bei jiang ya cong

Herbs 35–70 cm tall, perennial, with a taproot. Caudex with leaf sheath residues. Stems solitary or few, erect, branched apically, glabrous or somewhat floccose and glabrescent, leafy. Basal leaves linear to linear-lanceolate, 10–25 × 0.4–1 cm, margin flat, apex acuminate. Stem leaves similar to basal leaves but smaller. Synflorescence laxly corymbiform, with few capitula. Involucre cylindric, 1.4–1.6 × ca. 0.5 cm at anthesis, to 3 cm in fruit. Phyllaries arachnoid branched hairy; outermost phyllaries triangular to ovate-triangular. Achene cylindric, 1–1.5 cm, with smooth ribs, glabrous. Pappus dirty white, to 2 cm. Fl. and fr. Jul–Aug.

Stony thickets; above 900–1700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Uzbekistan].

See note under the *Scorzonera transiliensis*.

15. Scorzonera transiliensis Popov in Lipschitz, Fragm. Monogr. Scorzonera 2: 148. 1939.

橙黄鸦葱 cheng huang ya cong

Herbs 25–75 cm tall, perennial, with a taproot. Caudex woody, sometimes branched, with sparse leaf sheath residues. Stems solitary or few, erect, sparsely branched apically, glabrous or weakly floccose with branched hairs, leafy. Basal leaves linear to linear-lanceolate, usually 5–20 × 0.4–0.8 cm, margin flat, apex acuminate. Stem leaves similar to basal leaves but smaller. Synflorescence very loosely corymbiform, with few capitula. Involucre cylindric, ca. 1.5 × 0.5 cm at anthesis, to 3–3.5 cm in fruit. Phyllaries arachnoid branched hairy. Florets dark orange. Achene cylindric, ca. 1.5 cm, with smooth ribs, glabrous. Pappus dirty white, ca. 2 cm.

Meadows on mountain slopes; ca. 1700 m. Xinjiang [Kazakhstan, Kyrgyzstan].

Scorzonera transiliensis is closely related to *S. iliensis* and said to be mainly distinguished by its dark orange florets (Lipschitz, Fl. URSS 29: 84. 1964). It is endemic to the Zailiyskiy and Kungey Alatau (SE Kazakhstan, N Kyrgyzstan) and the Ketmen range of the Tien Shan (SE Kazakhstan) and Tian Shan (NW China). It has been listed for Xinjiang by C. H. An (Fl. Xinjiang. 5: 395. 1999), and the above description is based on that work and the original description. The status of this taxon requires further studies.

16. Scorzonera pubescens Candolle, Prodr. 7: 122. 1838.

基枝鸦葱 ji zhi ya cong

Herbs 7–20 cm tall, perennial, with grayish short branched hairs. Rootstock dark brown, cylindric, ca. 1 cm in diam. Caudex densely covered with leaf sheath residues. Stems solitary to few, erect, branched from base, basally leafy; branches ascending-erect. Basal leaves linear, 5–20 × 0.1–0.5 cm, margin flat, apex acuminate. Stem leaves similar to basal leaves but smaller. Synflorescence diffusely corymbiform, with few capitula. Involucre campanulate, 1.3–2 × 0.3–1 cm. Phyllaries abaxially arachnoid hairy; outermost phyllaries ovate to lanceolate. Florets yellow, sometimes ligule adaxially reddish, ca. 1.5 × as long as involucre. Achene cylindric, 1–1.2 cm, with tuberculate

ribs, glabrous. Pappus white tinged with yellow, ca. 1.5 cm. Fl. and fr. Jun.

Mountain slopes, hills, grasslands, dry river valleys; 600–1800 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia (W Asian part), Tajikistan].

17. Scorzonera inconspicua Lipschitz ex Pavlov, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 42: 139. 1933.

皱叶鸦葱 zhou ye ya cong

Scorzonera marschalliana C. A. Meyer var. *latifolia* Ruprecht; *S. marschalliana* var. *oblongifolia* Trautvetter; *S. tianshanensis* C. H. An.

Herbs usually 8–25 cm tall, perennial. Rootstock ca. 8 mm in diam. Caudex woody, with dark brown or pale yellow scarious leaf sheath residues. Stems solitary or few, branched from base or from middle with curved-erect branches, stellate puberulent, basally leafy. Basal leaves narrowly elliptic to narrowly lanceolate, 5–20 × 0.4–0.7[–2] cm, stellate puberulent, glabrescent, base attenuate, margin mostly undulate, apex acuminate. Stem leaves few, smaller than basal leaves but otherwise similar. Synflorescence laxly corymbiform, with usually 2–4 long-pedunculate capitula. Involucre cylindric, 1.5–2 × 0.5–0.8 cm at anthesis, to usually 2.5–3 × 1–1.3 cm in fruit. Phyllaries stellate puberulent, glabrescent; outermost phyllaries triangular-ovate, 3–8 × 4–5 mm. Florets yellow, ca. 1.5 × as long as involucre. Achene cylindric, 1–1.4 cm, with tuberculate ribs, glabrous. Pappus dirty white to straw-colored, usually 1.5–2 cm. Fl. and fr. May–Aug. $2n = 14$.

Stony slopes, dry steppes; 800–1700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

We have not seen material of *Scorzonera tianshanensis* (C. H. An, Fl. Xinjiang. 5: 480. 1999), but, from the description given, the only difference between it and *S. inconspicua* appears to be the presence of "two white membranous wings along the corolla tube," which perhaps may be an artifact but certainly not a suitable diagnostic feature whatsoever.

18. Scorzonera pusilla Pallas, Reise Russ. Reich. 2: 744. 1773.

细叶鸦葱 xi ye ya cong

Scorzonera astrachanica Candolle; *S. circinnata* Pallas, nom. illeg. superfl.; *S. popovii* Lipschitz; *Takhtajaniantha pusilla* (Pallas) Nazarova.

Herbs 5–20 cm tall, perennial, with a globose tuber to some cm below surface. Caudex with pale brown adaxially lanate leaf sheath residues becoming somewhat lacerate and subfibrous with age. Stems few, slender, erect, usually apically branched, sparsely pubescent or glabrescent, leafy. Basal leaves linear to filiform-linear, 1–1.5 × 0.1–0.3 cm, arachnoid hairy, margin flat, apex acuminate and often somewhat hooked. Stem leaves similar to basal leaves. Synflorescence sparsely corymbiform, with few capitula or capitulum solitary. Involucre narrowly cylindric, ca. 1.8 × 0.5–0.7 cm at anthesis, prolonged in fruit. Phyllaries abaxially arachnoid hairy; outermost phyllaries ovate, ca. 5 × 3.5 mm, apex acute. Florets yellow. Achene cylindric, ca. 8 mm, with smooth ribs, glabrous. Pappus dirty white, ca. 2.3 cm, plumose for most of length. Fl. and fr. Apr–Jul. $2n = 14$.

Rocky mountain slopes, gravelly deserts, sandy soils, semiconsolidated sand dunes, saline-alkaline areas, roadsides, wastelands, mountain plains, alluvial plains; 500–3400 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (SE European part), Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

19. Scorzonera pamirica C. Shih, Acta Phytotax. Sin. 25: 48. 1987.

帕米尔鸦葱 pa mi er ya cong

Herbs 4–13 cm tall, perennial, with an ellipsoid tuber to some cm below surface. Caudex with pale brown or pale yellow glabrous leaf sheath residues becoming lacerate and subfibrous with age. Stems few, slender, erect to arched-erect, sparsely branched apically, glabrous, leafy. Basal leaves linear, 4–8 × 0.1–0.2 cm, glabrous, apex acuminate. Stem leaves similar to basal leaves but smaller. Synflorescence sparsely corymbiform, with few capitula or capitulum solitary. Involucre narrowly cylindric, 1.3–1.5 × ca. 0.4 cm at anthesis, more than 2 cm in fruit. Phyllaries abaxially arachnoid hairy, apex acute to obtuse; outermost phyllaries ovate to narrowly ovate, 4–5 × 2–3 mm. Florets yellow. Achene glabrous, not seen when fully mature. Pappus dirty white, ca. 2 cm or more, scabrid apically or for most of length. Fl. and fr. Jun–Aug.

• Alpine plains, alpine meadows; 3300–3600 m. Xinjiang (Taxkorgan).

Scorzonera pamirica is closely related and very similar to the widespread *S. pusilla*, and their delimitation should be reassessed when more material is available. See also note under *S. aniana*.

20. Scorzonera aniana N. Kilian, **nom. nov.**

长茎鸦葱 chang jing ya cong

Replaced synonym: *Scorzonera elongata* C. H. An & X. L. He, Fl. Xinjiang. 5: 480. 1999, not *Scorzonera elongata* Willdenow, Sp. Pl. 3: 1508. 1803, nom. illeg. superfl. [*Catananche graeca* Linnaeus, Sp. Pl. 2: 813. 1753].

Herbs 30–40 cm tall, perennial, with a globose tuber some cm below surface. Caudex unbranched or branched, with scarious adaxially densely lanate pale brown leaf sheath residues becoming lacerate and subfibrous with age. Stems few to several, erect to arched-erect, branched apically, leafy. Stem leaves linear-lanceolate, to 15 × 0.2–0.3 cm, base inconspicuously attenuate, apex acuminate and often somewhat hooked. Synflorescence sparsely corymbiform, with few capitula. Involucre narrowly cylindric, 2–2.4 × 0.4–0.5 cm at anthesis. Phyllaries with arachnoid hairy and glabrescent margin; outermost phyllaries ovate to ovate-lanceolate, ca. 4 mm. Florets yellow. Achene columnar, ca. 1 cm, with tuberculate ribs, glabrous. Pappus yellowish, 2.4–2.6 cm. Fl. May.

• Sand dunes; 500–800 m. Xinjiang (Ürümqi).

Scorzonera aniana, the epithet referring to the first author of the replaced synonym, is closely related to *S. pusilla* and *S. pamirica*. No material has been seen by the present authors, and the description is based on Fl. Xinjiang. (loc. cit.).

21. Scorzonera mongolica Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 32: 492. 1888.

蒙古鸦葱 meng gu ya cong

Scorzonera fengtienensis Nakai; *S. hotanica* C. H. An; *S. mongolica* var. *putjatae* C. Winkler.

Herbs 5–35 cm tall, perennial, rosulate. Rootstock cylindric. Caudex with brown to pale yellow scarious leaf sheath residues. Stems few to some, grayish green, ascending to more rarely erect, branched apically, glabrous. Rosette leaves narrowly elliptic, elliptic-lanceolate, or linear-lanceolate, 2–13[–20] × 0.4–1.1[–4] cm, usually ± fleshy, glabrous, somewhat glaucous, base attenuate to long attenuate with an adaxially sometimes lanate sheath, apex acute to acuminate. Stem leaves often partly opposite, similar to rosette leaves but shorter. Synflorescence sparsely corymbiform, with few capitula or more rarely capitulum solitary. Involucre narrowly cylindric, usually 1.7–2.2 × 0.4–0.5 cm at anthesis, to 3 × 0.6–0.7 cm in fruit. Phyllaries abaxially arachnoid hairy and glabrescent or glabrous; outermost phyllaries ovate, 3–5 × 2–5 mm, apex acute. Florets yellow, rarely white, slightly longer than involucre. Achene pale yellow, cylindric, 5–7 cm, with smooth ribs, apex somewhat pilose, otherwise ± glabrous. Pappus white, 2–2.8 cm. Fl. and fr. Apr–Aug.

Saline meadows, saline sands, alkaline lands, dry lake basins, floodplains, lake margins, grassy beaches; near sea level to 3200 m. Gansu, Hebei, Henan, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [Kazakhstan, Mongolia].

22. Scorzonera ensifolia M. Bieberstein, Fl. Taur.-Caucas. 2: 235. 1808.

剑叶鸦葱 jian ye ya cong

Lasiospora ensifolia (M. Bieberstein) Cassini.

Herbs usually 20–40 cm tall, perennial, sparsely rosulate. Rootstock cylindric. Caudex with entire hardened adaxially abundantly reddish brown lanate leaf sheath residues. Stems solitary or few, ± erect, sparsely branched apically, ± pubescent or rarely glabrous, densely leafy. Rosette leaves linear-lanceolate to linear, to 20 × 0.3–0.8 cm, rather rigid, apex filiform acuminate. Stem leaves many, similar to rosette leaves, sparsely pubescent or glabrous. Synflorescence corymbiform, usually with 2–4 capitula. Involucre cylindric, to 2.5 × 1–1.5 cm. Phyllaries abaxially arachnoid hairy; outermost phyllaries lanceolate, apex acuminate and bent. Florets yellow, ca. 1.5 × as long as involucre. Achene cylindric, usually 7–8 mm, densely villous. Pappus pale brownish, 2–2.5 cm. Fl. and fr. May–Aug. $2n = 12$.

Sand dunes, wastelands, sandy soils; 500–600 m. Xinjiang [Kazakhstan, Russia (C, E, and S European parts); Europe].

23. Scorzonera sericeolanata (Bunge) Krascheninnikov & Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 43: 141. 1934.

灰枝鸦葱 hui zhi ya cong

Scorzonera tuberosa Pallas var. *sericeolanata* Bunge, Beitr. Fl. Russl. 200. 1852; *S. rubroviolacea* Godwinski.

Herbs 8–20 cm tall, perennial, with a globose tuber some cm below surface. Stems solitary or few, weak, erect, sparsely branched, white sericeous pubescent. Basal leaves few, linear, 5–20 × 0.2–0.8 cm, arachnoid hairy, glabrescent, or adaxially glabrous, base attenuate, margin flat, apex acuminate. Stem leaves similar to basal leaves but base ± amplexicaul. Synflorescence laxly corymbiform, with 5–7 capitula. Involucre narrowly cylindric to obconic, ca. 6 mm in diam. Phyllaries abaxially densely pubescent; outermost phyllaries narrowly triangular, apex acute. Florets yellow. Corolla with purplish red veins. Achene cylindric, 5–7 mm, densely sericeous. Pappus whitish, usually 1–1.2 cm. Fl. and fr. Apr–Jun.

Deserts, semiconsolidated sand dunes; 300–1400 m. Xinjiang [Kazakhstan, Russia (SW Asian part), Uzbekistan].

C. H. An (in Fl. Xinjiang. 5: 401. 1999) also reported the similar and related *Scorzonera tuberosa* Pallas for Xinjiang. That species is distributed in E and S European Russia and Kazakhstan and had not been reported before from farther east. The corresponding material has not been seen by the present authors, and the report needs confirmation.

24. Scorzonera circumflexa Krascheninnikov & Lipschitz, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 43: 148. 1934.

皱波球根鸦葱 zhou bo qiu gen ya cong

Herbs (8–)15–25 cm tall, perennial, with a globose tuber some cm below surface. Caudex rather inconspicuous, reddish brown lanate, with few scarious leaf sheath residues. Stems 1–3, erect, weak, sparsely branched apically, densely pubescent. Basal leaves few, broadly lanceolate, usually 5–15 × 0.8–1.5 cm, densely tomentose, base attenuate, margin undulate, apex acute to acuminate and often curled. Stem leaves similar to basal leaves but not basally attenuate. Synflorescence sparsely corymbiform, with 2 or 3 capitula. Involucre narrowly cylindric to obconic. Phyllaries abaxially densely pubescent; outermost phyllaries triangular-ovate to lanceolate. Florets yellow, purplish red when dry. Achene cylindric, 6–7 mm, densely sericeous. Pappus brownish, ca. 9 mm. Fl. and fr. Apr–May. $2n = 12$.

Stony slopes, mountain plains; ca. 1100 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

52. PODOSPERMUM Candolle in Candolle & Lamarck, Fl. Franç. 4: 61. 1805, nom. cons.

柄果菊属 bing guo ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Arachnospermum F. W. Schmidt.

Herbs, [annual or] biennial or perennial, often with woody caudex and rosulate. Leaves pinnately divided, base with semiamplexicaul usually persistent sheath. Involucre cylindric, usually distinctly prolonged toward fruiting. Phyllaries in several series, often

subapically corniculate. Receptacle naked. Achene with conspicuous cylindric carpopodium usually 1/5–1/3 as long as achene body. Pappus of strong bristles; bristles softly fimbriately plumose for most of length and apically scabrid.

About 17 species: N Africa, C and SW Asia, Europe; one species in China.

Molecular phylogenetic analyses by Mavrodiev et al. (Taxon 53: 699–712. 2004) revealed that *Scorzonera* in its wider sense is polyphyletic and provided support for the recognition of *Podospermum* as a separate genus.

1. Podospermum songoricum (Karelin & Kirilov) Tzvelev, Rast. Tsentral. Azii 14b: 104. 2008.

准噶柄果菊 zhun ga bing guo ju

Podospermum laciniatum (Linnaeus) Candolle var. *songoricum* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 396. 1842; *Scorzonera songorica* (Karelin & Kirilov) Lipschitz & Vassilczenko.

Herbs usually 15–40 cm tall, biennial to perennial?, rosulate, glabrous or sparsely arachnoid hairy. Caudex with complete leaf sheath residues. Stems few, sparsely branched apically, sparsely leafy. Rosette leaves linear-elliptic or narrowly elliptic to elliptic, pinnatipartite to pinnatisect, sometimes not divided, base attenuate and petiole-like; lateral lobes few, in middle third of blade, linear, linear-lanceolate, or narrowly elliptic, to 1 cm; terminal lobe much longer than lateral lobes, narrowly elliptic, linear-elliptic, or linear. Stem leaves linear-elliptic to linear, mostly undivided. Synflorescence sparsely corymbiform, with few capitula. Capitula long pedunculate. Involucre cylindric, 1–1.2 × 0.5–0.6 cm at anthesis, to 2 × 1 cm in fruit. Phyllaries sparsely arachnoid hairy and glabrescent, often subapically corniculate; outer phyllaries narrowly triangular to lanceolate, longest ca. 1/2 or more as long as inner linear-lanceolate phyllaries. Florets yellow, slightly longer than involucre. Achene gray, cylindric, 1–1.2 cm, ribs smooth, carpopodium 1/5–1/4 as long as achene body. Pappus dirty white, 1.1–1.2 cm. Fl. and fr. May–Jun. $2n = 14, 28$.

Steppes; ca. 1000 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

No material of *Podospermum songoricum* from China has been seen by the present authors, but its presence in Xinjiang is confirmed by C. H. An (Fl. Xinjiang. 5: 389. 1999). The description is based on Lipschitz (Fl. URSS 29: 40. 1964) and material from neighboring countries.

53. KOELPINIA Pallas, Reise Russ. Reich. 3: 755. 1776.

蝎尾菊属 xie wei ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, annual. Stem solitary, delicate. Leaves narrowly grasslike, margin entire. Synflorescence diffuse. Capitula with few to some florets. Involucre small, cylindric at anthesis, spreading in fruit. Phyllaries in 1 outer and 1 inner series. Receptacle naked. Achene columnar-scorpioid, usually with 5 ribs, abaxially and apically hooked spiny. Pappus absent.

Five species: N Africa, C, S, and SW Asia, S Europe; one species in China.

1. Koelpinia linearis Pallas, Reise Russ. Reich. 3: 755. 1776.

蝎尾菊 xie wei ju

Rhagadiolus koelpinia Willdenow.

Herbs 5–35 cm tall. Stem solitary, slender, branched from base, glabrous or sparsely pilosulose, remotely leafy. Stem leaves linear to filiform, 4.5–15 × 0.1–0.5(–0.7) cm, glabrous or subglabrous. Synflorescence diffusely racemiform to paniculiform, with 2–5 capitula or capitulum solitary. Capitula with 5–9 florets. Involucre at anthesis cylindric, 5–7 mm. Phyllaries glabrous or sparsely hairy, apex acute; outer phyllaries 2 or 3, narrowly triangular, ca. 2 × 0.5 mm; inner phyllaries 5, linear-lanceolate. Florets pale yellow, not or slightly exceeding involucre. Achene brownish, columnar-scorpioid, ca. 1 cm, abaxially with antrorse and apically with retrorse rigid hooked needlelike spines. Fl. and fr. Feb–Jul. $2n = 14, 36, 40, 42, 54, 56$.

Gravelly deserts; 400–1000 m. Xinjiang, SW Xizang [Afghanistan, NW India, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Russia (S European part), Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, SW Europe].

54. EPILASIA (Bunge) Bentham in Bentham & J. D. Hooker, Gen. Pl. 2: 532. 1873.

鼠毛菊属 shu mao ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Scorzonera sect. *Epilasia* Bunge, Beitr. Fl. Russl. 200. 1852.

Herbs, annual, white pubescent or glabrous. Leaves undivided. Involucre ovoid-cylindric to globose. Phyllaries in 2 rows; outer phyllaries herbaceous, leaflike, usually longer than [or equaling] inner phyllaries; inner phyllaries usually 5. Receptacle naked. Florets pale yellow [or pale red or blue]. Achene blackish [or gray], ± cylindric, ribbed, ribs smooth or spinulose, base with somewhat broadened hollow cylindric carpophore, glabrous, apex truncate or apical half conic, unribbed, and covered and hidden by caplike pappus disk with pappus. Pappus arising from flat of caplike conic pappus disk, grayish or brownish, of soft bristles in several rows, persistent, very densely long lanately softly fimbriately plumose, longer bristles apically scabrid.

About three species: C and SW Asia; two species in China.

1a. Apex of achene crowned with flat pappus disk and pappus ..... 1. *E. acrolasia*
1b. Apical half of achene hidden by conic caplike pappus disk and pappus ..... 2. *E. hemilasia*

1. Epilasia acrolasia (Bunge) C. B. Clarke ex Lipschitz, Fragm. Monogr. Scorzonera 2: 29. 1939.

顶毛鼠毛菊 ding mao shu mao ju

Scorzonera acrolasia Bunge, Beitr. Fl. Russl. 202. 1852; *Epilasia ammophila* (Bunge) C. B. Clarke ex Tzvelev; *S. ammophila* Bunge.

Herbs 6–25 cm tall, annual. Stem erect, moderately branched often already from base or more rarely unbranched, arachnoid hairy, glabrescent, leafy. Leaves narrowly spatulate, narrowly lanceolate, broadly lanceolate, or rarely ovate-lanceolate, 1–4(–5) × 0.2–1(–2) cm, ± arachnoid hairy, base attenuate and finally semiamplexicaul, margin flat or somewhat undulate and densely microdentate, apex acute to acuminate or more rarely obtuse. Synflorescence diffuse, paniculiform to corymbiform, with several capitula or more rarely capitulum solitary. Involucre ovoid-cylindric to globose, 1.1–1.4 × 0.6–0.8 cm at anthesis, 1.5–1.8 × ca. 1.5 cm in fruit (outer phyllaries not counted). Outer phyllaries linear-lanceolate, usually 2–3.5 cm, herbaceous, similar to upper stem leaves, distinctly longer than inner phyllaries; inner phyllaries lanceolate, leathery, margin somewhat scarious, apex obtuse to acute. Florets pale yellow [or purplish], to 1.3 × as long as involucre. Achene blackish, ± concolorous, cylindric, 4–5 mm, with hollow cylindric 1–1.5 mm carpophore, usually with 5 smooth or somewhat spinulose main ribs and ca. 10 secondary ribs. Pappus gray, usually 8–9 mm. Fl. and fr. May–Jun. $2n = 12$.

Leeward slopes on sand dunes, clay and gravelly areas; 500–1000 m. Xinjiang [Afghanistan, Kazakhstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

2. Epilasia hemilasia (Bunge) C. B. Clarke ex Kuntze, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 202. 1887.

鼠毛菊 shu mao ju

Scorzonera hemilasia Bunge, Beitr. Fl. Russl. 201. 1852; *Epilasia cenopleura* (Bunge) C. B. Clarke ex Soják; *E. hemilasia* var. *nana* (Boissier & Buhse) Kuntze; *E. intermedia* (Bunge) C. B. Clarke ex Soják; *S. cenopleura* Bunge; *S. intermedia* Bunge; *S. nana* Boissier & Buhse.

Herbs usually 5–50 cm tall, annual. Stem ascending to erect, unbranched or moderately branched often already from base, arachnoid hairy, glabrescent, basally densely and higher up distantly leafy. Leaves narrowly spatulate or narrowly lanceolate to linear-lanceolate, 2–9 × 0.3–1.5 cm, ± arachnoid hairy, base attenuate and finally semiamplexicaul, margin densely microdentate, apex acute to acuminate. Synflorescence diffuse, paniculiform to corymbiform, with several capitula or more rarely capitulum solitary. Involucre ovoid-cylindric to globose, 1.2–1.4 × 0.8–1 cm at anthesis, 1.5–1.7 × ca. 1.5 cm in fruit (outer phyllaries not counted). Outer phyllaries lanceolate, usually 2–4 cm, herbaceous and similar to upper stem leaves, distinctly longer than inner phyllaries, apex acuminate; inner phyllaries lanceolate, leathery, margin somewhat scarious, apex obtuse to acute. Florets pale yellow, slightly longer than involucre. Achene blackish, cylindric, 6–7 mm, with hollow ± cylindric 1–2 mm carpophore, body in lower half with 10 pale narrow raised often somewhat spinulose ribs, upper half covered and hidden by conic caplike pappus disk and pappus. Pappus gray, 8–10 mm. Fl. and fr. Apr–May. $2n = 12, 24$.

Sand or clay areas, grasslands; 800–1500 m. Xinjiang [Afghanistan, Kazakhstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

The unique achene of *Epilasia hemilasia* is interpreted here through a modification of the pappus disk. Normally the pappus disk is a ± flat disklike (or because of its central opening for the vascular strands connecting achene and floret actually rather ringlike) structure bearing the pappus' bristles and crowning the achene apex. In this species, the pappus disk is modified to a caplike structure covering the equally fertile apical half of the achene. This interpretation is supported by the fact that the outer series of plumose pappus bristles arises from the callose ringlike structure in the middle third of the achene (morphologically indistinguishable from the outer series of bristles on the pappus disk of *E. acrolasia*), while other bristles are basally shortly adnate to and then arise from the unribbed, pale brown surface between the callose ring and the achene apex, and the innermost series of ca. 5 bristles arises at the achene apex. The trichomes covering the surface between the bristles are considered as homologues to those at the base of the bristles in *E. acrolasia* and to the soft fimbriae of the plumose *Scorzonerinae* pappus in general.

55. TRAGOPOGON Linnaeus, Sp. Pl. 2: 789. 1753.

婆罗门参属 po luo men shen shu

Shi Zhu (石铸 Shih Chu); Alexander P. Sukhorukov, Evgeny V. Mavrodiev

Herbs, perennial, biennial, or rarely annual, glabrous or tomentulose to floccose [or lanate] especially at leaf bases and below capitula, often glabrescent; if biennial then vertical roots spindle-shaped; if perennial then with well-developed caudex. Stem simple or sparingly branched. Leaves basal and cauline, sessile, linear, lanceolate, or narrowly oblong, margin entire or undulate. Capitulum terminal, solitary or sometimes capitula few to many, large, with (20–)40–180 or more florets; peduncle often apically inflated and normally without bracts. Involucre cylindric at anthesis, mostly 10–20 mm or more in diam. Phyllaries 5–15(or 16), in 1(or 2) row(s), linear-lanceolate, triangular-lanceolate, or linear, ± equal, abaxially glabrous [with intertwining hairs], margins white and narrowly pellucid, apex acute. Receptacle naked. Florets with ligules yellow, mauve, orange, purple, or violet. Achene dark to pale brown, straw-colored, or whitish, heteromorphic, outer ones ± cylindric or curviform (fusiform), central ones cylindric and less tuberculate or smooth; achene body normally tuberculate, with 5 fairly well-differentiated ribs, with or rarely without hollows in pericarp; beak

slender or stout if present; pappus disk ± pubescent. Pappus persistent, dirty white, yellowish, or slightly fulvous; awns 12–20 or more in 1 or 2 rows, unequal, softly fimbriately plumose, apically scabrid.

More than 150 species: mainly in C and SW Asia and S Europe; 19 species (two endemic, one introduced) in China.

1a. Outer achenes (without pappus) 3.7–4.5 cm; ligules violet; cultivated/alien biennial or annual plants ..... 11. *T. porrifolius*
1b. Outer achenes (without pappus) not more than 3.5 cm; ligules of various colors; non-cultivated perennial or biennial plants.
2a. Peduncle mostly reduced; small plants to 20 cm tall ..... 18. *T. verrucosobracteatus*
2b. Peduncle not reduced, always well developed; plants also taller.
3a. Pappus awns clearly unequal, longest 2–5 ca. 7 mm and remainder ca. 4 mm; achenes 1–1.3 cm, beakless ..... 19. *T. heteropappus*
3b. Pappus awns slightly unequal, length ratio ca. 1.2:1; outer achenes longer than 2 cm.
4a. Peduncle with dark hairs; ligules violet; plants biennial ..... 17. *T. sibiricus*
4b. Peduncle glabrous or tomentulose to floccose; florets of various colors; plants biennial or perennial.
5a. Perennial polycarpics 10–35(–40) cm tall; ligules mauve, violet, purplish, rarely (*T. gracilis*) adaxially yellow but then abaxially with pink or mauve spot.
6a. Outer achenes (without pappus) 1–2 cm, body pale brown, 1.2–1.6 mm in diam., and terete or sometimes with 5 fairly well-differentiated ribs, beak slender, 0.2–0.6 mm in diam.; hollows in pericarp 40–50 μm in diam.; pappus dirty white; plants to 20(–30) cm tall.
7a. Ligules adaxially yellow, abaxially with a pink or mauve spot; pappus always slightly longer than achene body ..... 9. *T. gracilis*
7b. Ligules reddish purple; pappus equaling or slightly shorter than achene body ..... 10. *T. subalpinus*
6b. Outer achenes (without pappus) (1.8–)2–2.7(–3) cm, body whitish or sometimes with a tinge of red, (1.7–)1.8–2.6 mm in diam., and always with 5 fairly well-differentiated ribs, beak stout, 0.9–1.1 mm in diam.; hollows in pericarp more than 60 μm in diam.; pappus fulvous or fulvous tinged with red; plants (15–)20–40 cm tall.
8a. Achene:pappus ratio ca. 1.5:1; basal leaves lanceolate ..... 14. *T. elongatus*
8b. Achene:pappus ratio 1–1.2:1; basal leaves oblong or elliptic.
9a. Peduncle apically distinctly inflated ..... 12. *T. kasachstanicus*
9b. Peduncle apically ± not inflated.
10a. Plants glabrous ..... 16. *T. montanus*
10b. Plants tomentulose to floccose.
11a. Beak of outer achenes well differentiated from body ..... 13. *T. marginifolius*
11b. Beak of outer achenes slightly differentiated from body ..... 15. *T. ruber*
5b. Biennial monocarpics 40–150 cm tall; ligules yellow or yellowish orange.
12a. Peduncle apically distinctly inflated.
13a. Outer achenes (without pappus) 2–2.3 cm, body 2–2.5 mm in diam., beak 2–5 mm and stout ..... 7. *T. sabulosus*
13b. Outer achenes (without pappus) more than 2.3 cm, body to 2 mm in diam., beak 0.7–1.7 cm and slender.
14a. Phyllaries 6–9 cm; outer achenes with pappus 5.5–7 cm ..... 1. *T. capitatus*
14b. Phyllaries 4–5.5(–6) cm; outer achenes with pappus 4.4–6 cm.
15a. Number of phyllaries 5–8 ..... 2. *T. pseudomajor*
15b. Number of phyllaries (8–)10–12(–14) ..... 3. *T. dubius*
12b. Peduncle apically not or only slightly inflated.
16a. Outer achene with beak to 3 mm or without beak; plants floccose ..... 8. *T. stepposus*
16b. Outer achene with beak more than 5 mm; plants glabrous.
17a. Phyllaries slightly longer than florets ..... 4. *T. songoricus*
17b. Phyllaries shorter than florets.
18a. Ligules yellowish orange; outer achenes (without pappus) ca. 1.7 cm ..... 5. *T. altaicus*
18b. Ligules pure yellow; outer achenes (without pappus) (1.8–)2–2.5 cm ..... 6. *T. orientalis*

1. Tragopogon capitatus S. A. Nikitin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 257. 1938.

头状婆罗门参 tou zhuang po luo men shen

Herbs 40–100 cm tall, biennial. Stem simple or branched from lower or middle third, glabrous. Basal and lower cauline leaves linear to lanceolate, 15–35 × 0.3–0.7 cm. Capitula solitary to few; peduncle inflated, 0.7–1.5 cm in diam. Involucre 6.5–9 cm. Phyllaries 8–12(–14), longer than florets and equaling or 1/4 longer than achenes with pappus. Ligules yellow. Outer achenes 3–3.5 cm; body pale brown, ± curviform, 1.4–1.8 mm in diam., with 5 fairly well-differentiated ribs,

tuberculate; beak whitish, 1.5–2.2 cm, slender, non-tuberculate or toothed, apically inflated; pappus disk ± tomentulose. Pappus dirty white, 2.5–3.5 cm. Fl. and fr. Apr–Jun. $2n = 12$.

Stony steppes, grassy slopes, base of mountains, ditches, roadsides; 500–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan].

2. Tragopogon pseudomajor S. A. Nikitin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 258. 1938 [*"pseudomajus"*].

北疆婆罗门参 bei jiang po luo men shen

Herbs 40–80(–100) cm tall, biennial. Stem simple or branched from lower or middle third, erect, glabrous. Basal and lower cauline leaves linear to lanceolate, 15–30 × 0.3–0.5 cm. Capitula solitary to few; peduncle inflated, 7–11 mm in diam. Involucre 4–5.5 cm. Phyllaries (5–)7 or 8, longer than florets, equaling or longer than achenes with pappus. Ligules yellow. Outer achenes 2.4–3 cm; body pale brown, ± curviform, (1.5–)1.7–2 mm in diam., with 5 fairly well-differentiated ribs, tuberculate; beak whitish, 1–1.7 cm, slender, non-tuberculate or toothed, apically ± inflated; pappus disk ± pubescent. Pappus dirty white, 2.2–3 cm. Fl. and fr. Apr–Jun.

Meadows, river valleys, dry mountain slopes, plateaus; 1000–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

3. Tragopogon dubius Scopoli, Fl. Carniol., ed. 2, 2: 95. 1772.

霜毛婆罗门参 shuang mao po luo men shen

Herbs 40–80(–100) cm tall, biennial. Stem erect, simple or branched from lower or middle third, glabrous. Basal and lower cauline leaves lanceolate to linear, 15–40 × 0.3–0.5 cm. Capitula solitary to few; peduncle inflated, 7–10 mm in diam. Involucre 4–5.5 cm at anthesis, to 7 cm in fruit. Phyllaries 8–12(–14), longer than florets, equaling or longer than achenes with pappus. Ligules yellow. Outer achenes 2.2–3 cm; body pale brown, ± curviform, 1.4–1.7 mm in diam., with 5 fairly well-differentiated ribs, tuberculate; beak whitish, 1.2–1.6 cm, slender, non-tuberculate or toothed, apically inflated; pappus disk pubescent. Pappus dirty white, 2.2–2.8 cm. Fl. and fr. Apr–Jun. $2n = 12$.

Stony steppes, grassy slopes at base of mountains, ditches; 500–2000 m. Xinjiang [Kazakhstan, W Russia; Europe].

4. Tragopogon songoricus S. A. Nikitin, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 198. 1933.

准噶尔婆罗门参 zhun ga er po luo men shen

Herbs 40–80 cm tall, biennial. Stem erect, branched from middle third or above, glabrous. Basal and lower cauline leaves linear, 15–30 × 0.2–0.5 cm. Capitula solitary to few; peduncle not inflated, 3–5 mm in diam. Involucre 2.5–3.5 cm. Phyllaries 7 or 8(or 9), equaling or longer than florets, equaling or shorter than achenes with pappus. Ligules yellow, often light blue when dry. Outer achenes 1.8–2.2 cm; body pale brown, ± curviform or almost straight, 1.5–1.8 mm in diam., with 5 fairly well-differentiated ribs, tuberculate; beak whitish, 7–10 mm, abruptly differentiated from body, slender, non-tuberculate or toothed, apically ± inflated; pappus disk pubescent. Pappus dirty white, 1.5–2 cm. Fl. and fr. Jun–Aug.

Forest margins, semi-deserts; 500–2200 m. Xinjiang [Kazakhstan, Mongolia, SC Russia].

5. Tragopogon altaicus S. A. Nikitin & Schischkin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 260. 1938.

阿勒泰婆罗门参 a le tai po luo men shen

Herbs, 40–120 cm tall, biennial. Stem erect, strongly branched, glabrous. Basal and lower cauline leaves lanceolate, 15–40 × 0.4–1(–1.3) cm. Capitula few to many; peduncle not inflated, 3–5 mm in diam. Involucre 2.5–3 cm. Phyllaries 7–9(or 10), ca. 2/3 as long as florets, equaling achenes with pappus. Ligules yellowish orange. Outer achenes 1.3–1.8 cm; body pale brown, ± curviform or almost straight, 1.4–1.6 mm in diam., not ribbed and slightly tuberculate; beak pale, 2–6 mm, slender, smooth, apically not inflated; pappus disk ± pubescent. Pappus dirty white, 1–1.5 cm. Fl. and fr. Jun–Aug.

Mountain meadows, stony slopes in hills; 1500–3000 m. N Xinjiang [Kazakhstan, Mongolia, SC Russia].

Tragopogon altaicus has previously been mistaken by C. H. An (Fl. Xinjiang. 5: 380. 1999) for *T. pratensis* Linnaeus, which is not present in China.

6. Tragopogon orientalis Linnaeus var. **latifolius** C. H. An, Fl. Xinjiang. 5: 479. 1999.

东方婆罗门参 dong fang po luo men shen

Herbs 40–100 cm tall, biennial. Stem erect, normally branched, glabrous. Basal and lower cauline leaves linear to lanceolate, 15–30 × 0.3–1 cm. Capitula solitary to few; peduncle not inflated. Involucre 2–3.5 cm. Phyllaries 7–9(or 10), 1.3–1.5 × as long as florets, equaling or shorter than achenes with pappus. Ligules golden yellow. Outer achenes 1.8–2.5 cm; body pale brown, ± curviform or almost, 1.4–1.6 mm in diam., tuberculate; beak whitish, 0.8–1.3 cm, slender, non-tuberculate, apically almost not inflated; pappus disk ± pubescent. Pappus dirty white, 1.5–2.5 cm. Fl. and fr. May–Jul. $2n = 12$*.

● Mountain meadows; 1000–2100 m. Xinjiang.

The identity of *Tragopogon orientalis* var. *latifolius* needs to be confirmed, including whether or not it belongs to *T. orientalis*. The overall distribution of *T. orientalis* outside of China includes Kazakhstan, Mongolia, and Russia, as well as Europe and North America.

7. Tragopogon sabulosus Krascheninnikov & S. A. Nikitin, Otchet Rabotakh Pochv.-Bot. Otryada Kazakhstansk. Eksped. Akad. Nauk S.S.S.R. 4(2): 294. 1930.

沙婆罗门参 sha po luo men shen

Herbs 50–150 cm tall, biennial. Stem erect, branched from middle third, glabrous. Basal and lower cauline leaves linear to lanceolate, 15–40 × 0.5–1 cm. Capitula few to 10(–12); peduncle inflated under capitulum, 5–10 mm in diam. Involucre 3.5–5(–6) cm. Phyllaries 8–10(–12), smaller than florets and achenes with pappus. Ligules yellow. Outer achenes 2–2.3 cm; body pale brown, slightly curviform or straight, 2–2.5 mm in diam., tuberculate, with 5 fairly well-differentiated ribs; beak 2–5 mm, attenuate or stout, with inflated apex; pappus disk floccose. Pappus dirty white, 2–2.7 cm. Fl. and fr. May–Jul.

Sand dunes; 800–1500 m. Xinjiang [Kazakhstan, SC Russia].

8. Tragopogon stepposus (S. A. Nikitin) Stankov in Stankov & Taliev, Opred. Vyssh. Rast. Evrop. Chasti S.S.S.R. 691. 1949.

草原婆罗门参 cao yuan po luo men shen

Tragopogon podolicus (Besser ex Candolle) Artemczuk subsp. *stepposus* S. A. Nikitin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 261. 1938.

Herbs 40–80(–100) cm tall, biennial. Stem erect, branched from middle third, pubescent. Basal and lower cauline leaves linear, 15–30 × 0.2–0.5 cm. Capitula solitary to few; peduncle not inflated. Involucre 1.5–2.5 cm. Phyllaries 7 or 8, equaling or shorter than florets and achenes with pappus. Ligules yellow. Outer achenes 1–1.3 cm; body pale brown, slightly curviform, 0.9–1.2 cm, ca. 1 mm in diam., tuberculate; beak absent or very short and thick; pappus disk ± pubescent. Pappus dirty white, 1–1.3 cm. Fl. and fr. May–Jul. $2n = 12$.

Steppes, semi-deserts; 500–1500 m. Xinjiang [Kazakhstan, Russia (W Asian and E European parts)].

9. Tragopogon gracilis D. Don, Mem. Wern. Nat. Hist. Soc. 3: 414. 1821 [*"gracile"*].

纤细婆罗门参 xian xi po luo men shen

Herbs to 20(–30) cm tall, perennial. Caudex stout. Stems few, simple, slender, erect, glabrous. Basal and lower cauline leaves lanceolate-subulate, 7–15 × 0.2–0.4 mm, margin sometimes adaxially rounded. Capitulum solitary; peduncle not inflated. Involucre 1.8–2.3 cm at anthesis, to 3.5 cm in fruit. Phyllaries 5–7, shorter than florets and ± equaling achenes with pappus. Ligules bicolored, abaxially with pink or mauve spot, adaxially yellow. Outer achenes 1.3–1.8 cm; body pale brown, slightly curviform, 1.3–1.6 mm in diam., slightly tuberculate, with small (to 40–50 μm in diam.) hollows in pericarp; beak slender, 5–7 mm. Pappus dirty white, 1.5–2 cm. Fl. and fr. Apr–Jun. $2n = 12, 24$.

Mountain slopes, river terraces; 2500–3500 m. Xinjiang, Xizang [Afghanistan, N India, Kazakhstan, Kyrgyzstan, Nepal, Tajikistan, Uzbekistan].

10. Tragopogon subalpinus S. A. Nikitin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 271. 1938.

高山婆罗门参 gao shan po luo men shen

Herbs to 10(–25) cm tall, perennial. Caudex stout. Stems few, simple, slender, erect, glabrous. Basal and lower cauline leaves linear-lanceolate, 10–20 × 0.4–1 cm. Capitula solitary to few; peduncle not inflated. Involucre 1.5–2.5(–3.5) cm. Phyllaries 7 or 8, ± equaling florets and achenes with pappus. Ligules reddish purple. Outer achenes 1.3–1.7 cm; body pale brown, straight or slightly curviform, 1.2–1.4 mm in diam., smooth or slightly tuberculate, with small (to 40–50 μm in diam.) hollows in pericarp; beak slender, ca. 6 mm. Pappus dirty white, ca. 1.5 cm. Fl. and fr. Jun–Jul.

Mountain grasslands; 3000–3500 m. Xinjiang [Kazakhstan, Kyrgyzstan].

11. Tragopogon porrifolius Linnaeus, Sp. Pl. 2: 789. 1753.

蒜叶婆罗门参 suan ye po luo men shen

Herbs 40–125 cm tall, biennial or annual. Stem erect, simple or branched from middle third, glabrous or slightly tomentulose. Basal and lower cauline leaves lanceolate or linear, 15–40 × 0.3–0.7 cm, marginally often undulate. 6–12 mm in diam.; peduncle inflated. Capitula solitary to few. Involucre 4–5 cm at anthesis, to 8 cm in fruit. Phyllaries 7 or 8, ca. 1/3 longer than florets and ± equaling achenes with pappus. Ligules violet. Outer achenes 3.7–4.5 cm; body pale brown, curviform, 1.4–1.6 mm in diam.; beak whitish, 2–2.5 cm, slender, smooth, apically inflated; pappus disk ± tomentulose. Pappus dirty white, 2.7–3.7 cm. Fl. and fr. May–Aug. $2n = 12$.

700–2000 m. Naturalized or cultivated in Beijing, Guizhou, Shaanxi, Sichuan, Xinjiang, and Yunnan [native to Europe].

Tragopogon porrifolius is naturalized in S Africa, Asia, Australia, North America, and perhaps Oceania.

This is a polyphyletic taxon. The relationship of Chinese plants requires more investigation.

12. Tragopogon kasachstanicus S. A. Nikitin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 268. 1938.

中亚婆罗门参 zhong ya po luo men shen

Herbs 20–35 cm tall, perennial. Caudex stout. Stem single, erect, branched from middle third, glabrous, ± lanate, tomentulose, or glabrescent at nodes and below capitula. Basal and lower cauline leaves lanceolate to narrowly oblong, abaxially keeled, sometimes folded along midvein. Capitula solitary to few; peduncle ± inflated, 4–8 mm in diam. Involucre ca. 3 cm at anthesis, 4.5–5 cm in fruit. Phyllaries 8, equaling or shorter than florets. Ligules purple to violet. Outer achenes 2.2–2.7 cm; body whitish, straight to ± curved, 1.8–2.2 mm in diam., tuberculate, with 5 fairly well-differentiated ribs; beak 3–5 mm, stout, apically ± inflated; pappus disk ± tomentulose. Pappus slightly fulvous, 2.2–2.5 cm. Fl. and fr. Apr–Jun.

Mountain slopes, river valleys, sandy soils; 500–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan].

13. Tragopogon marginifolius N. Pavlov, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 47(2): 83. 1938.

膜缘婆罗门参 mo yuan po luo men shen

Tragopogon gonocarpus S. A. Nikitin.

Herbs 20–35 cm tall, perennial. Caudex stout. Stem single, erect, simple or branched from middle third or higher, glabrous or tomentulose/floccose at nodes and below capitula. Basal and lower cauline leaves lanceolate to oblong, 10–30 × 0.5–2 cm, margin white, ± undulate and membranous. Capitula solitary to few; peduncle not inflated. Involucre 2.5–4 cm. Phyllaries 8, lanceolate, shorter than or equaling florets and achenes with pappus. Ligules purple to mauve. Outer achenes 2–2.5 cm; body whitish, straight to ± curved, 2–2.5 mm in diam., tuberculate, with 5 fairly well-differentiated ribs, abruptly contracted into beak; beak 5–10 mm, stout, apically ± inflated; pappus disk ± tomentulose. Pappus slightly fulvous, often with tinge of red, 2–2.5 cm. Fl. and fr. Apr–Jun. $2n = 12$.

Stony slopes, sandy deserts; 800–1400 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia (E and S European parts), Uzbekistan].

14. Tragopogon elongatus S. A. Nikitin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 269. 1938.

长茎婆罗门参 chang jing po luo men shen

Herbs 15–35 cm tall, perennial. Caudex stout. Stem single, erect, simple or branched from middle or upper third, glabrous or tomentulose/floccose at nodes and below capitula. Basal and lower cauline leaves lanceolate, 10–20 × 4–8 cm, margin membranous and sometimes ± crisp. Capitula solitary to few; peduncle not inflated. Involucre 2–3 cm. Phyllaries 7 or 8, often darkly colored. Ligules purple to mauve. Outer achenes 1.8–2.2 cm; body whitish, straight to ± curved, 2–2.5 mm in diam., tuberculate, with 5 fairly well-differentiated ribs; beak 7–10 mm, stout, apically ± inflated; pappus disk ± tomentulose. Pappus slightly fulvous, 1.5–1.8 cm. Fl. and fr. Apr–Jun.

Mountain grasslands, stony deserts and semi-deserts; 500–1200 m. Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan].

15. Tragopogon ruber S. G. Gmelin, Reise Russland 2: 198. 1774.

红花婆罗门参 hong hua po luo men shen

Tragopogon ruber var. *leucocarpus* C. H. An.

Herbs 15–35 cm tall, perennial. Caudex stout. Stem single, erect, simple or branched from middle third or above, glabrous or tomentulose/floccose at nodes and below capitula. Basal and lower cauline leaves lanceolate to oblong, 10–30 × 0.5–2 cm, margin white, ± undulate, and membranous. Capitula solitary to few; peduncle not inflated. Involucre 3.5–6 cm. Phyllaries 8, lanceolate, equaling or shorter than florets and achenes with pappus. Ligules purple to mauve. Outer achenes 2–2.5 cm; body whitish, straight to ± curved, 1.8–2.2 mm in diam., tuberculate, with 5 fairly well-differentiated ribs; beak 5–10 mm, stout, apically ± inflated; pappus disk ± tomentulose. Pappus slightly fulvous, often with tinge of red, 2–2.5 cm. Fl. and fr. Apr–Jun. $2n = 12$.

Mountains, sand dunes; 500–1500 m. Xinjiang [Kazakhstan, Russia (S European part)].

16. Tragopogon montanus S. A. Nikitin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 270. 1938.

山地婆罗门参 shan di po luo men shen

Herbs 15–35 cm tall, perennial. Caudex stout. Stem erect, branched from lower or middle third but sometimes simple, glabrous. Basal and lower cauline leaves lanceolate to oblong, 10–25 × 0.5–2 cm, margin white, ± undulate, and membranous. Capitula solitary to few; peduncle not inflated. Involucre 3–6 cm. Phyllaries 8, lanceolate, equaling or shorter than florets and achenes with pappus. Ligules purple to mauve. Outer achenes 2–2.5 cm; body whitish, straight to ± curved, 1.8–2.5 mm in diam., tuberculate, with 5 fairly well-differentiated ribs, gradually attenuate into beak; beak 5–10 mm, stout, apically ± inflated; pappus disk ± tomentulose. Pappus slightly fulvous, 2–2.5 cm. Fl. and fr. Apr–Jun. $2n = 12$.

Mountains; 1200–2500 m. Xinjiang [Kazakhstan, Kyrgyzstan, SC Russia, Tajikistan, Uzbekistan; SW Asia].

17. Tragopogon sibiricus Ganeschin, Trudy Bot. Muz. Imp. Akad. Nauk 13: 225. 1915.

西伯利亚婆罗门参 xi bo li ya po luo men shen

Herbs 0.5–1 m tall, biennial. Stem erect, simple or branched from middle third, glabrous. Basal and lower cauline leaves lanceolate to linear, 15–40 × 0.4–1 cm, margin flat. Capitula solitary to few; peduncle with dark hairs, ± inflated. Phyllaries 7 or 8, ca. 1/3 longer than florets and equaling achenes with pappus. Ligules violet. Outer achenes 1.8–2.4 cm; body smooth or subtuberculate on 5 fairly well-differentiated ribs; beak 0.6–1.4 cm, slender, ± inflated; pappus disk ± tomentulose. Pappus dirty white, 1.5–2 cm. Fl. and fr. Jun–Aug. $2n = 12$.

Forest margins; ca. 1700 m. Xinjiang [Russia (W Asian and E European parts)].

18. Tragopogon verrucosobracteatus C. H. An, Fl. Xinjiang. 5: 479. 1999.

瘤苞婆罗门参 liu bao po luo men shen

Herbs to 20 cm tall, perennial. Stem simple, densely covered with lanceolate or linear leaves, gradually decreasing in size toward apex. Capitulum solitary; peduncle mostly reduced, not inflated. Phyllaries 8(–10), lanceolate. Ligules yellow. Outer achenes 1.5–2 cm, beakless. Pappus dirty white, ca. 2 cm. Fl. and fr. Jun–Aug.

• Semi-deserts, stony places; ca. 500 m. Xinjiang.

Tragopogon verrucosobracteatus is poorly known and requires more investigation.

19. Tragopogon heteropappus C. H. An, Fl. Xinjiang. 5: 479. 1999.

长苞婆罗门参 chang bao po luo men shen

Herbs 30–50 cm tall, perennial. Stem simple. Basal and lower stem leaves lanceolate. Capitula solitary to few. Phyllaries 8(–10), lanceolate. Ligules yellow. Outer achenes 1–1.3 cm, almost beakless. Pappus short; awns clearly unequal, longest 2–5 ca. 7 mm, remainder ca. 4 mm. Fl. Jun.

• Semi-deserts, stony places; 1000–1300 m. Xinjiang.

Tragopogon heteropappus is poorly known and requires more investigation.

56. FABERIA Hemsley, J. Linn. Soc., Bot. 23: 479. 1888.

花佩菊属 hua pei ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Faberiopsis C. Shih & Y. L. Chen.

Herbs, perennial, often rosulate, with rhizomes. Stem leafy or ± leafless. Leaves lyrately pinnate or undivided, leathery. Capitula

with 5–30 florets. Involucre ± narrowly cylindric to ± narrowly campanulate. Phyllaries mostly glabrous; outer phyllaries in several series, gradually longer centripetally, often conspicuously imbricate, longest ca. 1/2 as long as inner ones; inner phyllaries 5–14, ± equal in length, ± linear-lanceolate to linear. Receptacle naked. Florets reddish to bluish purple. Achene brown to reddish brown, subcylindric to narrowly ellipsoid, rather weakly compressed, with 5 main ribs and 1 or 2 narrower ribs in between, apex truncate. Pappus brownish, single, of strong scabrid bristles.

• Seven species: China.

Systematic placement and circumscription of the genus have been revised based on molecular phylogenetic analyses of subtribes Lactucinae and Crepidinae (J. W. Zhang & N. Kilian, in prep.; N. Kilian et al., in prep.). N. Kilian et al. (in V. A. Funk et al., Syst. Evol. Biogeogr. Compositae, 348–350. 2009) placed *Faberia* in subtribe Crepidinae, but now ITS phylogenies show it on a very basal branch in subtribe Lactucinae. Recent additions to the genus by Sennikov (Komarovia 5: 109–110. 2008) are based on a different genus concept and are, as far as relevant for the flora of China, not supported. Karyological studies (Y. Liu, T. Deng & Q. E. Yang, pers. comm.) have revealed that the four species investigated have the unusual basic chromosome number of $x = 17$, perhaps indicating a hybrid origin of this genus.

Prenanthes glandulosa Dunn (J. Linn. Soc., Bot. 35: 514. 1903), which was initially placed by the first author in *Notoseris* (*N. glandulosa* (Dunn) C. Shih), is only known from the holotype at K, a piece of a flowering plant raised from seeds collected in "West China." It seems to be a distinct species, perhaps referable to *Faberia*, as may be assumed from the involucre (purplish, inner phyllaries ca. 6, outer ones linear as in *F. lancifolia*), the 10–12 blue (or purple?) florets, and the pale straw-colored pappus. The lower leaves have a broadly ovate blade with cordate base and a distinct, basally sheathlike widened and clasping petiole. The axes of the paniculiform to corymbiform synflorescence are densely glandular hairy, a feature otherwise not known from *Faberia*.

1a. Leaves lyrately pinnatifid to lyrately pinnatisect.
  2a. Leaves with terminal lobe much larger than lateral lobes, to 2/3 of entire leaf; involucre 1.4–1.5 cm; inner phyllaries usually 12–14; capitula with 20–30 florets ..... 3. *F. sinensis*
  2b. Leaves with terminal lobe never conspicuously larger than lateral lobes; involucre 1.1–1.3 cm; inner phyllaries ca. 8; capitula with 10–15 florets ..... 4. *F. ceterach*
1b. Leaf blade not divided or at most coarsely sinuate-dentate.
  3a. Leaf blade lanceolate to narrowly elliptic or oblanceolate, at least ca. 3 × as long as wide.
    4a. Capitula many in a leafless narrowly paniculiform synflorescence ..... 1. *F. lancifolia*
    4b. Capitula 1–3 on short branchlets subtended by upper stem leaves ..... 2. *F. nanchuanensis*
  3b. Leaf blade broadly elliptic, ovate, or pentagonal, mostly not more than ca. 2 × as long as wide.
    5a. Leaves on stem, with petiole usually shorter than blade; leaf blade triangular-ovate to pentagonal; capitula with 5 florets; inner phyllaries 5 ..... 7. *F. faberi*
    5b. Most leaves basal, with petiole distinctly longer than blade; leaf blade broadly elliptic to ovate; capitula with 10–20 florets; inner phyllaries at least 8.
      6a. Leaf blade mostly more than 5 cm; synflorescence corymbiform, with some capitula; florets bluish purple ..... 5. *F. cavaleriei*
      6b. Leaf blade at most ca. 4 cm; synflorescence sparsely branched, with 1–4 capitula only; florets purplish, drying yellowish ..... 6. *F. thibetica*

1. Faberia lancifolia J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 196. 1934.

披针叶花佩菊 pi zhen ye hua pei ju

Lactuca glabra C. C. Chang (1934), not Candolle (1838).

Herbs 30–70 cm tall, perennial. Rhizomes short, oblique, with many slender roots. Stem erect, ± branched from middle, sparsely hairy especially apically, leafy especially in basal portion. Basal leaves lanceolate and attenuate into a petiole-like basal portion to 1/3 of its length, 9–21 × 1–2.5 cm, base narrow, margin entire, apex acute to acuminate. Stem leaves usually 4 or 5, rather distant, similar to basal leaves but successively smaller; uppermost stem leaves reduced to linear-lanceolate bracts. Synflorescence narrowly paniculiform, with many capitula; branches wiry, spreading-erect, mostly 3–7 cm, with (1 or)2–6 capitula. Capitula with ca. 10 florets; peduncle 0.5–2 cm, conspicuously bracteate; bracts linear-lanceolate, 2–3 mm, spreading. Involucre purplish, 1–1.3 cm. Outer phyllaries linear-lanceolate, longest 5–6 mm; inner phyllaries ca. 6. Florets dark bluish purple. Achene pale brown, 3–4 mm. Pappus 5–6 mm. Fl. and fr. Aug–Sep.

• Crevices and ledges of cliffs by streams; 2100–2500 m. Yunnan (Tengchong).

Faberia lancifolia is a conspicuous but rare species, apparently only known from the type collection made in 1912.

2. Faberia nanchuanensis C. Shih, Acta Phytotax. Sin. 33: 195. 1995.

假花佩菊 jia hua pei ju

Faberiopsis nanchuanensis (C. Shih) C. Shih & Y. L. Chen.

Herbs 30–40 cm tall, perennial. Rhizomes short, horizontal. Roots long stretching. Stem solitary, dark purple, erect and weakly zigzag, slightly diverging at each node from perpendicular, weakly branched in apical portion, glabrous except for somewhat brown lanate leaf axils, distantly leafy. Basal leaves few to some; petiole ± purplish, 5–12 cm; leaf blade narrowly elliptic, 4–14 × 1–3 cm, base cuneate, margin inconspicuously mucronulately sinuate-dentate, apex acuminate. Stem leaves usually 5–7; petiole 1–9 cm, shorter upward; leaf blade narrowly elliptic to lanceolate but uppermost ones narrowly lan-

ceolate, otherwise like basal leaves, abaxially somewhat tinged purplish. Synflorescence of 1 to few short branchlets subtended by upper stem leaves, each with 1–3 capitula. Capitula with usually 15–20 florets. Involucre green and tinged purple, 1.1–1.3 cm. Phyllaries with apex obtuse to acute; outer phyllaries triangular-ovate to lanceolate, longest ca. 5 mm, margin ± ciliate; inner phyllaries usually 9–12, apically ciliate. Florets bluish purple. Achene not seen when mature. Pappus 7–8 mm. Fl. Jun–Aug. $2n = 34$*.

• Wet places in ravines, on banks of pools and creeks; 600–700 m. Chongqing (Nanchuan).

C. Shih and Y. L. Chen (Acta Phytotax. Sin. 34: 439. 1996) described the ligule of the florets on the basis of the holotype as trisect with a larger 3-dentate middle segment and founded on this particularity the new genus *Faberiopsis*. Other collections of *Faberia nanchuanensis*, however, show the usual 5-dentate ligule of the Cichorieae, and both morphological and molecular data (J. W. Zhang et al., in prep.) corroborate its placement in *Faberia*. The species is morphologically closest to *F. lancifolia*.

3. Faberia sinensis Hemsley, J. Linn. Soc., Bot. 23: 479. 1888.

花佩菊 hua pei ju

Crepis hieracium H. Léveillé; *Faberia hieracium* (H. Léveillé) H. Léveillé; *Lactuca faberia* Franchet, nom. illeg. superfl.; *Prenanthes sinensis* (Hemsley) Stebbins ex Babcock (1947), not *P. chinensis* Thunberg (1784).

Herbs 40–90 cm tall, perennial, rosulate. Rhizomes short, oblique, with many slender roots. Stem erect, branched apically and sparsely brown hairy, usually leafless except for linear bracts subtending branches. Rosette leaves 7–50 × 3.5–8 cm, lyrately pinnatifid to lyrately pinnatisect, abaxially pale green and brown hairy, adaxially green and glabrous; lateral lobes few to many, opposite or alternate along petiole-like basal portion, semiorbicular, semielliptic, or triangular-ovate, to 1 × 2.5 cm, gradually smaller toward leaf base; terminal lobe elliptic, ovate, or lanceolate, 4–40 cm, base cordate, rounded, or subtruncate, margin sinuate to lyrately lobed and distantly shortly mucronulately dentate, apex acuminate. Synflorescence corymbiform, with few to some capitula. Capitula with usually 20–30 florets; peduncle 1–7 cm, slender. Involucre 1.4–1.5 cm. Phyllaries apically tinged purple, ciliate at margin with brownish hairs, otherwise glabrous or inner phyllaries also abaxially sparsely hairy near apex, apex ± acute; outer phyllaries triangular-ovate to lanceolate, longest 5–6 mm; inner phyllaries usually 12–14. Florets purplish to bluish. Achene reddish brown, 3.5–4.5 mm. Pappus 7–8 mm. Fl. and fr. Jun–Sep. $2n = 34$*.

• Forest margins, forests, moist places under rocks; 600–3200 m. Sichuan, Yunnan.

The entire plant of *Faberia sinensis* is used medicinally for promoting semen production.

4. Faberia ceterach Beauverd, Bull. Soc. Bot. Genève 2: 51. 1910.

滇花佩菊 dian hua pei ju

Herbs 25–70 cm tall, perennial, rosulate, ?with rhizomes. Stem erect, basally brown hairy, apically branched and ± glabrous, leafless except for linear bracts subtending branches or with usually 1 or 2 leaves similar to rosette leaves. Rosette leaves narrowly elliptic to oblanceolate, 7–18 × 2–5 cm, lyrately pinnatipartite to lyrately pinnatisect, abaxially pale glaucous and brown hairy, adaxially dark green and glabrous, base cuneate to petiole-like for 1–3 cm, apex acute to acuminate; lateral lobes 7–15, semiorbicular to ovate, gradually smaller toward leaf base; terminal lobe lanceolate. Synflorescence narrowly paniculiform, with usually 10–20 capitula. Capitula with 10–15 florets. Involucre 1.1–1.3 cm. Phyllaries purplish red, abaxially glabrous; outer phyllaries triangular-ovate to lanceolate, longest 3–4 mm, apex acute; inner phyllaries ca. 8, apex obtuse. Florets purplish to bluish. Achene reddish brown, 3.5–4.5 mm. Pappus 6–7 mm. Fl. and fr. Jul.

• 2200–2600 m. Yunnan (Kunming).

Faberia ceterach seems only to be known from a few collections made in the early 20th century.

5. Faberia cavaleriei H. Léveillé, Bull. Géogr. Bot. 24: 252. 1914.

贵州花佩菊 gui zhou hua pei ju

Faberia tsiangii (C. C. Chang) C. Shih; *Hieracium tsiangii* C. C. Chang; *Prenanthes cavaleriei* (H. Léveillé) Stebbins ex Lauener.

Herbs 60–80 cm tall, perennial, rosulate, glabrous or sparsely hairy. Rhizomes with many slender roots. Stem erect, branched apically, sparsely leafy. Basal leaves rosulate; petiole 12–14 cm; leaf blade broadly elliptic to ovate, 9–14 × 4–6 cm, base cordate, truncate, or shortly cuneate, margin shallowly sinuate and distantly shortly mucronulately dentate, apex acute to acuminate. Stem leaves with petiole 1–3 cm; leaf blade lanceolate, smaller and narrower but otherwise similar to basal leaves, apex acuminate. Synflorescence corymbiform. Capitula with usually 10–20 florets, sessile or pedunculate; peduncle (when present) 2–5 cm, slender. Involucre 1.2–1.4 cm. Phyllaries purplish red, abaxially glabrous; outer phyllaries triangular-ovate to lanceolate, longest 0.5–0.7 mm, apex acute to obtuse; inner phyllaries 8, apex obtuse. Florets bluish purple. Achene reddish dark brown, 4–4.5 mm. Pappus 7–8 mm. Fl. and fr. Jun–Jul. $2n = 34$*.

• Densely shaded woods; 900–1500 m. Guangxi (Ziyuan), Guizhou (Guiding).

Faberia cavaleriei is rare and only known from a few collections.

6. Faberia thibetica (Franchet) Beauverd, Bull. Soc. Bot. Genève 2: 50. 1910.

光滑花佩菊 guang hua hua pei ju

Lactuca thibetica Franchet, J. Bot. (Morot) 9: 293. 1895.

Herbs 15–35 cm tall, perennial, rosulate. Rhizomes with many slender roots. Stem erect, simple or sparsely branched, glabrous, not or very sparsely leafy. Basal leaves rosulate; petiole 4–11 cm; leaf blade triangular-ovate, 2–4 × 1–3 cm, base cordate or unequally cordate, margin shallowly to coarsely sinuate-dentate, or irregularly coarsely dentate, apex acute to acuminate. Stem leaves similar to basal leaves but with shorter

petiole and smaller narrower blade. Synflorescence sparsely branched, with 1–4 capitula. Capitula nodding at anthesis, with usually 15–25 florets. Involucre ca. 1.5 cm. Phyllaries abaxially glabrous; outer phyllaries triangular-ovate to linear-lanceolate, longest 1/2–2/3 as long as inner phyllaries, apex acute; inner phyllaries 10–12, apex subacute. Florets purplish, drying yellowish. Achene brown, ca. 5 mm. Pappus ca. 8 mm. Fl. and fr. Jul. $2n = 34$*.

• Grasslands on mountain slopes; ca. 2700 m. Sichuan (Kangding).

Faberia thibetica is rare and only known from a few collections.

7. Faberia faberi (Hemsley) N. Kilian, Z. H. Wang & J. W. Zhang, **comb. nov.**

狭锥花佩菊 xia zhui hua pei ju

Basionym: *Prenanthes faberi* Hemsley, J. Linn. Soc., Bot. 23: 486. 1888 [*"Faberii"*]; *Lactuca hemsleyi* Franchet, nom. illeg. superfl.; *P. vitifolia* Diels.

Herbs 1.2–2.5 m tall, perennial. Rhizomes horizontal, 1–2 cm in diam. Stem solitary, erect, ± glabrous, leafy, apically with or without branches as leafy as main stem. Stem leaves with petiole 2–6 cm; leaf blade triangular-ovate to pentagonal, 8–15 × 5–12 cm, glabrous or very sparsely with stiff hairs, base hastate to cordate, margin shallowly sinuately mucronately dentate and mucronulately denticulate, apex acute to acuminate; lower stem leaves rarely with a single pair of small, elliptic, entire, and subopposite to opposite lateral lobes. Synflorescences contracted paniculiform, with some to many capitula; branches short, wiry, often pilose. Capitula rather clustered, each with ca. 5 florets; peduncle 0–2 mm. Involucre ca. 10 × 3 mm. Phyllaries green, ± shortly white ciliate; outer phyllaries broadly ovate-triangular, longest 2.5–3(–5) mm, apex acute; inner phyllaries 5, apex obtuse. Florets pale purple. Achene brown, 3.5–4 mm. Pappus 6–8 mm. Fl. and fr. Jun–Aug.

• Mountain slopes, forest margins; 1800–3000 m. Chongqing, Guizhou, Sichuan, Yunnan.

Molecular phylogenetic analyses by N. Kilian et al. (in prep.) fully confirm the morphological affinity to *Faberia* of *F. faberi*, previously classified under *Prenanthes* (e.g., FRPS 80(1): 189. 1997).

The syntypes of *Prenanthes vitifolia*, collected by Rosthorn in Chongqing in 1891 and conserved at O with the annotation in Diels's hand "*Prenanthes vitifolia* Diels" on the printed label of O, are evidence that *P. vitifolia* is conspecific with *Faberia faberi*. The sheet at O with the collection number "470" on an original handwritten label is **designated here as the lectotype** of the name **Prenanthes vitifolia** Diels.

57. CICERBITA Wallroth, Sched. Crit. 433. 1822.

岩参属 yan shen shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Cephalorrhynchus Boissier; *Galathenium* Nuttall; *Mycelis* Cassini.

Herbs, perennial, often with rhizomes. Stem leafy. Leaves pinnate, lyrately pinnate, or undivided. Capitula with 5–20[–30] florets. Involucre narrowly to broadly cylindric or campanulate. Phyllaries glabrous [or abaxially appressed hairy]; outer phyllaries in several series, gradually longer centripetally, ± imbricate, longest ca. 1/2(–3/4) as long as inner ones; inner phyllaries 5–10, ± equal in length, ± linear-lanceolate to linear. Receptacle naked. Florets bluish or purplish, exceptionally white. Achene some shade of brown, subcylindric, ± ellipsoid, or ± fusiform, weakly to distinctly compressed, with 5 main ribs (2 lateral and sometimes strongly enlarged, 1 median ventrally, and 2 median dorsally), also with 0–2 slender ribs in between main ribs, apex truncate, attenuate, or beaked. Pappus white, single of slender scabrid bristles or double and with an additional outer row of short hairs.

Probably ca. 20–30 species: C and SW Asia, Europe; seven species (five endemic) in China.

The circumscription of *Cicerbita* has been heavily in debate since its creation. The genus is used here in a revised circumscription inferred from most recent molecular phylogenetic and morphological studies of the entire subtribe (N. Kilian et al., in prep.), but its circumscription is still not settled, in particular concerning the species of C and SW Asia. Its concept with respect to the taxa occurring in China is therefore tentative and aims at keeping the nomenclatural changes to a minimum. Molecular phylogenetic analyses by N. Kilian et al. (in prep.) revealed that *Chaetoseris* as treated in FRPS (80(1): 266–283. 1997) is diphyletic. Whereas the larger part of the genus, including *C. lyriformis* (= *Melanoseris beesiana*), which provides the type of the generic name, is nested in the genus *Melanoseris*, the smaller part forms a distant clade close to *Cicerbita* (generic name typified by *C. alpina* Wallroth). The latter clade includes *Chaetoseris* sect. *Roborovskia* Tzvelev (Rast. Tsentral. Azii 14b: 98. 2008) and *Cicerbita azurea*. We place this clade here tentatively in *Cicerbita*. We, moreover, follow Tzvelev (Bot. Zhurn. 92: 1756. 2007; Rast. Tsentral. Azii 14b: 100. 2008) in placing *Youngia* sect. *Cyanoglossa* S. W. Liu & T. N. Ho (originally with two species described by S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 39: 553–556. 2001; further two species added by Tzvelev, loc. cit.: 2007) in close proximity to *Chaetoseris* sect. *Roborovskia*. It was so far not possible to study material of any of these species, as the material was not made available on loan to us. We place this group (*Chaetoseris* sect. *Cyanoglossa* (S. W. Liu & T. N. Ho) Tzvelev) tentatively in *Cicerbita*. Finally, we leave *Cicerbita thianschanica*, which has not been included so far in the aforementioned molecular phylogenetic studies, in *Cicerbita*.

1a. Plants robust, 0.6–1.5 m tall and synflorescence racemiform ..... 1. *C. thianschanica*

1b. Plants mostly rather delicate, mostly less than 0.6 m tall but sometimes to 0.9 m tall and then synflorescence paniculiform.

2a. Basal leaves and lower and middle stem leaves usually with triangular-ovate to orbicular leaf blade contracted into a well-developed long unwinged petiole; involucre 11–13 mm ..... 4. *C. azurea*

2b. Leaves not as above, or if basal leaves with triangular-ovate to orbicular leaf blade and well-developed petiole present then involucre ≤ 8 mm; involucre 6–10(–12) mm.

3a. Basal leaves at anthesis usually missing; stem throughout leafy with well-developed conspicuously auriculately to sagittately clasping leaves.
4a. Capitula with usually 10–12 florets; involucre (8–)9–10(–12) mm; inner phyllaries 8 ..... 2. *C. roborowskii*
4b. Capitula with ca. 5 florets; involucre 7–9 mm; inner phyllaries 5 ..... 3. *C. auriculiformis*
3b. Basal leaves at anthesis usually present; stem leaves few, reduced, undivided except for lowermost, and base not clasping.
5a. Involucre 9–10 mm; synflorescence divaricately branched; capitula with curved-erect peduncle ..... 7. *C. neglecta*
5b. Involucre 6–9 mm; synflorescence not divaricately branched; capitula with straight spreading-erect peduncle.
6a. Basal and stem leaves usually entire or more rarely few basal leaves with a few broadly triangular lobes; florets blue ..... 5. *C. zhenduoi*
6b. Basal and lowermost stem leaves runcinate; florets mauve ..... 6. *C. ladyginii*

1. Cicerbita thianschanica (Regel & Schmalhausen) Beauverd, Bull. Soc. Bot. Genève 2: 123. 1910.

天山岩参 tian shan yan shen

Mulgedium thianschanicum Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 329. 1880.

Herbs 0.6–1.5 cm tall, perennial. Rhizomes thick, woody. Stem solitary, erect, branched from middle or apically. Basal and lower stem leaves with petiole 8–9 cm, winged, semi-amplexicaul; leaf blade oblanceolate, to 16[–50] × 7–8[–9] cm, lyrately pinnatipartite to lyrately pinnatisect, margin coarsely mucronulately dentate; lateral lobes 2 or 3 pairs, elliptic; terminal lobe larger than lateral lobes, triangular-hastate, to 9 × 8 cm, apex acute to acuminate. Middle stem leaves sessile, auriculately clasping, similar to lower stem leaves. Upper stem leaves lanceolate to narrowly elliptic, smaller, less or not divided. Synflorescence narrowly racemiform to 50 cm, with many capitula often clustered at nodes. Capitula with usually 10–20 florets; peduncle wiry, 1–3(–5) cm. Involucre broadly cylindric to campanulate, ca. 1.2 cm at anthesis, to 1.5 × 0.8 cm in fruit. Phyllaries glabrous or sparsely pubescent; outer phyllaries triangular-ovate to lanceolate, largest 7–9 × 1.5–2 mm; inner phyllaries ca. 8. Florets pale purple [to blue]. Achene brown, narrowly ellipsoid, ca. 5 mm, somewhat compressed, lateral ribs somewhat broadened, apex truncate. Pappus double, outer hairs 0.2–0.4 mm, bristles 6–7 mm. Fl. and fr. Jul–Sep. $2n = 18$.

Mountain valleys, forests, along rivers; 1600–2000 m. Xinjiang [Kazakhstan, Tajikistan].

2. Cicerbita roborowskii (Maximowicz) Beauverd, Bull. Soc. Bot. Genève 2: 135. 1910.

川甘岩参 chuan gan yan shen

Lactuca roborowskii Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 29: 177. 1883; *Chaetoseris albiflora* Tzvelev; *C. potaninii* Tzvelev; *C. prattii* (Dunn) Tzvelev; *C. roborowskii* (Maximowicz) C. Shih; *L. prattii* Dunn.

Herbs 20–90 cm tall, perennial. Rhizomes very short. Stem solitary, erect, apically branched and glabrous or with white, stiff, subulate, and partly glandular hairs. Basal and lower leaves with winged clasping petiole to 10(–15) cm; leaf blade narrowly obovate to elliptic, 4.5–16 × 1.5–6 cm, pinnatipartite to pinnatisect or lyrately so, glabrous, margin entire or with few larger teeth; lateral lobes 2–7 pairs, lanceolate, elliptic, or linear, recurved, apex acute to obtuse; terminal lobe triangular-ovate, ovate-sagittate, linear, or lanceolate, apex acute to obtuse. Middle and upper stem leaves shortly petiolate or sessile; leaf blade elliptic to lanceolate, smaller, narrower, and less divided than lower leaves, base sagittately to auriculately clasping. Synflorescence paniculiform, with numerous capitula. Capitula with 10–12 florets. Involucre narrowly cylindric, (8–)9–10(–12) × 3–4 mm. Phyllaries glabrous or with subulate hairs, apex acute to obtuse; outer phyllaries triangular-ovate to linear-lanceolate, longest ca. 3/4 as long as inner phyllaries; inner phyllaries 8. Florets blue to purplish blue, rarely white. Achene 4–5 mm; body dark reddish to blackish brown, ellipsoid, compressed, with broad lateral ribs; beak greenish to brownish, 1–1.5 mm, slender. Pappus double, outer hairs ca. 0.2 mm, bristles ca. 7 mm. Fl. and fr. Jul–Sep.

• Thickets, grasslands; 1900–4200 m. Gansu, Ningxia, Qinghai, Sichuan, Xizang.

Chaetoseris albiflora, with white florets and strongly recurved leaf lobes, recently described from Xizang, hardly deserves recognition as a separate taxon and is here placed in the synonymy of *Cicerbita roborowskii*. Another recently described species from Xizang and based on a single 19th century collection, *Chaetoseris potaninii* is said to be closely related to *Cicerbita roborowskii* but to have a strongly reduced outer pappus and leaves with only 1–3 pairs of lateral lobes each with 1 or 2 large teeth. As the division of the leaves in *C. roborowskii* shows some variation, this feature, although conspicuous, does not preclude conspecificity of *Chaetoseris potaninii*, neither does the stated pappus feature. A closer inspection of the material is pending, but for the time being *C. potaninii* is included in *Cicerbita roborowskii*. As no discontinuity could be observed between plants having leaves with narrow (linear to linear-lanceolate or narrowly elliptic), ± entire lateral and terminal lobes on the one hand and those having leaves with wider (broadly lanceolate to ovate), 1- or 2-toothed lobes (originally described as *Lactuca prattii*) on the other hand, the inclusion of this latter species starting with Beauverd in 1910 is therefore maintained.

3. Cicerbita auriculiformis (C. Shih) N. Kilian, **comb. nov.**

抱茎岩参 bao jing yan shen

Basionym: *Stenoseris auriculiformis* C. Shih, Acta Phytotax. Sin. 33: 195. 1995; *Chaetoseris qiliangshanensis* S. W. Liu & T. N. Ho.

Herbs 45–80 cm tall, perennial. Stem solitary, erect, branched apically, glabrous. Lower stem leaves with petiole 6–11 cm, narrowly winged, ± clasping; leaf blade narrowly ovate, not divided or lyrately or non-lyrately pinnatisect; lateral lobes if present 1 or 2 pairs, obliquely ovate to oblong, recurved; terminal lobe 6.5–8.5 × 3.5–4.5 cm, base cordate, margin entire

or shallowly sinuate-dentate, apex acute to obtuse. Middle and upper stem leaves similar to lower leaves but with broadly winged, sagittately to auriculately clasping petiole-like basal portion or sessile; lateral lobes 2–4 pairs, ca. 3 × 0.7–1 cm; terminal lobe triangular-hastate to lanceolate. Synflorescence paniculiform, with numerous capitula. Capitula with ca. 5 florets. Involucre narrowly cylindric, 7–9 × ca. 2 mm. Phyllaries green, glabrous; outer phyllaries triangular-ovate to linear-lanceolate, longest ca. 1/2 as long as inner phyllaries; inner phyllaries 5. Florets bluish purple. Achene ca. 4 mm; body ellipsoid, compressed, with broad lateral ribs; beak ca. 1 mm and thick. Pappus double, outer hairs 0.1–0.2 mm, bristles ca. 5 mm. Fl. and fr. Jul–Aug.

• Mountain slopes, along rivers, forests; 2000–2300 m. Gansu (Yuzhong), W Nei Mongol, Qinghai.

Cicerbita auriculiformis is closely related to *C. roborowskii*, although well distinct by its smaller capitula with only 5 inner phyllaries. This relationship was clearly expressed by S. W. Liu and T. N. Ho (Fl. Qinghai. 3: 512. 1996) when publishing it under the name *Chaetoseris qiliangshanensis*. However, the species had been known before, but it was, for its small capitula, misplaced in *Stenoseris* as *S. auriculiformis* (e.g., FRPS 80(1): 286. 1997).

4. Cicerbita azurea (Ledebour) Beauverd, Bull. Soc. Bot. Genève 2: 123. 1910.

岩参 yan shen

Sonchus azureus Ledebour, Fl. Altaic. 4: 138. 1833; *Cicerbita azurea* var. *glabra* Sennikov; *C. glabra* (Sennikov) Tzvelev; *Lactuca azurea* (Ledebour) Danguy; *Mulgedium azureum* (Ledebour) Candolle.

Herbs 30–60 cm tall, perennial. Rhizomes horizontal to oblique. Stem solitary, erect, branched apically, ± with brownish glandular hairs or glabrous. Basal and lower stem leaves with petiole 4.5–5.5(–18) cm, narrowly winged or unwinged, base ± expanded and semiamplexicaul to clasping; leaf blade pinnatisect, abaxially sparsely villous but glabrescent, margin sinuate-dentate; lateral lobes 1 pair, elliptic-triangular to triangular; terminal lobe cordate, ovate, triangular-hastate, or rarely reniform, 2–8 × 1.5–6 cm, apex acuminate to rounded. Middle and upper stem leaves with winged petiole; leaf blade smaller, lateral lobes 1 pair or absent. Synflorescence racemiform to more rarely paniculiform, with few to many capitula. Capitula with usually 11–18 florets. Involucre cylindric, 1.1–1.3 × 0.4–0.6 mm. Phyllaries usually tinged deep violet, glandular hairy along midvein or glabrous; outer phyllaries lanceolate to linear-lanceolate, longest 6–9 mm; inner phyllaries 8–10, abaxially sparsely villous but glabrescent. Florets deep blue. Achene pale brown, narrowly ellipsoid, 4–5 mm, weakly compressed, constricted for ca. 0.2 mm below pappus disk. Pappus double, outer hairs inconspicuous and ca. 0.1 mm, bristles 6–8 mm. Fl. and fr. Jul–Oct.

Forest margins, mountain slopes, open areas in forests, grasslands on flats; 600–2900 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, SC Russia].

5. Cicerbita zhenduoi (S. W. Liu & T. N. Ho) N. Kilian, **comb. nov.**

振铎岩参 zhen duo yan shen

Basionym: *Youngia zhenduoi* S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 39: 554. 2001; *Chaetoseris cyanea* (S. W. Liu & T. N. Ho) Tzvelev (2007), not (D. Don) C. Shih (1991); *C. zhenduoi* (S. W. Liu & T. N. Ho) Tzvelev; *Y. cyanea* S. W. Liu & T. N. Ho.

Herbs 15–30 cm tall, perennial, rosulate. Rhizomes short. Stem erect, branched from base or higher up, glabrous or white pubescent. Rosette leaves glabrous or pubescent, margin ± entire. Early leaves with distinct 1.3–3 cm petiole; leaf blade triangular-ovate, 1–1.8 × 0.6–0.8 cm, base sagittate, truncate, or cuneate, apex obtuse to acute. Leaf blade of later rosette leaves elliptic to lanceolate, 4–8.5 × 0.3–0.8 cm, undivided to rarely weakly pinnatifid with few triangular lobes, base gradually attenuate, apex acute to long acuminate. Stem leaves similar to later rosette leaves, narrowly ovate-elliptic to narrowly lanceolate; uppermost leaves bractlike. Synflorescence loosely racemiform or paniculiform, glabrous or pubescent, with few to some capitula. Capitula with usually 4–7 florets. Involucre narrowly cylindric, 6–8 × 1.5–2 mm. Phyllaries glabrous or pubescent; outer phyllaries ovate to lanceolate, longest ca. 4 × 1 mm, apex acute; inner phyllaries apically blackish purple, apex obtuse. Florets blue. Achene fusiform and apically attenuate, ca. 4 mm, somewhat compressed. Pappus 4–5 mm. Fl. and fr. Sep.

• Moist slopes, riverbanks; 3600–3700 m. Qinghai (Yushu).

We have not seen material of *Cicerbita zhenduoi*; therefore, its inclusion follows Tzvelev (Rast. Tsentral. Azii 14b: 100. 2008), and its description is taken from the original publication. We are not convinced that *Youngia cyanea*, described also from the environment of Jiangxigou, distinguished chiefly by the shape of the rosette leaves and the absence or presence of pubescence, represents a different species. From the variation experienced in the subtribe, the differences in either feature may well be within the usual range found. The corresponding combination under *Chaetoseris* provided by Tzvelev is illegitimate as a later homonym of *Chaetoseris cyanea* (D. Don) C. Shih, and the epithet is also not available in *Cicerbita*. Until closer study of the material, we prefer to treat both as conspecific.

6. Cicerbita ladyginii (Tzvelev) N. Kilian, **comb. nov.**

高原岩参 gao yuan yan shen

Basionym: *Chaetoseris ladyginii* Tzvelev, Bot. Zhurn. 92: 1756. 2007.

Herbs 20–50 cm tall, perennial. Stem solitary, erect, branched in apical half, glabrous. Basal leaves few, pinnatifid with lateral lobes broadly lanceolate to broadly triangular. Stem leaves 3–6, sessile, narrowly lanceolate to linear, undivided. Synflorescence glandular hairy. Involucre narrowly cylindric, 8–9 mm. Phyllaries almost glabrous, margin shortly ciliate; outer phyllaries with longest 3–4 mm. Florets mauve. Achene fusiform, not seen when mature. Pappus single, caducous. Fl. and fr. Jul–Aug.

• 4000–4100 m. Xizang.

We have not seen material of *Cicerbita ladyginii*; therefore, its description is taken from the original publication.

7. Cicerbita neglecta (Tzvelev) N. Kilian, **comb. nov.**

光苞岩参 guang bao yan shen

Basionym: *Chaetoseris neglecta* Tzvelev, Bot. Zhurn. 92: 1756. 2007.

Herbs 40–70 cm tall, perennial. Stem erect, branched from base or higher up. Basal leaves runcinately pinnate, with conspicuous terminal lobe. Lower stem leaves like basal leaves but others linear-lanceolate, undivided, base auriculately clasping, margin entire. Synflorescence divaricately paniculiform. Capitula with peduncle curved-erect, glandular hairy. Involucre narrowly cylindric, 9–10 mm. Phyllaries green, glabrous; outer phyllaries with longest 3–5 mm. Florets lilac. Achene 3.5–4 mm; body reddish brown, with thick lateral ribs; beak 0.7–1 mm. Pappus with outer hairs ca. 0.2 mm. Fl. and fr. Sep.

• 4000–4100 m. Xizang.

We have not seen material of *Cicerbita neglecta*; therefore, its description is taken from the original publication.

58. MELANOSERIS Decaisne in Jacquemont, Voy. Inde 4(Bot.): 101. 1843.

毛鳞菊属 mao lin ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Chaetoseris C. Shih; *Kovalevskiella* Kamelin; *Stenoseris* C. Shih.

Herbs, perennial, sometimes rosulate, rarely acaulescent, glabrous, glandular hairy, pilose, or hispid. Stems solitary or several, usually leafy. Leaves pinnate, lyrately pinnate, or undivided. Capitula often nodding, with 3–40 florets. Involucre narrowly cylindric to broadly campanulate. Phyllaries glabrous or with soft or rigid hairs; outer phyllaries mostly in several series, gradually longer centripetally, mostly to more than 1/2 as long as inner ones and often even ± approaching them in length, more rarely very short, absent in one species with a secondary capitulum (*Melanoseris souliei*); inner phyllaries 3 to many, ± equal in length, ± linear-lanceolate to linear. Receptacle naked. Florets bluish, purplish, sometimes yellow, or rarely white. Achene some shade of brown, mostly ellipsoid and strongly compressed, more rarely subcylindric to ± fusiform and weakly compressed, with (4 or)5 main ribs (2 mostly strongly broadened lateral, 1 median ventrally, and (1 or)2 median dorsally) and with 0–2 slender ribs in between main ribs, apex truncate, attenuate, or with a stout beak. Pappus white or rarely yellowish, single of slender scabrid bristles or more frequently double and with an additional outer row of minute hairs.

Probably ca. 60–80 species: Africa, Asia, Himalayan region; 25 species (16 endemic) in China; one additional species (endemic) is tentatively placed with *Melanoseris*.

The generic name *Melanoseris*, based on *M. lessertiana*, is one of the oldest in subtribe Lactucinae but has never found recognition. Molecular phylogenetic analyses of subtribe Lactucinae (N. Kilian et al., in prep.) revealed, however, that the bulk of *Chaetoseris*, including the type of the name, the genus *Stenoseris*, and a number of species formerly placed in *Cicerbita*, *Lactuca*, *Mulgedium*, and *Prenanthes*, are all members of a sizable *Melanoseris* clade. The genus chiefly seems to represent the important branch in the evolution of subtribe Lactucinae that successfully colonized subtropical and drier tropical regions.

1a. Plants rosulate and acaulescent; capitula sessile, densely congested in a secondary capitulum; phyllaries only in 1 row ..... 25. *M. souliei*
1b. Plants neither rosulate nor acaulescent; capitula without secondary capitula; phyllaries in 2 or more rows.
2a. Capitula with 3–9 florets; inner phyllaries 3–5(or 6).
3a. Involucre 1.5–1.8 mm; capitula with 7–9 florets; plants, including involucre, strongly hirsute with pale hairs ..... 7. *M. hirsuta*
3b. Involucre 0.9–1.4(–1.6) mm; capitula with 3–6 florets; plants, including involucre, glabrous or ± hairy, but never strongly hirsute with pale hairs.
4a. Involucre 1.3–1.6 mm; inner phyllaries 4; achene 9–11 mm including a slender 3–4 mm beak ..... 10. *M. henryi*
4b. Involucre 0.9–1.4(–1.5) mm; inner phyllaries 3–5(or 6); achene 4–7 mm and unbeaked or with less than 2 mm beak.
5a. Outer phyllaries with longest 4–5 mm; inner phyllaries 5(or 6); florets 4–6 ..... 23. *M. violifolia*
5b. Outer phyllaries with longest ≤ 3 mm; inner phyllaries 3–5; florets 3–5.
6a. Leaf blade of all leaves not divided.
7a. Involucre with 3 or 4 inner phyllaries; capitula with 3 or 4 bluish purple florets; anther tube ca. 2 mm ..... 16. *M. tenuis*
7b. Involucre with 4 or 5 inner phyllaries; phyllaries with reddish hairs; capitula with 4 or 5 yellow florets; anther tube ca. 4 mm ..... 26. *Lactuca scandens*
6b. Leaf blade of at least lower and middle leaves pinnatisect or lyrately pinnatisect.
8a. Involucre 1.2–1.5 cm at anthesis and in fruit; outer phyllaries with longest to 3 mm; achene 6–7 mm ..... 18. *M. graciliflora*
8b. Involucre 0.9–1.1 cm at anthesis and in fruit; outer phyllaries with longest to 2 mm; achene 4–5 mm.
9a. Achene unbeaked ..... 20. *M. oligolepis*
9b. Achene contracted into a distinct stout beak of 0.5–1 mm.

10a. Rachis of leaves usually pectinate; leaf blade terminal lobe ovate to ovate-lanceolate, base truncate, shallowly cordate, or broadly cuneate ..... 17. *M. triflora*
10b. Rachis of leaves not pectinate; leaf blade terminal lobe elliptic to lanceolate, base cuneate ..... 19. *M. leptantha*

2b. Capitula with 10 or more florets; inner phyllaries at least (7 or)8.
11a. Peduncle bracts regularly conspicuous, usually purplish red when dry, lanceolate, to 1.5 cm, ± semiamplexicaul ..... 24. *M. bracteata*
11b. Peduncle without or with inconspicuous bracts.
12a. Outer phyllaries with white densely fimbriate margin.
13a. Capitula with ca. 40 florets; involucre conspicuously thick and large, 1.8–2.3 × 1–1.5 cm ..... 3. *M. macrantha*
13b. Capitula with ca. 15 florets; involucre only ca. 1.5 × 0.8 cm ..... 4. *M. ciliata*
12b. Outer phyllaries with glabrous margin.
14a. Florets yellow (cyanic florets sometimes drying yellowish, corolla teeth then keeping original color).
15a. Leaves pinnately lobed, lobes narrowly elliptic, elliptic, or lanceolate; involucre 1.1–1.5 mm ..... 1. *M. yunnanensis*
15b. Leaves pinnately lobed, lobes rhombic to irregularly rhombic; involucre 9–10 mm ..... 2. *M. rhombiformis*
14b. Florets purple, purplish red, blue, or exceptionally white.
16a. Plants 5–50 cm tall; stems either several, weak, and sparsely branched or with solitary dominant stem branched from base or else stem delicate.
17a. Plants 5–30 cm tall; capitula with usually 12–24 florets; involucre to 10 mm in diam. in fruit; branches, peduncles, and involucres often reddish villous; pappus without a row of minute outer hairs ..... 21. *M. lessertiana*
17b. Plants 20–50 cm tall; capitula with usually 10–15 florets; involucre ≤ 5 mm in diam. in fruit; branches, peduncles, and involucres never reddish villous; pappus with a row of minute outer hairs ..... 22. *M. macrorhiza*
16b. Plants taller; stem strong, with dominant main stem apically branched.
18a. Lower and middle stem leaves gradually attenuate into a petiole or petiole-like basal portion, at least middle stem leaves with blade usually clasping stem; blade shape not as below.
19a. Involucre at fruiting 1–1.5 cm wide; capitula with usually 25–35 florets ..... 12. *M. atropurpurea*
19b. Involucre at fruiting less than 1 cm wide; capitula with usually 10–16 florets.
20a. Capitula with ca. 10 florets ..... 14. *M. likiangensis*
20b. Capitula with 12–16 florets.
21a. Involucre 1.7–2 cm; leaf blade lateral lobes 1 or 2 pairs ..... 13. *M. leiolepis*
21b. Involucre ca. 1.5 cm; leaf blade lateral lobes 5–7 pairs ..... 15. *M. pectiniformis*
18b. Lower and middle stem leaves abruptly contracted from a basally broad blade into a narrowly winged petiole; leaf blade undivided and triangular-ovate to broadly lanceolate or pinnately lobed with 1–3 pairs of elliptic to lanceolate lateral lobes.
22a. Lower and middle stem leaves with 2 or 3 pairs of lateral lobes; leaf blade terminal lobe usually much narrower than blade.
23a. Involucre ca. 1.5 cm in fruit; capitula with usually 15–20 florets ..... 8. *M. sichuanensis*
23b. Involucre ca. 2 cm in fruit; capitula with ca. 30 florets ..... 9. *M. taliensis*
22b. Lower and middle stem leaves undivided or with 1 or 2 pairs of lateral lobes; leaf blade terminal lobe at least in some leaves as wide or almost as wide as blade.
24a. Involucre 1.7–2.1 cm; capitula with ca. 40 florets ..... 11. *M. macrocephala*
24b. Involucre 1.2–1.7 cm; capitula with usually 15–30 florets.
25a. Lower and middle stem leaves undivided or single leaves with 1 pair of elliptic lateral lobes; involucre 1.3–1.7 cm ..... 5. *M. cyanea*
25b. Lower and middle stem leaves with 1 or 2 pairs of elliptic lateral lobes; involucre 1.2–1.5 cm ..... 6. *M. beesiana*

1. Melanoseris yunnanensis (C. Shih) N. Kilian & Z. H. Wang, **comb. nov.**

云南毛鳞菊 yun nan mao lin ju

Basionym: *Chaetoseris yunnanensis* C. Shih, Acta Phytotax. Sin. 29: 410. 1991; *C. lutea* (Handel-Mazzetti) C. Shih; *C. teniana* (Beauverd) C. Shih; *Cicerbita cyanea* (D. Don) Beauverd var. *lutea* Handel-Mazzetti; *C. cyanea* var. *teniana* Beauverd.

Herbs ca. 1 m tall or more, perennial. Root slenderly turniplike. Stem solitary, erect, apically branched and glandular hairy. Lower and middle stem leaves with petiole 3–10 cm, narrowly winged, not clasping; leaf blade elliptic to ovate, 10–15 × 4–9 cm, pinnatipartite or pinnatisect to bipinnately lobed, pilose and hispid glandular hairy, margin dentate; lateral lobes 2–6 pairs, opposite or alternate, elliptic to lanceolate, apex acute; secondary lobes if present 1 or 2 pairs, broadly triangular to lanceolate; terminal lobe elliptic to lanceolate. Upper stem leaves similar to middle stem leaves but petiole shorter; leaf blade smaller and less divided; uppermost leaves linear-lanceolate, undivided. Synflorescence racemiform to narrowly paniculiform, with few to many capitula. Capitula nodding, with usually 15–20 florets; peduncle wiry, 0.2–2(–5) cm. Involucre purplish green, cylindric, 1.1–1.5 × 0.4–0.8 cm. Phyllaries ± acute at apex; outer phyllaries triangular-ovate to linear-lanceolate, glabrous or abaxially hispid on midvein, longest approaching inner phyllaries in length. Florets yellow to whitish. Achene ca. 7 mm; body dark reddish brown, ellipsoid, compressed, lateral ribs broadened, apex contracted into a ca. 2 mm paler beak. Pappus double, outer hairs 0.1–0.2 mm, bristles 7–8 mm. Fl. and fr. Sep–Oct.

• Grasslands on mountain slopes, river valleys, forests; 700–3400 m. Sichuan, Yunnan.

Melanoseris yunnanensis and *Chaetoseris lutea* show many transitions between each other and actually seem to be conspecific. According to the fragmentary type material of *Cicerbita cyanea* var. *teniana* preserved at G (the type material in herb. Bonati, formerly at LA, is presumably lost), it represents a strongly glandular form of *M. yunnanensis*.

2. Melanoseris rhombiformis (C. Shih) N. Kilian & Z. H. Wang, **comb. nov.**

菱裂毛鳞菊 ling lie mao lin ju

Basionym: *Chaetoseris rhombiformis* C. Shih, Acta Phytotax. Sin. 29: 409. 1991.

Herbs 60–70 cm tall, perennial. Stem solitary, erect, apically with slender glabrous branches. Lower stem leaves with petiole 3–5 cm, basally widened; leaf blade narrowly elliptic, 14–17 × 5–8 cm, pinnatipartite, margin dentate; lateral lobes 6–9 pairs, ± rhombic to rarely triangularly hastate, base broadly petiolulate or sessile, apex acuminate; terminal lobe rhombic, hastate-rhombic, or triangular-hastate-rhombic, apex acute. Middle stem leaves similar to lower stem leaves but with fewer lateral lobes. Upper stem leaves similar to middle stem leaves but broadly triangular to broadly ovate, base broadly winged, petiole-like, and auriculately clasping, margin entire; lateral lobes 2 pairs, irregularly triangular-hastate, basally attenuate; terminal lobe irregularly triangular-hastate. Synflorescence paniculiform, with numerous capitula. Capitula ?nodding, with ca. 10 florets. Involucre cylindric, 8–10 × ca. 3 mm. Phyllaries abaxially glabrous, apex acute to obtuse; outer phyllaries narrowly triangular to linear-lanceolate. Florets yellow. Achene 4–5 mm; body dark brown, ellipsoid, compressed, lateral ribs broadened, apex contracted into a ca. 1 mm beak. Pappus double, outer hairs inconspicuous, bristles ca. 4 mm. Fl. and fr. Sep–Oct.

• Thickets; ca. 2500 m. Yunnan (Eryuan).

3. Melanoseris macrantha (C. B. Clarke) N. Kilian & J. W. Zhang, **comb. nov.**

缘毛毛鳞菊 yuan mao mao lin ju

Basionym: *Lactuca macrantha* C. B. Clarke, Compos. Ind. 267. 1876; *Chaetoseris macrantha* (C. B. Clarke) C. Shih; *Cicerbita macrantha* (C. B. Clarke) Beauverd.

Herbs 0.5–1.5 m tall, perennial. Stem stout, erect, apically branched and glandular hairy. Lower and middle stem leaves with petiole long (lowermost leaves) to sessile with an expanded and clasping base; leaf blade narrowly spatulate, elliptic, or narrowly lanceolate, 14–40(or more) × 4–8 cm, pinnatipartite to pinnatisect (in lowermost leaves); lateral lobes 2–5 pairs but to 8-paired in lowermost leaves, abaxially glabrous, margin coarsely dentate, apex acute; terminal lobe narrowly triangular, narrowly ovate, or irregular rhombic, apex acute to acuminate. Upper stem leaves similar to middle stem leaves but smaller and less divided. Synflorescence racemiform to corymbosely paniculiform, lax, with few capitula. Capitula with ca. 40 florets; peduncle (2–)5–14 cm. Involucre dark purplish green, broadly campanulate, 1.8–2.3 × 1–1.5 cm. Phyllaries with apex acute to obtuse; outer phyllaries ovate to lanceolate, margin white densely fimbriate; inner phyllaries without a fimbriate margin. Florets blue to bluish purple. Achene 6–7 mm; body brown, ellipsoid, compressed, lateral ribs broadened, apex tapering into a barely differentiated thick beak of 1–2 mm. Pappus double, outer hairs 0.1–0.2 mm, bristles ca. 8 mm. Fl. and fr. Jul–Sep. $2n = 16$.

Forests, thickets; 3200–4100 m. Xizang [Bhutan, N India, Nepal].

4. Melanoseris ciliata (C. Shih) N. Kilian, **comb. nov.**

景东毛鳞菊 jing dong mao lin ju

Basionym: *Chaetoseris ciliata* C. Shih, Acta Phytotax. Sin. 29: 403. 1991.

Herbs ca. 50 cm tall. Stem erect, apically branched and sparsely glandular hairy. Lower and middle stem leaves with petiole 3–5.5 cm, narrowly winged, basally widened and auriculately clasping; leaf blade lyrately pinnatisect, abaxially or both surfaces with squarrose hairs on veins; lateral lobes 1 pair, elliptic, apex acute to obtuse; terminal lobe triangular, 6–8 × 3–4 cm, base truncate, apex acute. Upper stem leaves similar to middle stem leaves but smaller; uppermost stem leaves sessile, lanceolate to linear-lanceolate, undivided. Synflorescence racemiform, with few capitula. Capitula with ca. 15 florets. Involucre broadly cylindric to campanulate, ca. 1.5 × 0.8 cm. Phyllaries dark green, abaxially glabrous, apex acute to obtuse;

outer phyllaries broadly triangular to linear-lanceolate, margin white fimbriate. Florets bluish. Achene beaked but only immature ones seen. Pappus ?single, bristles ca. 6 mm. Fl. Nov.

• Mountain slopes; 2800–2900 m. Yunnan (Jingdong).

Melanoseris ciliata is a little-known species in need of closer examination on the basis of additional material with mature achenes.

5. Melanoseris cyanea (D. Don) Edgeworth, Trans. Linn. Soc. London 20: 81. 1846.

蓝花毛鳞菊 lan hua mao lin ju

Sonchus cyaneus D. Don, Prodr. Fl. Nepal. 164. 1825; *Chaetoseris cyanea* (D. Don) C. Shih; *C. hastata* (Candolle) C. Shih; *C. hispida* C. Shih; *Cicerbita cyanea* (D. Don) Beauverd; *C. cyanea* var. *glandulifera* (Franchet) Beauverd; *C. cyanea* var. *hastata* (Candolle) Beauverd; *Lactuca funebris* W. W. Smith; *L. hastata* Candolle; *L. hastata* var. *glandulifera* Franchet; *Melanoseris hastata* (Candolle) Edgeworth; *Mulgedium cyaneum* (D. Don) Candolle.

Herbs 0.8–1.8 m tall, perennial. Root slenderly turniplike. Stem solitary, erect, branched apically, ± glabrous to densely covered with purplish to brownish glandular hairs. Lower and middle stem leaves with petiole to 12 cm, narrowly winged, not or rarely very faintly sagittately clasping; leaf blade ovate to triangular, 5–11 × 3.5–8.5 cm, undivided or with 1 pair of ± elliptic lateral lobes, margin coarsely dentate, base of blade or terminal lobe cuneate, truncate, cordate, or hastate, apex acute. Upper stem leaves shortly petiolate to sessile; leaf blade similar to middle stem leaves but smaller, narrowly elliptic, undivided to shallowly pinnatifid. Synflorescence paniculiform, often with rather long virgate branches, with several to numerous capitula. Capitula with usually 20–30 florets. Involucre cylindric, 1.3–1.7 × 0.5–0.8 cm. Phyllaries with midvein white or purplish hispid except in innermost ones, apex acute; outer phyllaries triangular-ovate to lanceolate. Florets blue to purplish. Achene 7–8 mm; body dark brown, ellipsoid, compressed, lateral ribs broadened, apex attenuate into a pale 2–3 mm slender beak. Pappus double, outer hairs 0.1–0.3 mm, bristles ca. 7 mm. Fl. and fr. Sep–Nov. $2n = 16$*.

Moist places under forests, thickets in mountain valleys, forest margins, grassy slopes, wastelands on mountain slopes; 1500–3100 m. Chongqing, Guizhou, Sichuan, Xizang, Yunnan [Bhutan, N India, Kashmir, Myanmar, Nepal].

Plants with less glandular hairy to almost glabrous branches, as they occur in various species besides strongly glandular plants, were originally described as *Lactuca hastata* and recognized as *Chaetoseris hastata* in FRPS (80(1): 275. 1997) but have been considered as conspecific with *C. cyanea* by most authors, a treatment which is also followed here. Plants from Chongqing earlier described as a separate species, *C. hispida*, were later recognized by its author as conspecific with *C. cyanea*, and the name was sunk in the synonymy of that species.

6. Melanoseris beesiana (Diels) N. Kilian, **comb. nov.**

毛鳞菊 mao lin ju

Basionym: *Lactuca beesiana* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 201. 1912; *Chaetoseris beesiana* (Diels) C. Shih; *C. lyriformis* C. Shih.

Herbs ca. 1 m tall, perennial. Stem solitary, erect, apically branched and glandular hairy. Lower and middle stem leaves with petiole 3–7 cm, ± winged, basally semiamplexicaul; leaf blade 7–17 × 4–13 cm, lyrately pinnatisect, abaxially glandular hairy, base cuneate, margin dentate; lateral lobes 1 or 2 pairs, ± elliptic; terminal lobe broadly triangular-hastate, ovate, or triangular, comprising most of blade, apex acute to acuminate. Upper stem leaves similar to middle stem leaves but smaller; uppermost leaves sessile, linear-lanceolate to elliptic, not divided. Synflorescence narrowly racemiform or paniculiform, with few to several capitula. Capitula with usually 15–25 florets; peduncle 0.5–3 cm. Involucre cylindric to narrowly campanulate, 1.2–1.5 × 0.4–0.7 cm. Phyllaries dark green, abaxially densely glandular hispid, apex acute to obtuse; outer phyllaries narrowly triangular to lanceolate. Florets purple. Achene ca. 5 mm; body dark brown, broadly ellipsoid, compressed, lateral ribs broadened, apex attenuate into a pale 1–2 mm beak. Pappus double, outer hairs ca. 0.1 mm, bristles ca. 7 mm. Fl. and fr. Aug–Oct. $2n = 16$*.

• Forests, wastelands, farmlands; 700–3700 m. Sichuan, Xizang, Yunnan.

Melanoseris beesiana was established by C. Shih (Acta Phytotax. Sin. 29: 405. 1991) as *Chaetoseris lyriformis* (providing the type of the generic name *Chaetoseris*), but *Lactuca beesiana* provides an older epithet. It is, no doubt, closely related to the more widespread *M. cyanea* and mainly distinguished from the latter by its regularly lyrately pinnatisect lower and middle stem leaves and somewhat smaller involucres. With some reservation, species rank is maintained for this taxon, but future research may reveal that subspecies rank is perhaps more appropriate.

7. Melanoseris hirsuta (C. Shih) N. Kilian, **comb. nov.**

鹤庆毛鳞菊 he qing mao lin ju

Basionym: *Chaetoseris hirsuta* C. Shih in Y. Ling & C. Shih, Fl. Reipubl. Popularis Sin. 80(1): 282. 1997, based on *Lactuca hirsuta* Franchet, J. Bot. (Morot) 9: 258. 1895, not *Lactuca hirsuta* Muhlenberg ex Nuttall, Gen. N. Amer. Pl. 2: 124. 1818.

Herbs 15–30 cm tall, perennial, with a taproot ?and shoot-bearing lateral roots, strongly hirsute of pale partly glandular hairs. Stem solitary, erect, leafy. Lower and middle stem leaves oblanceolate to obovoid in outline, ca. 12 × 5 cm, lyrately pinnatisect, basally abruptly contracted into a ± winged petiole-like portion, base semiamplexicaul to weakly clasping, margin densely and sharply sinuate-dentate and denticulate; lateral lobes 1 or 2 pairs, triangular to rhombic, apex acute to obtuse; terminal lobe broadly ovate to broadly triangular, very much larger than lateral lobes, base cordate, apex acute. Upper stem leaves ovate to lanceolate, smaller, ± without petiole-like basal portion, otherwise similar to middle stem leaves. Synflorescence narrowly paniculiform, leafy, with few to some capitula. Capitula nodding, with ca. 8 florets; peduncle less than 1 cm. Involucre cylindric, 1.5–1.8 cm. Phyllaries abaxially hirsute as remainder of plant; outer phyllaries few, ± inconspicuous; inner phyllaries 5. Florets yellowish. Achene brown, narrowly ellipsoid, ca. 1 cm, subcompressed, apex attenuate into a short stout beak. Pappus single, yellowish, ca. 7 mm, caducous. Fl. and fr. Aug–Oct.

• Meadows, below rocks, alongside paths; 1700–3300 m. Sichuan, Yunnan (Dali).

A well-delimited yet little-known species, this taxon is placed here with some hesitation.

8. Melanoseris sichuanensis (C. Shih) N. Kilian, **comb. nov.**

四川毛鳞菊 si chuan mao lin ju

Basionym: *Chaetoseris sichuanensis* C. Shih, Acta Phytotax. Sin. 29: 408. 1991.

Herbs ca. 80 cm tall, perennial. Stem solitary, erect, apically branched and sparsely glandular hairy. Middle stem leaves with petiole 2.5–4 cm, very narrowly winged; leaf blade ovate to elliptic, 9–11 × 6–7 cm, pinnatisect to subpinnatisect, base ± truncate, margin dentate; lateral lobes 2 or 3 pairs, lanceolate, apex acute, acuminate, or obtuse; upper and middle lobes 2–4.5 × 1–1.5 cm; lower lobes smaller; terminal lobe elliptic-lanceolate, ca. 4 × 1.5 cm. Upper stem leaves similar to middle stem leaves but smaller; uppermost leaves linear. Synflorescence narrowly paniculiform, with numerous capitula. Capitula with usually 15–20 florets. Involucre cylindric to campanulate, ca. 1.5 × 0.5 cm. Phyllaries with an obtuse to acute apex; outer phyllaries lanceolate, hispid. Florets purplish. Achene ca. 6 mm; body pale brown, ellipsoid, compressed, lateral ribs broadened, apex contracted into a ca. 2 mm beak. Pappus double, outer hairs inconspicuous, bristles ca. 8 mm. Fl. and fr. Aug–Oct.

• Mountain slopes; 2700–3700 m. Sichuan (Mianning), Yunnan.

9. Melanoseris taliensis (C. Shih) N. Kilian & Z. H. Wang, **comb. nov.**

戟裂毛鳞菊 ji lie mao lin ju

Basionym: *Chaetoseris taliensis* C. Shih, Acta Phytotax. Sin. 29: 402. 1991.

Herbs ca. 50 cm tall, perennial. Rhizomes tuberlike. Stem solitary, erect, apically branched and glandular hairy. Lower and middle stem leaves with petiole 4–5 cm, winged, basally broadened and clasping; leaf blade narrowly ovate, 10–15 × ca. 6 cm, runcinately pinnatipartite to subpinnatisect, margin dentate, apex acute to obtuse; lateral lobes 2 or 3 pairs, elliptic to irregularly rhombic, increasing in size toward leaf apex; terminal lobe lanceolate, irregularly rhombic, or falcate, much narrower than lateral lobes, with few small semiorbicular lobes. Upper stem leaves similar to lower and middle stem leaves but smaller; uppermost leaves linear-lanceolate, undivided. Synflorescence racemiform to sparsely paniculiform, with few capitula. Capitula with ca. 30 florets. Involucre campanulate, ca. 2 × 1 cm. Phyllaries glabrous, apex acute to obtuse; outer phyllaries triangular-lanceolate. Achene 8–9 mm; body dull brown, narrowly ellipsoid, compressed, lateral ribs broadened, apex tapering into a paler 2–3 mm beak. Pappus double, outer hairs ca. 0.1 mm, bristles ca. 7 mm. Fl. and fr. Oct. $2n = 16$*.

• Mountaintops; 2800–3000 m. Yunnan (Dali, Lijiang).

10. Melanoseris henryi (Dunn) N. Kilian, **comb. nov.**

普洱毛鳞菊 pu er mao lin ju

Basionym: *Lactuca henryi* Dunn, J. Linn. Soc., Bot. 35: 512. 1903.

Herbs to 1 m tall, perennial. Stem solitary, erect, apically branched, glabrous, leafy. Lower stem leaves not seen. Middle stem leaves spatulate, to 12 × 3 cm, pinnatifid to pinnatipartite, somewhat setose, base attenuate, margin sinuate-dentate, apex obtuse to acute; lateral lobes 1 or 2 pairs, semiorbicular to broadly ovate; terminal lobe ovate to lanceolate, as wide as lateral lobes. Upper stem leaves similar to middle stem leaves but smaller and less divided, apex acute to acuminate; uppermost stem leaves narrowly elliptic, undivided. Synflorescence paniculiform with some to many capitula. Capitula with 4 or 5? florets; peduncle wiry, sparsely setose. Involucre narrowly cylindric, 1.3–1.6 × ca. 0.3 cm. Phyllaries glabrous, apex obtuse; outer phyllaries lanceolate to linear-lanceolate, longest ca. 1/2 as long as inner ones; inner phyllaries 4. Florets ?purplish. Achene 0.9–1.1 cm; body reddish, narrowly ellipsoid, compressed, apex tapering into a paler 3–4 mm beak. Pappus ca. ?7 mm.

• About 1500 m. Yunnan (Pu'er).

Lactuca henryi, based on the collection *A. Henry 13494*, was omitted from FRPS and by X. Zhuang (Fl. Yunnan. 13. 2004), but, as confirmed by the electronic image of an isotype at NY, it represents a species well characterized by its slender involucres and long-beaked achene. It can fairly safely be assigned to *Melanoseris*.

11. Melanoseris macrocephala (C. Shih) N. Kilian & J. W. Zhang, **comb. nov.**

大头毛鳞菊 da tou mao lin ju

Basionym: *Chaetoseris macrocephala* C. Shih, Acta Phytotax. Sin. 29: 404. 1991.

Herbs 50–100 cm tall, perennial. Stem solitary, erect, apically branched and glandular hairy. Lower and middle stem leaves with petiole 5–10 cm, narrowly winged; leaf blade ovate to ± broadly lanceolate, 10–14 × 5–6 cm, undivided or pinnatisect, abaxially sparsely glandular hairy, base ± truncate, margin dentate, apex acute to acuminate; lateral lobes (0 or)1 or 2 pairs, elliptic, apex obtuse to acute; terminal lobe ovate to broadly lanceolate, often hastate and comprising most of blade, apex acute to acuminate. Upper stem leaves with shorter petiole and smaller, otherwise similar to middle stem leaves; uppermost stem leaves sessile, lanceolate, base cuneate, apex acuminate. Synflorescence racemiform or paniculiform, with few to several capitula. Capitula with ca. 40 florets; peduncle 1–5 cm. Involucre broadly campanulate, 1.7–2.1 × ca. 1 cm. Phyllaries glandular hispid, apex acute; outer phyllaries triangular to lanceolate. Florets purplish red. Achene ca. 5 mm; body dark brown, ellipsoid, compressed, lateral ribs broadened, apex attenuate into a pale 1–2 mm beak. Pappus double, outer hairs 0.1–0.2 mm, bristles ca. 7 mm. Fl. and fr. Aug–Sep.

• Forest margins, thickets, grasslands; 2000–3500 m. Xizang (Nyalam).

12. Melanoseris atropurpurea (Franchet) N. Kilian & Z. H. Wang, **comb. nov.**

大花毛鳞菊 da hua mao lin ju

Basionym: *Lactuca atropurpurea* Franchet, J. Bot. (Morot) 9: 260. Jul 1895; *Chaetoseris dolichophylla* C. Shih; *C. grandi-*

flora C. Shih, nom. illeg. superfl.; *Cicerbita grandiflora* Beauverd, nom. illeg. superfl.; *L. grandiflora* Franchet, nom. illeg. superfl.; *L. pseudosonchus* H. Léveillé.

Herbs 50–100 cm tall, perennial. Root turniplike. Stems solitary or few, erect, apically branched and glandular hairy. Basal leaves elliptic and basally attenuate into a long narrow petiole-like portion, 20–30 × 10–15 cm, pinnatipartite to pinnatisect and often lyrately so, margin dentate; lateral lobes 3–5 pairs, elliptic to rhombic, gradually smaller toward leaf base, apex obtuse to acute; terminal lobe triangular, ± irregularly rhombic, elliptic, or lanceolate, much larger than lateral lobes, base hastate to rounded, apex acute to obtuse. Lower and middle stem leaves shortly petiolate to sessile and clasping, similar to basal leaves but smaller; lateral lobes 3–7 pairs. Upper stem leaves sessile, less divided and smaller. Synflorescence racemiform or paniculiform, with few to several capitula. Capitula nodding before anthesis, with usually 25–35 florets; peduncle (1–)2–6(–10) cm. Involucre dark purplish green, broadly campanulate, 1.7–2.1 × 1–1.5 cm. Phyllaries glabrous or rarely glandular hispid, apex acute; outer phyllaries triangular-ovate to lanceolate. Florets blue to bluish purple. Achene 6–7 mm; body dark brown, ellipsoid, compressed, lateral ribs broadened, apex tapering into a pale 1–2 mm thick beak. Pappus double, outer hairs 0.2–0.3 mm, bristles ca. 8 mm. Fl. and fr. Jul–Nov. $2n$ = 16*.

Forests, forest margins, thickets, alpine meadows; 2800–4000 m. Sichuan, Xizang, Yunnan [Myanmar].

Franchet published the name *"Lactuca atropurpurea"* twice in 1895, in July (J. Bot. (Morot) 9: 260) and in August (J. Bot. (Morot) 9: 294), the latter name for a species of *Dubyaea* and illegitimate as a later homonym but under to Art. 58.1 of the *Vienna Code* the epithet is available for use in the new name *D. atropurpurea* Stebbins. In October 1895 (J. Bot. (Morot) 9: 368), Franchet unfortunately renamed the legitimate earlier homonym to *L. grandiflora*, which is thus illegitimate, as are the combinations in *Chaetoseris* and *Cicerbita* based on it. *Chaetoseris dolichophylla* seems not actually distinct from *Melanoseris atropurpurea* and is here tentatively included in this species.

13. Melanoseris leiolepis (C. Shih) N. Kilian & J. W. Zhang, **comb. nov.**

光苞毛鳞菊 guang bao mao lin ju

Basionym: *Chaetoseris leiolepis* C. Shih, Acta Phytotax. Sin. 29: 402. 1991.

Herbs to 1 m tall, perennial. Stem solitary, erect, apically branched and glandular hairy. Lower and middle stem leaves narrowly elliptic and basally attenuate into winged ± clasping petiole-like portion, 10–14 × 2.5–4 cm, lyrately pinnatifid to lyrately pinnatipartite, sparsely glandular hairy, margin shallowly sinuate-dentate; lateral lobes 1 or 2 pairs, semiorbicular to elliptic, apex rounded to obtuse; terminal lobe narrowly ovate to lanceolate, 5–8 × 2.5–4 cm, margin ± sinuate, apex acute to acuminate. Upper stem leaves ± sessile, narrowly elliptic to linear-lanceolate, smaller, lyrately pinnatifid or not divided. Synflorescence racemiform or sparsely paniculiform, with few to several capitula. Capitula nodding, with usually 12–16 florets. Involucre campanulate, 1.7–2 × 0.7–1 cm. Phyllaries glabrous, apex acute to obtuse; outer phyllaries triangular-ovate to lanceolate. Florets purple. Achene 6–7 mm; body brown to dark brown, ellipsoid, compressed, lateral ribs broadened, apex tapering into a paler 1–2 mm beak. Pappus double, outer hairs 0.1–0.2 mm, bristles ca. 8 mm. Fl. and fr. Oct.

• Mountain slopes; ca. 2500 m. Yunnan (Jingdong).

14. Melanoseris likiangensis (Franchet) N. Kilian & Z. H. Wang, **comb. nov.**

丽江毛鳞菊 li jiang mao lin ju

Basionym: *Lactuca likiangensis* Franchet, J. Bot. (Morot) 9: 259. 1895; *Chaetoseris bonatii* (Beauverd) C. Shih; *C. likiangensis* (Franchet) C. Shih; *Cicerbita bonatii* Beauverd; *C. likiangensis* (Franchet) Beauverd; *L. bonatii* (Beauverd) H. Léveillé; *L. forrestii* W. W. Smith.

Herbs 40–60 cm tall, perennial. Rhizomes thick. Stem solitary, erect, apically branched and mostly densely glandular hairy. Basal and lower stem leaves narrowly ovate to narrowly elliptic and basally attenuate into a ± winged petiole-like portion, 12–25 × 3–10 cm, pinnatipartite to pinnatisect, margin ± coarsely sinuate-dentate; lateral lobes 3–7 pairs, lowermost small and triangular, others elliptic to suborbicular, apex acute to obtuse; terminal lobe triangular-ovate to lanceolate, distinctly larger than lateral lobes, apex acuminate to acute. Middle and upper stem leaves similar to lower leaves but smaller and sessile with an auriculately clasping base; uppermost leaves lanceolate to elliptic-lanceolate, less divided or undivided. Synflorescence paniculiform, with several to many capitula. Capitula drooping to nodding, with ca. 10 florets; peduncle wiry, 0.5–3 cm. Involucre cylindric, 1.3–1.8 × 0.4–0.6 cm. Phyllaries purplish green, glandular hispid; outer phyllaries triangular-ovate to lanceolate; inner phyllaries ca. 8. Florets blue to bluish purple. Achene 6–8 mm; body brownish red, narrowly ellipsoid, compressed, lateral ribs broadened, apex contracted into a paler ca. 2 mm beak. Pappus double, outer hairs 0.1–0.2 mm, bristles 6–8 mm. Fl. and fr. Aug–Oct. $2n$ = 16*.

• Forests, open boulder-strewn slopes, grasslands; 1900–3100 m. Yunnan.

According to the type material preserved at G, *Chaetoseris bonatii*, based on *Cicerbita bonatii*, is apparently conspecific.

15. Melanoseris pectiniformis (C. Shih) N. Kilian & J. W. Zhang, **comb. nov.**

栉齿毛鳞菊 zhi chi mao lin ju

Basionym: *Chaetoseris pectiniformis* C. Shih, Acta Phytotax. Sin. 29: 408. 1991.

Herbs ca. 90 cm tall, perennial. Stem purplish red below middle, branched from middle or apically and sparsely glandular hairy. Lower stem leaves narrowly elliptic and basally attenuate into a short petiole-like portion, pinnatipartite to subpinnatisect, margin dentate. Middle stem leaves to 10 × 1.5 cm, basally with an auriculately or sagittately clasping petiole-like portion; lateral lobes 5–7 pairs, opposite to obliquely opposite, lanceolate to elliptic, gradually smaller toward leaf base, rachis sometimes pectinate, apex acute to obtuse; terminal lobe lanceolate. Upper stem leaves narrowly elliptic, smaller, less divided, margin entire. Synflorescence racemiform, with few capit-

ula. Capitula with ca. 15 florets. Involucre cylindric, ca. 1.5 × 0.6 cm. Phyllaries glandular hispid, apex acute to obtuse; outer phyllaries lanceolate to linear-lanceolate. Florets purplish red. Achene ca. 6 mm; body dark brown, ellipsoid, compressed, lateral ribs broadened, apex attenuate into a 2–3 mm beak. Pappus double, outer hairs 0.1–0.2 mm, bristles ca. 7 mm. Fl. and fr. Aug.

● Forests in mountain valleys; ca. 3200 m. Xizang (Mainling).

16. Melanoseris tenuis (C. Shih) N. Kilian, **comb. nov.**

全叶细莴苣 quan ye xi wo ju

Basionym: *Stenoseris tenuis* C. Shih, Acta Phytotax. Sin. 29: 412. 1991.

Herbs 0.5–1.5 m tall, perennial. Stem solitary, erect, apically branched and glandular hairy. Lower and middle stem leaves with petiole 5–8 cm, basally slightly widened and not clasping; leaf blade triangular to triangular-ovate, 5–14 × 5–10 cm, undivided, glandular hairy, glabrescent, base somewhat cuneate to truncate, shallowly cordate, or shallowly hastate, margin mucronulate-dentate, apex acute to acuminate. Upper stem leaves similar to middle stem leaves but with shorter petiole and smaller; uppermost stem leaves sessile or subsessile. Synflorescence paniculiform, with usually numerous capitula and capillaceous branches. Capitula with 3 florets; peduncle capillaceous. Involucre green, narrowly cylindric, 11–13 × ca. 1.5 mm. Phyllaries glabrous; outer phyllaries ovate to lanceolate, longest ca. 3 × 1 mm, apex acute; inner phyllaries 3. Florets bluish purple. Achene ca. 5 mm; body brown, narrowly ellipsoid to obcolumnar, compressed, lateral ribs broadened, apex contracted into a thick ca. 1 mm beak. Pappus ± single, ca. 6 mm. Fl. and fr. Aug–Sep.

● Forest margins, forests, thickets; 2400–3100 m. S and SE Xizang (Bomi, Nyalam, Yadong), NW Yunnan.

17. Melanoseris triflora (C. C. Chang & C. Shih) N. Kilian, **comb. nov.**

栉齿细莴苣 zhi chi xi wo ju

Basionym: *Stenoseris triflora* C. C. Chang & C. Shih, Acta Phytotax. Sin. 29: 413. 1991.

Herbs to 1.2 m tall, perennial. Stem stout, apically branched and glandular hairy. Middle stem leaves with petiole 9–11 cm, pectinate, basally slightly widened; leaf blade lyrately pinnatisect with pectinate rachis, glandular hairy, glabrescent; lateral lobes 1 or 2 pairs, elliptic, ovate, or lanceolate, much smaller than terminal lobe, base rounded, margin coarsely mucronulate-dentate, apex acute to shortly acuminate; terminal lobe ovate to ovate-lanceolate, 9–11 × 7–9 cm, base truncate, shallowly cordate, or broadly cuneate, apex acuminate to acute. Upper stem leaves smaller, with shorter pectinate petiole, and 1 pair of lateral lobes, otherwise similar to middle stem leaves; uppermost leaves lanceolate, ± undivided, apex acuminate. Synflorescence paniculiform, with numerous capitula and capillaceous branches. Capitula with 3 florets; peduncle capillaceous. Involucre narrowly cylindric, 9–11 × 1–1.5 mm. Phyllaries glabrous; outer phyllaries ovate, longest ca. 1.5 × 0.5–1 mm, apex obtuse to acute; inner phyllaries 3. Florets purplish red. Achene ca. 4 mm; body pale brown, ellipsoid, compressed, lateral ribs broadened, apex constricted into a thick 0.5–1 mm beak. Pappus ± single, ca. 6 mm. Fl. and fr. Oct.

● Forest margins, forests; 2000–2800 m. Yunnan (Fugong, Lüchun).

18. Melanoseris graciliflora (Candolle) N. Kilian, **comb. nov.**

细莴苣 xi wo ju

Basionym: *Lactuca graciliflora* Candolle, Prodr. 7: 139. 1838; *Cicerbita taliensis* (Franchet) Beauverd; *L. taliensis* Franchet; *Stenoseris graciliflora* (Candolle) C. Shih; *S. taliensis* (Franchet) C. Shih.

Herbs 0.5–2.5 m tall, perennial. Root slenderly turniplike. Stem solitary, erect, apically branched and glabrous or sparsely glandular hairy. Lower and middle stem leaves with petiole 4–7 cm, basally slightly widened; leaf blade pinnatisect to lyrately pinnatisect, glandular hairy, margin shallowly mucronulate-dentate; lateral lobes 2 or 3 pairs but uppermost pair often incompletely separated from terminal lobe, opposite or alternate, sessile or shortly petiolulate, elliptic to lanceolate, 1.5–4.5 × 1–2 cm, base cuneate to truncate, apex acute to acuminate; terminal lobe triangular-ovate to lanceolate, 5.5–11 × 4–9 cm, base hastate, cordate, truncate, or cuneate, apex acute. Upper stem leaves shortly petiolate to subsessile, smaller, less or not divided, otherwise similar to middle stem leaves. Synflorescence paniculiform, with numerous capitula and capillaceous branches. Capitula with usually 3 or 4 florets; peduncle capillaceous. Involucre narrowly cylindric, 12–15 × ca. 1.5 mm. Phyllaries glabrous; outer phyllaries triangular-ovate to lanceolate, largest ca. 3 × 1 mm, apex acute; inner phyllaries 3. Florets bluish purple. Achene 6–7 mm; body brown, narrowly ellipsoid to obcolumnar, compressed, lateral ribs broadened, apex contracted into a thick 1–1.5 mm beak. Pappus ± single, 6–7 mm. Fl. and fr. Jun–Sep. $2n = 16$*.

Thickets, forest margins, grasslands; 2800–3500 m. Guizhou, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal].

19. Melanoseris leptantha (C. Shih) N. Kilian, **comb. nov.**

景东细莴苣 jing dong xi wo ju

Basionym: *Stenoseris leptantha* C. Shih, Acta Phytotax. Sin. 29: 414. 1991.

Herbs 50–70 cm tall, perennial. Stem solitary, erect, apically branched and sparsely glandular hairy. Lower and middle stem leaves with petiole 1–4 cm, basally slightly widened; leaf blade lyrately pinnatisect, glabrous, margin mucronulate-dentate; lateral lobes 1 pair, elliptic, ca. 2 × 1 cm, apex obtuse to rounded; terminal lobe elliptic to lanceolate, 5.5–10 × 3–4 cm, apex acuminate. Upper stem leaves petiolate or sessile, lanceolate to elliptic, 7–9 × ca. 1.5 cm, undivided, base cuneate, otherwise similar to middle stem leaves. Synflorescence paniculiform, with numerous capitula and capillaceous branches. Capitula with ca. 3 florets; peduncle capillaceous. Involucre narrowly cylindric, ca. 10 × 2 mm. Phyllaries purplish red, glabrous; outer phyllaries ovate, largest ca. 1 × 0.5 mm, apex obtuse; inner phyllaries 3. Florets bluish purple. Achene ca. 4 mm; body yellowish brown, narrowly ellipsoid to obcolumnar,

compressed, lateral ribs broadened, apex contracted into a thick ca. 1 mm beak. Pappus ± single, ca. 5 mm. Fl. and fr. Nov. $2n = 16$*.

• Moist areas on mountain slopes; 2500–3200 m. Sichuan (Muli), Yunnan (Jingdong).

Melanoseris leptantha appears rather similar to *Stenoseris triflora*, and its specific distinctness needs confirmation.

20. Melanoseris oligolepis (C. C. Chang ex C. Shih) N. Kilian, **comb. nov.**

大理毛鳞菊 da li mao lin ju

Basionym: *Cicerbita oligolepis* C. C. Chang ex C. Shih, Acta Phytotax. Sin. 29: 398. 1991.

Herbs 0.6–1.3 m tall, perennial. Stem solitary, erect, apically branched and ± brownish pilose, leafy. Lower and middle stem leaves with petiole to 6 cm, unwinged; leaf blade obovate to oblanceolate, pinnatisect, margin faintly sinuate-dentate; lateral lobes 1 or 2 pairs, narrowly elliptic, 2.5–4 × 1–1.5 cm, apex acute to acuminate; terminal lobe ovate to lanceolate, 4–10 × 2–4 cm, apex acute to acuminate. Synflorescence narrowly paniculiform, with numerous capitula and capillaceous branches. Capitula with 4 florets; peduncle capillaceous. Involucre narrowly cylindric, 9–11 × ca. 2 mm. Phyllaries glabrous; outer phyllaries triangular-ovate to lanceolate, longest ca. 2 mm; inner phyllaries 4. Florets blue. Achene brown, narrowly ellipsoid, 4–5 mm, compressed, lateral ribs broadened, apex truncate. Pappus double, outer hairs to 0.1 mm, bristles ca. 7 mm. Fl. and fr. Aug.

• Forests on mountain slopes; 2100–3000 m. Yunnan (Dali).

Originally placed in *Cicerbita*, *Melanoseris oligolepis* is morphologically near and apparently closely related to the preceding four species.

21. Melanoseris lessertiana (Candolle) Decaisne in Jacquemont, Voy. Inde 4(Bot.): 102. 1843.

黑苞毛鳞菊 hei bao mao lin ju

Mulgedium lessertianum Candolle, Prodr. 7: 251. 1838; *Cicerbita lessertiana* (Candolle) Mamgain & R. R. Rao; *C. lessertiana* subsp. *lyrata* (Decaisne) Mamgain & R. R. Rao; *Lactuca lessertiana* (Candolle) C. B. Clarke; ?*L. monocephala* C. C. Chang; *Melanoseris lyrata* Decaisne; ?*Mulgedium monocephalum* (C. C. Chang) C. Shih; ?*M. qinghaicum* S. W. Liu & T. N. Ho.

Herbs 5–30[–40] cm tall, perennial. Root slenderly turniplike. Stems usually several, weak, sparsely branched, glabrous to apically reddish villous, rarely with a solitary dominant stem branched from base. Basal and lower stem leaves elliptic to oblanceolate, 6–9[–15] × 1–2[–3.5] cm, undivided to lyrately pinnatisect, base cuneate to petiole-like, margin entire to shallowly sinuate-dentate, apex acute to shortly acuminate; lateral lobes 2 or 3 pairs, ovate, triangular-ovate, or ± elliptic; terminal lobe ovate to triangular-ovate. Middle and upper stem leaves smaller and narrower, less or not divided, basally less attenuate; uppermost leaves linear to linear-lanceolate. Synflorescence racemiform, with 1 to several capitula. Capitula with usually 12–24 florets; peduncle mostly 1–2 cm. Involucre campanulate, 1–1.3 cm at anthesis, to 1.8 × 0.7–1 cm in fruit. Phyllaries acute at apex; outer phyllaries lanceolate, abaxially ± villous; inner phyllaries 8. Florets purplish red to bluish. Achene 6–8(–10) mm; body dark to blackish brown, ellipsoid, compressed, lateral ribs broadened, apex contracted into a concolorous to pale 2–3(–5) mm slender beak. Pappus single, 6–8 mm. Fl. and fr. Aug–Sep. $2n = 16$.

Grasslands on mountain slopes; 2700–4500 m. ?Qinghai, Xizang, NW Yunnan [Bhutan, N India, Kashmir, Nepal, Pakistan].

Melanoseris lessertiana shows considerable variation in habit, leaf shape, and achene beak length over its distribution area, which is worth closer investigation. The single-headed *Lactuca monocephala* has tentatively been included, considering it a depauperate form, because otherwise the type image matches *M. lessertiana*. The type material of *Mulgedium qinghaicum* has not been available for loan, but from the description and figure it appears likely conspecific and has also tentatively been included.

22. Melanoseris macrorhiza (Royle) N. Kilian, **comb. nov.**

头嘴菊 tou zui ju

Basionym: *Mulgedium macrorhizum* Royle, Ill. Bot. Himal. Mts. 251, t. 61, f. 1. 1835; *Cephalorrhynchus albiflorus* C. Shih; *C. macrorhizus* (Royle) Tuisl; *C. saxatilis* (Edgeworth) C. Shih; *Cicerbita duthieana* Beauverd; *C. laevigata* (Candolle) Beauverd; *C. macrorhiza* (Royle) Beauverd; *C. macrorhiza* var. *saxatilis* (Edgeworth) Beauverd; *Lactuca hoffmeisteri* Klotzsch; *L. laevigata* (Blume) Candolle var. *saxatilis* (Edgeworth) C. B. Clarke; *L. macrorhiza* (Royle) J. D. Hooker; *Melanoseris saxatilis* Edgeworth; *Mulgedium laevigatum* Candolle.

Herbs 20–50 cm tall, perennial. Taproot slenderly turniplike. Stems solitary or few, slender, ascending-erect to erect, branched from base or higher up, glabrous [or purplish brown pilose], leafy. Lower and middle stem leaves with petiole of lower ones not basally expanded and middle ones expanded and auriculate; leaf blade elliptic to spatulate, 6–14.5[–20] × 1–4.5 cm, lyrately pinnatifid to lyrately pinnatisect, rachis glabrous [or ± hispid with purplish brown hairs], margin entire; lateral lobes 2–4(–6) pairs, orbicular to elliptic, apex obtuse to rounded; terminal lobe largest, ovate-cordate, reniform, or elliptic, apex rounded to acute. Upper stem leaves similar to middle stem leaves but smaller; uppermost leaves lanceolate to broadly linear, undivided. Synflorescence loosely to paniculately corymbiform, with usually to 8–10 capitula and slender branches. Capitula with usually 10–15 florets; peduncle capillaceous. Involucre cylindric to narrowly campanulate, (1–)1.2–1.5 × 0.4–0.5 cm. Phyllaries dark purplish green, glabrous; outer phyllaries triangular-ovate to lanceolate, longest ca. 1/2 as long as inner ones; inner phyllaries 8. Florets purple, bluish purple, or rarely white. Achene 4–5 mm; body dark brown, narrowly ellipsoid, subcompressed, lateral ribs weakly broadened, apex attenuate into pale 1–3 mm stout beak. Pappus double, outer row of hairs 0.1–0.2 mm, bristles 6–7 mm. Fl. and fr. Jul–Oct. $2n = 16$.

Mountain valleys, forests, thickets, grasslands; 2700–4000 m. Xizang, Yunnan [Afghanistan, Bhutan, N India, Kashmir, Myanmar, Nepal, Pakistan; SW Asia].

Whereas, according to the molecular phylogenetic analysis by N. Kilian et al. (in prep.), *Cephalorrhynchus* in the sense of its type (*C.*

glandulosus Boissier) is a congener of *Cicerbita*, *Melanoseris macrorhiza*, previously treated as a member of *Cephalorrhynchus* (e.g., FRPS 80(1): 291. 1997), clearly belongs to *Melanoseris*. The white-flowered *C. albiflorus* is considered as a mere albino form of this species, as is known also occasionally in other species, and therefore treated as conspecific.

23. Melanoseris violifolia (Decaisne) N. Kilian, **comb. nov.**

西藏毛鳞菊 xi zang mao lin ju

Basionym: *Prenanthes violifolia* Decaisne in Jacquemont, Voy. Inde 4(Bot.): 100. 1843 [*"violaefolia"*]; *Cicerbita sikkimensis* (J. D. Hooker) C. Shih; *C. violifolia* (Decaisne) Beauverd; *Lactuca hookeri* (C. B. Clarke ex J. D. Hooker) Stebbins; *L. sikkimensis* (J. D. Hooker) Stebbins; *P. alata* J. D. Hooker & Thomson ex C. B. Clarke (1876), not (Hooker) D. Dietrich (1847); *P. hookeri* C. B. Clarke ex J. D. Hooker; *P. sikkimensis* J. D. Hooker.

Herbs 50–70 cm tall, perennial. Stem solitary, erect, branched apically, glabrous or sparsely strigose. Basal, lower, and middle stem leaves with petiole 5–6 cm, slender, ± broadly winged toward base; leaf blade undivided or lyrately pinnatisect, margin sparsely sinuate-dentate to subentire; lateral lobes if present 1 pair, sessile or with a 7–8 mm winged petiolule, lanceolate to elliptic, to 2 × 1 cm; terminal lobe broadly triangular to triangular-ovate, 3–8 × 3–7 cm, base hastate, cordate, sagittate, or truncate, apex obtuse to rounded. Upper stem leaves similar to middle stem leaves or with much shorter winged basally narrow to clasping petiole and smaller blade with a basally cuneate terminal lobe. Synflorescence paniculiform, with several to 30 capitula and slender branches. Capitula with 4–6 florets; peduncle capillaceous. Involucre narrowly cylindric, 1.2–1.4 × ca. 0.3 cm. Phyllaries glabrous, apex acute to obtuse; outer phyllaries lanceolate, longest 4–5 mm; inner phyllaries 5(or 6). Florets bluish to reddish purple. Achene dark brown, narrowly ellipsoid, 6–7 mm, subcompressed, lateral ribs weakly broadened, apex truncate. Pappus double, outer hairs ca. 0.1 mm, bristles 6–8 mm. Fl. and fr. Jun–Aug.

Forests, forest margins, meadows; 3000–3700 m. Xizang [Bhutan, N India, Kashmir, Nepal].

Melanoseris violifolia, formerly treated as a member of *Cicerbita* (e.g., FRPS 80(1): 223. 1997, under *C. sikkimensis*) is, as inferred from morphology, closely related to *M. macrorhiza* and can therefore safely be considered as a member of *Melanoseris* too.

24. Melanoseris bracteata (J. D. Hooker & Thomson ex C. B. Clarke) N. Kilian, **comb. nov.**

苞叶毛鳞菊 bao ye mao lin ju

Basionym: *Lactuca bracteata* J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 270. 1876; *Mulgedium bracteatum* (J. D. Hooker & Thomson ex C. B. Clarke) C. Shih.

Herbs, perennial. Root slender. Stem solitary, 20–120 cm, erect, branched apically, strongly glandular hairy to glandular hispid. Basal and lower stem leaves ovate, elliptic-ovate, or oblanceolate, 3–6[–11] × 1–2.5[–4] cm, glandular hairy, base attenuate and auriculately clasping, margin sinuate-dentate, apex acute. Middle and upper stem leaves smaller, oblanceolate to lanceolate, apex acuminate, otherwise similar to lower leaves. Leaves in synflorescence usually purplish red when dry, lanceolate, base ± semiamplexicaul, margin entire, apex acuminate. Synflorescence racemiform or sparsely paniculiform, leafy, with several to 20 capitula. Capitula nodding at anthesis, with usually 20–30 florets; peduncle with lanceolate bracts to 1.5 cm. Involucre campanulate, 1.2–1.4 cm at anthesis, to 1.9 × 1 cm in fruit. Phyllaries purplish red when dry, abaxially glabrous, apex obtuse to acute; outer phyllaries lanceolate, not much shorter than inner phyllaries. Florets pale blue to mauve. Achene 5–9 mm; body grayish brown, fusiform, compressed, lateral ribs weakly broadened, apex attenuate into a slender beak 1/3–1/2 as long as achene body. Pappus indistinctly double, 7–8 mm. Fl. and fr. Sep. $2n = 16$.

Forests; 800–3000 m. Xizang [Bhutan, NE and NW India, Nepal].

25. Melanoseris souliei (Franchet) N. Kilian, **comb. nov.**

康滇毛鳞菊 kang dian mao lin ju

Basionym: *Lactuca souliei* Franchet, J. Bot. (Morot) 9: 257. 1895; *Syncalathium orbiculariforme* C. Shih; *S. souliei* (Franchet) Y. Ling.

Herbs 2–5 cm tall, perennial, rosulate, ± acaulescent, with a taproot. Rosette shoot terminally hollow, inflated to secondary capitulum. Leaves with petiole 1–5 cm, basally widened; leaf blade of outer leaves undivided, broadly triangular, triangular-ovate, orbicular, or obovate, 0.5–2 × 0.5–1.5 cm; leaf blade of more inner leaves 1.5–7 × 1–2.5 cm, lyrately pinnatipartite to pinnatisect, margin sinuate-dentate or entire; lateral lobes 1–3 pairs, elliptic, semiorbicular, triangular, or suborbicular; terminal lobe elliptic, ovate, suborbicular, or triangular-ovate, 1–3 × 0.8–2.5 cm, base cordate to truncate, apex rounded to acute. Secondary capitulum (1–)2–7 cm in diam., with few to many sessile densely congested capitula with 1 elliptic subtending leaf. Capitula with 4–6 florets. Involucre narrowly cylindric, 1–1.4 × 0.4–0.5 cm. Phyllaries 5, in 1 row, equal, lanceolate, connate for basal 1/3–1/2. Florets purplish red to blue. Achene ca. 4 mm; body dark to blackish brown, obovoid, compressed, with winglike lateral ribs and 1 slender rib on either side, apex constricted into a ca. 0.5 mm fragile thin beak. Pappus single, ca. 8 mm, caducous with pappus disk. Fl. and fr. Aug. $2n = 16$*.

Alpine meadows, scree slopes, stony areas, marshes, forest margins; 2300–4300 m. Sichuan, Xizang, Yunnan [?Bhutan, Myanmar].

Recent works, corroborating the observation by Stebbins (Mem. Torrey Bot. Club 19(3): 47–50. 1940) on the peculiarity of *Melanoseris souliei* inferred from achene morphology, have shown that *M. souliei* is misplaced in *Syncalathium* and the Crepidinae (J. W. Zhang et al., Bot. J. Linn. Soc. 154: 79–87. 2007; N. Kilian et al. in V. A. Funk et al., Syst. Evol. Biogeogr. Compositae, 348–350. 2009; J. W. Zhang et al., Taxon 60: 15–26. 2011) and the striking overall similarity to the species of that genus purely a result of convergent evolution in response to the environmental changes following the uplift of the Qinghai-Xizang Plateau. The inclusion of *Syncalathium orbiculariforme* by X. Zhuang (Fl. Yunnan. 13: 764. 2004) has been supported also by molecular studies (J. W. Zhang et al., loc. cit. 2011). The molecular phylogenetic analysis of subtribe Lactucinae (N. Kilian et al., in prep.) reveals the species to be nested in the *Melanoseris* clade. It is here therefore tentatively assigned to *Melanoseris*, admitting that this is debatable in the light of its peculiar morphology and the still not settled circumscription of the genus.

Lactuca scandens C. C. Chang, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 9: 133. 1934.

攀援岩参 pan yuan yan shen

Herbs, perennial. Stem semiscandent, pale purplish red, with reddish bristles. Basal leaves unknown. Lower and middle stem leaves with red bristles and with slender basally ± widened, ± winged petiole to ca. 9 cm; leaf blade suborbicular or subreniform, 4.5–5.5 × 4.5–7.5 cm, base cordate, margin faintly denticulate, apex acuminate. Uppermost stem leaves sessile or with short, winged, clasping petiole and ovate to narrowly elliptic-ovate blade, otherwise similar to middle stem leaves. Synflorescence racemiform, branches 1–1.5 cm with 2 or 3 capitula. Capitula with 4 or 5 florets. Involucre narrowly cylindric, ca. 1.2 cm. Phyllaries blackish green, reddish setose; outer phyllaries inconspicuous; inner phyllaries 4 or 5, apex subacute. Florets yellow. Achene not seen when mature. Pappus white, ca. 6.5 mm.

• Chongqing (Baxian).

No material has been available of *Lactuca scandens*, based on and only known from the collection *T. T. Yü 1702* made in October 1932 in the "vicinity of Pa-hsien" (deposited in the herbarium of the Science Society of China at Nanking). C. C. Chang compared it with, and considered it to be related to, the insufficiently known *L. hirsuta* Franchet, placed here in *Melanoseris* not without doubt (see above). *Lactuca scandens* is diagnosed rather clearly, and in its combination of characters it resembles only few known species of Cichorieae in China (even if the presumed scandent habit is ignored) but matches none in a way that conspecificity could be proposed with sufficient confidence. A safe generic assignment, however, is not possible from the original description; thus, its treatment under *Melanoseris* is very tentative and a formal transfer not justified.

59. PARAPRENANTHES C. C. Chang ex C. Shih, Acta Phytotax. Sin. 26: 418. 1988.

假福王草属 jia fu wang cao shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, perennial or more rarely annual. Stem usually solitary, erect, branched apically, glabrous or glandular hairy, leafy or rarely ± leafless. Leaves pinnately lobed or more rarely undivided. Synflorescence with capillaceous branches. Capitula often pendent at anthesis, with 4–15 florets; peduncle capillaceous. Involucre narrowly cylindric. Phyllaries usually green and tinged pale purplish red, glabrous; outer phyllaries few, gradually longer centripetally, mostly much shorter than inner phyllaries; inner phyllaries usually 5 or 8, ± equal in length, ± linear-lanceolate to linear. Receptacle naked. Florets pale reddish or purple. Achene body dark to blackish brown, fusiform, weakly compressed, with 5 main ribs (2 lateral, 1 median ventrally, and 2 median dorsally) and 2 rather similar secondary ribs in between, apically attenuate and pale but without or rarely with a short beak. Pappus white, single, of slender scabrid bristles.

Twelve species: E and SE Asia; 12 species (11 endemic) in China.

1a. Involucre with 5(or 6) inner phyllaries.
  2a. Stem leafless or with a single or very few leaves; leaves mostly undivided or more rarely with 1 pair of very small ovate lateral lobes ..... 6. *P. umbrosa*
  2b. Stem leafy throughout; leaves with 1–7 pairs of lateral lobes or more rarely undivided.
    3a. Lower and middle stem leaves pinnatisect to subpinnatisect, with 4–7 pairs of ± narrowly elliptic lateral lobes, rachis for most part not or narrowly winged ..... 10. *P. dolichophylla*
    3b. Lower and middle stem leaves lyrately pinnatifid to pinnatisect, with 1–4 pairs of elliptic to triangular lobes or more rarely undivided, rachis for most part at least broadly winged.
      4a. Stem leaves with mostly a slender cuneately winged petiole and undivided blade or blade lyrately pinnatipartite to lyrately pinnatisect with 1 or 2(or 3) pairs of lobes ..... 8. *P. diversifolia*
      4b. Stem leaves with an unwinged petiole and lyrately pinnatifid to lyrately pinnatipartite blade with 3 or 4 pairs of lobes ..... 9. *P. heptantha*
1b. Involucre with ca. 8 inner phyllaries.
  5a. Middle and upper stem leaves auriculately to sagittately clasping stem.
    6a. Leaves sagittately clasping stem; outer phyllaries longest 5–8 mm ..... 2. *P. yunnanensis*
    6b. Leaves auriculately clasping stem; outer phyllaries longest 4–5 mm ..... 3. *P. auriculiformis*
  5b. Stem leaves not clasping stem and except for uppermost ± petiolate.
    7a. Stem leaves all palmately 3-lobed or palmately 3-cleft ..... 11. *P. multiformis*
    7b. Stem leaves undivided or pinnately lobed with 1–8 pairs of lateral lobes.
      8a. Middle stem leaves sessile, 3-parted, with to 20 cm linear terminal lobe and 1 pair of very small broadly linear-lanceolate lateral lobes at its base ..... 12. *P. longiloba*
      8b. Middle stem leaves petiolate, undivided or pinnately divided with (1 or)2–5 pairs of lateral lobes.
        9a. Middle stem leaves lyrately pinnate, pinnatifid, or pinnatisect with broader lateral or terminal lobes or rarely undivided.
          10a. Leaves adaxially glaucous, margin shallowly and distantly dentate; synflorescence corymbiform; achene ca. 5 mm, attenuate into a pale stout ca. 1 mm beak ..... 1. *P. polypodiifolia*

10b. Leaves adaxially green, margin usually strongly dentate; synflorescence narrowly paniculiform; achene 4–5 mm, attenuate into a pale ca. 1 mm beaklike apex ..... 7. *P. sororia*

9b. Middle stem leaves pinnatisect with conspicuously narrow and longish (most of them linear or linear-lanceolate) lateral and terminal lobes.

11a. Basal leaves undivided but other leaves pinnatisect with 1–3(or 4) pairs of lateral lobes ..... 4. *P. prenanthoides*

11b. All but uppermost leaves pinnatisect, with 2–8 pairs of lateral lobes ..... 5. *P. glandulosissima*

1. Paraprenanthes polypodiifolia (Franchet) C. C. Chang ex C. Shih, Fl. Reipubl. Popularis Sin. 80(1): 181. 1997.

蕨叶假福王草 jue ye jia fu wang cao

Lactuca polypodiifolia Franchet, J. Bot. (Morot) 9: 265. 1895; *Mulgedium meridionale* C. Shih; *M. polypodiifolium* (Franchet) C. Shih; *Paraprenanthes meridionalis* (C. Shih) Sennikov.

Herbs 50–110 cm tall, perennial. Stem apically densely glandular hairy. Leaves glaucous, glabrous, all with unwinged or weakly winged petiole, margin of leaf blade shallowly and distantly mucronulately dentate. Basal leaves, lower stem leaves, and middle stem leaves with petiole 9–12 cm; leaf blade lyrately pinnatifid to pinnatisect, margin sinuate; lateral lobes 1 or 2(–4) pairs, elliptic-rhombic, ovate, or triangular-ovate, much smaller than terminal lobe, apex obtuse to acute; terminal lobe triangular-ovate to lanceolate, 5–8 × 3.5–6 cm, base cordate, truncate, or cuneate, apex acute to shortly acuminate. Upper stem leaves smaller, with a shorter petiole; leaf blade similar to middle stem leaves or undivided and ovate to broadly lanceolate. Synflorescence corymbiform, with some to many capitula on somewhat divaricating branchlets. Capitula with usually 10–15 florets. Involucre 9–11 × ca. 3 mm. Outer phyllaries triangular-ovate to linear-lanceolate, longest ca. 3 × 1 mm, apex acute; inner phyllaries 8, apex ± obtuse. Florets purplish red or rarely white. Achene ca. 5 mm, apically attenuate into a stout ca. 1 mm beak. Pappus ca. 6 mm. Fl. and fr. May–Jun.

• Trailsides on mountain slopes, forests in mountain valleys; 800–2000 m. Guangxi, Sichuan, Yunnan.

2. Paraprenanthes yunnanensis (Franchet) C. Shih, Acta Phytotax. Sin. 26: 421. 1988.

云南假福王草 yun nan jia fu wang cao

Lactuca yunnanensis Franchet, J. Bot. (Morot) 9: 264. 1895; *Paraprenanthes sagittiformis* C. Shih.

Herbs 0.6–1.5 m tall, perennial. Stem glabrous. Basal and lower leaves with petiole ca. 15 cm, winged; leaf blade to 30 × 15 cm, undivided and triangular-ovate with a cordate or truncate to cuneate base or pinnatisect with an additional 1 or 2 pairs of small lateral lobes; lateral lobes when present rhombic, triangular-ovate, or lanceolate, recurved, apex acute. Middle stem leaves with a short winged sagittately clasping petiole or sessile; leaf blade elliptic to oblanceolate, pinnatipartite to pinnatisect, glabrous to weakly glandular hairy, base sagittately clasping if sessile, margin ± sinuate and mucronulately dentate; lateral lobes 1–3(–5) pairs, 2–7 × 0.5–2(–4) cm; terminal lobe to 13 × 4 cm, otherwise like lower leaves. Upper stem leaves sessile, smaller, lanceolate, mostly not divided, base sagittately clasping; uppermost leaves linear-lanceolate, base not clasping, margin entire. Synflorescence paniculiform, with many capitula. Capitula with usually 10–15 florets. Involucre 10–13 × 3–4 mm. Outer phyllaries triangular to linear-lanceolate, largest 5–8 × ca. 1 mm, apex acute; inner phyllaries ± 8, apex obtuse to acute. Florets pale purple. Achene ca. 4 mm, attenuate into an almost beaked apex. Pappus 6–7 mm. Fl. and fr. Jul–Aug.

• River valleys, forests; 1500–2700 m. Yunnan.

The leaf shape of *Paraprenanthes yunnanensis* shows considerable variation even within a population, and we follow X. Zhuang (Fl. Yunnan. 13: 741. 2004) in considering *P. sagittiformis* as conspecific with *P. yunnanensis*. *Lactuca parishii* Craib from Myanmar and Thailand is very close to this species and may perhaps be conspecific.

3. Paraprenanthes auriculiformis C. Shih, Acta Phytotax. Sin. 26: 421. 1988.

圆耳假福王草 yuan er jia fu wang cao

Herbs, annual. Stem glabrous. Basal leaves unknown. Lower and middle stem leaves sessile, lanceolate, 10–14 × 3.5–6 cm, pinnatipartite, glabrous, base auriculately clasping, margin weakly sinuate and mucronulately dentate; lateral lobes 2 or 3 pairs, elliptic to narrowly triangular, apex rounded and mucronulate to acute; terminal lobe lanceolate to narrowly triangular, apex acute to acuminate. Upper stem leaves lanceolate, triangular, or narrowly elliptic, undivided, margin inconspicuously dentate or entire, apex acuminate. Synflorescence paniculiform, with some to many capitula. Capitula with usually 10 florets. Involucre 9–11 × ca. 3 mm. Outer phyllaries triangular-ovate to lanceolate, largest 4–5 × ca. 1 mm, apex acute; inner phyllaries ± 8, apex ± obtuse. Florets purple. Achene 3–4 mm, attenuate into a stout ca. 1 mm beaklike apex. Pappus 7–8 mm. Fl. and fr. Jul.

• Grasslands on mountain slopes; ca. 1900 m. Yunnan (Menghai).

Paraprenanthes auriculiformis is a little-known species in need of further studies with affinity to *P. yunnanensis*.

4. Paraprenanthes prenanthoides (Hemsley) C. Shih, Acta Phytotax. Sin. 26: 423. 1988.

异叶假福王草 yi ye jia fu wang cao

Crepis prenanthoides Hemsley, J. Linn. Soc., Bot. 23: 477. 1888; *Lactuca chungkingensis* Stebbins.

Herbs 30–130 cm tall, perennial. Stem apically densely glandular hairy. Basal leaves often present at anthesis; petiole 6–10 cm, unwinged; leaf blade triangular-ovate to broadly lanceolate, 3–11 × 3–7 cm, glabrous, base conspicuously cordate to hastate, margin sinuate and mucronulate-dentate, apex acute to shortly acuminate. Lower and middle stem leaves with a shorter petiole; leaf blade to 17 cm, pinnatisect, margin entire to very shallowly mucronulate-dentate, base cuneate; lateral lobes

1–3(or 4) pairs, opposite or alternate, rhombic-elliptic, lanceolate, or linear and sometimes falcate, to 8 cm, apex acute; terminal lobe narrowly elliptic, broadly lanceolate, or linear-lanceolate, to 13 cm, apex acute to acuminate. Upper stem leaves sessile, smaller, pinnatisect, lobes ± linear-lanceolate. Synflorescence paniculiform, with some to many capitula. Capitula with usually 12–15 florets. Involucre 9–11 × ca. 3 mm. Phyllaries with an obtuse to acute apex; outer phyllaries triangular-ovate to lanceolate, largest ca. 3 × 0.6–0.8 mm; inner phyllaries (7 or)8. Florets purplish red. Achene ca. 4 mm, attenuate into a stout ca. 1 mm beaklike apex. Pappus 5–6 mm. Fl. and fr. Apr–May.

• Forests; 500–1200 m. Guangxi, Guizhou, Sichuan.

5. Paraprenanthes glandulosissima (C. C. Chang) C. Shih, Fl. Reipubl. Popularis Sin. 80(1): 182. 1997.

密毛假福王草 mi mao jia fu wang cao

Lactuca glandulosissima C. C. Chang, Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 9: 130. 1934.

Herbs 40–100 cm tall, annual. Stem apically densely glandular hairy. Basal leaves, lower stem leaves, and middle stem leaves with petiole 3–7 cm, unwinged, basally not or scarcely widened; leaf blade pinnatisect, ± glabrous, margin very shallowly mucronulate-dentate or entire; lateral lobes 2–8 pairs, opposite to obliquely opposite; basal lateral lobes rhombic to elliptic, 5–20 × 4–10 mm; other lateral lobes linear-elliptic to linear-lanceolate, 2.5–6 × 0.5–2 cm, apex acute to acuminate; terminal lobe linear-elliptic to linear-lanceolate, 6–10 × 0.3–1.5 cm, apex acute to acuminate. Upper stem leaves shortly petiolate or sessile, similar to middle stem leaves or 3-parted; uppermost stem leaves linear-elliptic, undivided. Synflorescence paniculiform to corymbosely so, with many capitula. Capitula with usually 10–15 florets. Involucre 9–11 × ca. 3 mm. Outer phyllaries triangular to lanceolate, largest ca. 3 × 0.3–0.5 mm, apex acute; inner phyllaries 8, apex ± obtuse. Florets bluish purple. Achene ca. 4 mm, attenuate into a ca. 1 mm beaklike apex. Pappus 5–6 mm. Fl. and fr. Apr–May.

• Forests, forest margins; 500–2300 m. Sichuan, Yunnan.

Paraprenanthes glandulosissima appears closely allied to *P. prenanthoides*, and its specific distinctness should be critically assessed by further studies.

6. Paraprenanthes umbrosa (Dunn) Sennikov, Bot. Zhurn. 82(5): 111. 1997.

伞房假福王草 san fang jia fu wang cao

Lactuca umbrosa Dunn, J. Linn. Soc., Bot. 35: 513. 1903; *Mulgedium umbrosum* (Dunn) C. Shih.

Herbs 40–140 cm tall, annual. Stem glabrous, leafless, with a single leaf, or with very few leaves. Basal leaves with petiole 4–17 cm, unwinged; leaf blade mostly triangular to triangular-ovate, 6–13 × 5–10 cm, undivided, base cordate, hastate, or sagittate, margin entire or sinuate and remotely unequally mucronulately dentate; leaf blade more rarely lyrately pinnatisect with 1 pair of small ovate lateral lobes. Stem leaves if any triangular-hastate, undivided, otherwise like basal leaves. Synflorescence corymbiform to corymbosely paniculiform, with few to many capitula. Capitula with usually 6–10 florets. Involucres cylindric, 10–13 × 2–3 mm. Phyllaries glabrous, apex acute; outer phyllaries triangular-ovate to lanceolate, largest 5–7 × 1–2 mm; inner phyllaries 5(or 6). Florets purplish red. Achene ca. 6 mm, contracted into a ca. 1 mm beak. Pappus 6–7 mm. Fl. and fr. Oct.

• River valleys; ca. 1200 m. Yunnan.

Paraprenanthes umbrosa has previously been placed in *Mulgedium* (e.g., FRPS 80(1): 72. 1997). Its reclassification by Sennikov is convincing and is followed here.

7. Paraprenanthes sororia (Miquel) C. Shih, Acta Phytotax. Sin. 26: 422. 1988.

假福王草 jia fu wang cao

Lactuca sororia Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 189. 1866; *L. sororia* f. *glabra* Y. Ling; *L. sororia* var. *glabra* Kitamura; *L. sororia* var. *glandulosa* Kitamura; *L. sororia* var. *nudipes* (Migo) Kitamura; *L. sororia* var. *pilipes* (Migo) Kitamura; *L. thirionnii* H. Léveillé; *Mycelis sororia* (Miquel) Nakai; *M. sororia* var. *nudipes* Migo; *M. sororia* var. *pilipes* Migo; *Paraprenanthes hastata* C. Shih; *P. luchunensis* C. Shih; *P. pilipes* (Migo) C. Shih; *P. thirionnii* (H. Léveillé) C. Shih.

Herbs 0.5–1.5[–1.8] m tall, perennial. Stem glabrous or more rarely glandular hairy. Basal leaves withered at anthesis. Lower and middle stem leaves with petiole 3–7 cm, unwinged; leaf blade undivided and triangular-ovate to lanceolate or ± lyrately pinnatifid to ± lyrately pinnatisect, glabrous, base cordate, truncate, or cuneate, margin ± sinuate and mucronulately dentate; lateral lobes 1 or 2(or 3) pairs, sometimes alternate or unpaired, ovate to irregularly rhombic, 1–11 × 1–7 cm, smaller toward leaf base, apex rounded to acute; terminal lobe broadly triangular to broadly lanceolate, 5.5–15 × 5.5–15 cm, base hastate, cordate, truncate, or cuneate, margin often coarsely sinuate, apex acute. Upper stem leaves sessile or with a shorter winged petiole, smaller, less or not divided. Synflorescence narrowly paniculiform, with many capitula. Capitula with usually 10–15 florets. Involucre 9–11 × ca. 3 mm. Outer phyllaries ovate to lanceolate, longest ca. 4 × 1 mm, apex acute; inner phyllaries ± 8, apex obtuse to rounded. Florets purplish. Achene 4–5 mm, attenuate into a ca. 1 mm beaklike apex. Pappus 7–8 mm. Fl. and fr. May–Aug. $2n = 18$*.

Mountain slopes, thickets in mountain valleys, forests; 200–3200 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, ?Guizhou, ?Hainan, Hubei, Hunan, ?Jiangsu, Jiangxi, Sichuan, Taiwan, ?Xizang, Yunnan, Zhejiang [Japan, Vietnam].

Paraprenanthes sororia is the most widespread species of the genus and one of the two species distributed also outside China. Its circumscription and delimitation differ in the literature. *Paraprenanthes pilipes* and *P. sylvicola* have been considered either as specifically distinct or as conspecific, and *Lactuca diversifolia* (here treated as *P. diversifolia*) has been treated as a separate species and, more recently, as conspecific. This last species, however, clearly differs and is readily distinguished from *P. sororia* by its smaller capitula with only 5 inner phyllaries and 4–6 florets and by its endemic status in China. In contrast, *P. sylvicola* as treated in FRPS (80(1): 172. 1997), delimited by undivided leaves and glabrous upper stem portion, actually comprises

plants (or specimens) with undivided leaves of both *P. sororia* and *P. diversifolia*. The type of the name *P. sylvicola* represents *P. diversifolia*. Glandular hairy plants, which occur throughout the distribution range of *P. sororia*, were formally described as a variety (*Mycelis sororia* var. *pilipes*) from Japan and later upvalued to species rank as *P. pilipes*. However, the co-occurrence of entirely glabrous and apically glandular hairy plants is also known from other species in subtribe Lactucinae and is of no taxonomic value. *Paraprenanthes pilipes* is therefore treated as synonymous with *P. sororia*. *Paraprenanthes hastata*, with conspicuous undivided lanceolate to lanceolate-hastate middle stem leaves and glandular hairy upper stem portion, which is only known from the incomplete type material collected in Chongqing on Jinyun Shan, is here considered merely as a depauperate form of *P. sororia*. *Paraprenanthes luchunensis*, finally, combines two different elements, and we follow X. Zhuang (Fl. Yunnan. 13: 741. 2004) who included that name in the sense of its type in *P. sororia*; other collections cited in the protologue represent *P. polypodiifolia*.

8. Paraprenanthes diversifolia (Vaniot) N. Kilian, **comb. nov.**

林生假福王草 lin sheng jia fu wang cao

Basionym: *Lactuca diversifolia* Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 245. 1903; *Paraprenanthes gracilipes* C. Shih; *P. sylvicola* C. Shih; *Prenanthes diversifolia* (Vaniot) C. C. Chang (1934), not Ledebour ex Sprengel (1826).

Herbs 0.5–1.5 m tall, annual. Stem glabrous or apically glandular hairy. Lower stem leaves with petiole 4–9 cm, slender cuneately winged, base not clasping; leaf blade triangular, triangular-ovate, or broadly lanceolate, 7–18 × 4–24 cm, usually undivided, glabrous or sparsely glandular hairy, base cuneate, truncate, cordate, or hastate, margin sinuate and mucronately dentate, apex acute. Middle and upper stem leaves with a shorter narrow to broader winged petiole; leaf blade with a rather cuneate base, undivided and otherwise similar to lower leaves or lyrately pinnatipartite to lyrately pinnatisect; lateral lobes if present 1 or 2(or 3) pairs, triangular-ovate to elliptic; terminal lobe triangular-ovate to lanceolate, apex acute. Uppermost leaves sessile, elliptic to narrowly rhombic, undivided, base narrow and not clasping, apex acute. Synflorescence narrowly paniculiform, with some to numerous capitula. Capitula with 4–6 florets. Involucre 10–11 × 1.5–2 mm. Outer phyllaries ovate-triangular to lanceolate, largest ca. 3 × 0.5 mm, apex acute; inner phyllaries 5, apex acute to obtuse. Florets purplish red to sometimes whitish. Achene ca. 4 mm, attenuate into an almost beaked apex. Pappus 5–6 mm. Fl. and fr. Feb–Aug.

• Mountain valleys, forests; 500–2500 m. Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang.

Paraprenanthes diversifolia has often not been recognized properly in the past but confused with *P. sororia*. However, it is very well characterized by its small capitula with only 5 inner phyllaries and 4–6 florets. In contrast, leaf shape and indumentum do not actually distinguish it from *P. sororia* (see also note there) and *P. pilipes*.

9. Paraprenanthes heptantha C. Shih & D. J. Liu, Acta Phytotax. Sin. 26: 423. 1988.

雷山假福王草 lei shan jia fu wang cao

Herbs 0.8–2 m tall, annual. Stem glabrous. Basal leaves unknown. Lower and middle stem leaves with petiole 2.5–10 cm, ± unwinged; leaf blade narrowly elliptic, 12–24 × 8.5–13 cm, lyrately pinnatipartite or unequally pinnatipartite, margin sinuate and mucronulate-dentate; lateral lobes 3 or 4 pairs, opposite or alternate, elliptic, triangular, or irregularly rhombic, apex obtuse to rounded; terminal lobe irregularly rhombic, lanceolate, or narrowly triangular. Upper stem leaves shortly petiolate; leaf blade linear-elliptic, ca. 10 × 1.3 cm, base cuneate, apex acuminate, otherwise similar to middle stem leaves. Synflorescence narrowly paniculiform, with many capitula. Capitula with 7 or 8 florets. Involucre ca. 9 × 2 mm. Outer phyllaries triangular-ovate to lanceolate, largest ca. 3 × 1 mm, apex acute; inner phyllaries 5, apex obtuse. Florets bluish purple. Achene ca. 4 mm, attenuate into an almost beaked apex. Pappus ca. 5 mm. Fl. and fr. May–Jul.

• Grasslands on mountain slopes, forests; 600–1200 m. Guangxi, Guizhou (Leishan), Hunan, Jiangsu, Sichuan.

Paraprenanthes heptantha shows affinities to *P. diversifolia*, and future studies should assess the delimitation between both species.

10. Paraprenanthes dolichophylla (C. Shih) N. Kilian & Z. H. Wang, **comb. nov.**

长叶假福王草 chang ye jia fu wang cao

Basionym: *Notoseris dolichophylla* C. Shih, Acta Phytotax. Sin. 27: 459. 1989.

Herbs ca. 45 cm tall, perennial. Stem densely glandular hairy. Basal and lower stem leaves unknown. Middle stem leaves with petiole 1–1.5 cm, unwinged; leaf blade obovate to narrowly oblanceolate, 20–22 × 4–13 cm, pinnatisect to subpinnatisect, glabrous, margin sinuate to sublobate and mucronulately dentate; lateral lobes 4–7 pairs, opposite or alternate, sometimes petiolulate, ± narrowly elliptic, longest pair each 2.5–8 × 1–2.5 cm, decreasing in size toward base and if more than 4 pairs also toward leaf apex, lowermost pair smallest; terminal lobe elliptic to narrowly elliptic, apex acute to acuminate. Synflorescence paniculiform, with numerous capitula. Capitula with ca. 5 florets. Involucre 9–10 × 2–3 mm. Outer phyllaries ovate to lanceolate, largest ca. 3 × 1 mm, apex acute; inner phyllaries 5, linear-lanceolate, equal in length, apex obtuse. Florets purple. Achene 4–5 mm. Pappus ca. 7 mm. Fl. May.

• Forests on mountain slopes; 1600–1700 m. Sichuan (Tianquan).

Paraprenanthes dolichophylla was originally described on the basis of flowering material only. Recently collected material with ripe achenes revealed that the species is a member of *Paraprenanthes*, which has also been supported by the molecular analysis of that material.

11. Paraprenanthes multiformis C. Shih, Acta Phytotax. Sin. 26: 420. 1988.

三裂假福王草 san lie jia fu wang cao

Herbs 40–90 cm tall, annual. Stem apically densely glandular hairy. Basal leaves unknown. Middle stem leaves with petiole 3–10 cm, unwinged, basally not widened; leaf blade triangular-ovate, 6–8 × 5–7 cm, 3-lobed or 3-parted, base cordate, margin ± sinuate and mucronulately dentate; lateral lobes tri-

angular-ovate to semiorbicular, somewhat smaller or ± equal in size to terminal lobe, apex rounded to acute; terminal lobe ± triangular-ovate, apex acute. Upper stem leaves with petiole shorter and ± winged; leaf blade triangular, smaller and less divided than in middle stem leaves or not divided, base cuneate, apex acuminate. Uppermost leaves lanceolate, triangular-lanceolate, or narrowly elliptic, pilose as upper stem, margin dentate or entire, apex acuminate. Synflorescence narrowly paniculiform, with some to many capitula. Capitula with usually 10–15 florets. Involucre 9–11 × ca. 3 mm. Outer phyllaries triangular-ovate to lanceolate, largest 2–3 × ca. 1 mm, apex acute; inner phyllaries 8, apex ± obtuse. Florets reddish. Achene ca. 4 mm, attenuate into an almost beaked apex. Pappus ca. 6 mm. Fl. and fr. May–Aug.

• Forests, forest margins; 600–800 m. Fujian, Hunan (Zhijiang), Jiangxi, Sichuan.

12. Paraprenanthes longiloba Y. Ling & C. Shih, Acta Phytotax. Sin. 26: 421. 1988.

狭裂假福王草 xia lie jia fu wang cao

Herbs, annual. Stem glabrous. Basal leaves unknown. Middle stem leaves sessile, 3-parted; lateral lobes 1 pair, broadly linear-lanceolate, very small; terminal lobe narrowly linear, to 20 × 1 cm, margin subundulate or inconspicuously dentate, apex long acuminate. Upper stem leaves gradually smaller, similar to middle stem leaves. Synflorescence paniculiform, with numerous capitula. Capitula with usually 8–12 florets. Involucre 9–11 × ca. 3 mm. Outer phyllaries triangular-ovate to linear-lanceolate, largest 3–4 × ca. 0.5 mm, apex acute; inner phyllaries 8, apex obtuse. Florets purple. Achene 4.5–5 mm, attenuate into an almost beaked apex. Pappus 5–6 mm. Fl. and fr. Jul.

• Mountain slopes; ca. 2000 m. Yunnan (Kunming).

60. NOTOSERIS C. Shih, Acta Phytotax. Sin. 25: 196. 1987.

紫菊属 zi ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, perennial. Stem erect, rarely scandent and ± zigzag, branched apically, glabrous or glandular hairy, leafy. Leaves pinnately lobed, more rarely undivided. Synflorescence with few to numerous capitula and capillaceous branchlets. Capitula pendent at anthesis, with 3–12 florets; peduncle capillaceous. Involucre narrowly cylindric. Phyllaries often tinged purple; outer phyllaries few, gradually longer centripetally, longest ca. 1/2 as long as inner ones; inner phyllaries 3(or 4), 5, or ca. 8, ± equal in length, ± linear-lanceolate to linear. Receptacle naked. Florets some shade of purple. Achene usually purplish to brownish red, cylindric to subfusiform, compressed, with 5 main ribs and 2 secondary ribs in between, apex truncate. Pappus white, single, of slender scabrid bristles.

About 11 species: China, Himalayan region; ten species (eight endemic) in China.

1a. Herbs scandent; stem ± zigzag.
2a. Inner phyllaries ca. 8; capitula with 10–12 florets ..... 1. *N. yakoensis*
2b. Inner phyllaries 4 or 5; capitula with 5–8 florets ..... 2. *N. scandens*
1b. Herbs not scandent; stem straight, erect.
3a. Inner phyllaries 3 or 4; capitula with 3 or 4 florets; base of petiole often expanded and auriculately clasping .... 10. *N. triflora*
3b. Inner phyllaries 5; capitula with 4–6 florets; base of petiole never expanded and clasping.
4a. Blade of lower and middle stem leaves not divided.
5a. Lower and middle stem leaves hastate-triangular to rhombic; involucre at anthesis and in fruit less than 1.2 cm ..... 3. *N. nanchuanensis*
5b. Lower and middle stem leaves ovate to triangular-ovate; involucre at anthesis and in fruit 1.2–1.5 cm.
6a. Middle stem leaves narrowly ovate, base cuneate, petiole winged; upper stem leaves sessile ..... 4. *N. guizhouensis*
6b. Middle stem leaves ovate to triangular-ovate, base cordate, truncate, or cuneate, petiole unwinged; upper stem leaves shortly petiolate ..... 6. *N. macilenta*
4b. Blade of lower and middle stem leaves pinnately lobed.
7a. Terminal lobe of lower and middle stem leaves narrowly elliptic to lanceolate, always much exceeded in width by upper pair of lateral lobes separated by winged or unwinged rachis ..... 8. *N. porphyrolepis*
7b. Terminal lobe of lower and middle stem leaves ovate, triangular-ovate, or broadly rhombic, not or slightly exceeded in width by upper pair of lateral lobes separated by winged or unwinged rachis.
8a. Involucre at anthesis ca. 1.2 cm and in fruit to 1.6 cm ..... 7. *N. melanantha*
8b. Involucre at anthesis and in fruit 0.9–1.2 cm.
9a. Involucre at anthesis ca. 1 cm and in fruit to 1.2 cm; achene basally more attenuate than apically; pappus not distinctly exceeding involucre in fruit ..... 5. *N. yunnanensis*
9b. Involucre at anthesis ca. 0.9 cm and in fruit to 1 cm; achene apically more attenuate than basally; pappus distinctly exceeding involucre in fruit ..... 9. *N. wilsonii*

1. Notoseris yakoensis (Jeffrey) N. Kilian, **comb. nov.**

垭口紫菊 ya kou zi ju

Basionym: *Prenanthes yakoensis* Jeffrey, Notes Roy. Bot. Gard. Edinburgh 5: 203. 1912; *P. volubilis* Merrill.

Vines 3–4 m, herbaceous, perennial. Stem scandent, ± zigzag, flexible, apically branched and glandular hairy, leafy. Stem leaves with petiole 1–3 cm, unwinged, ± glandular hairy, basally not widened; leaf blade triangular-ovate to lanceolate, 4–15 × 2–6 cm, both surfaces ± glandular hairy, base cordate to hastate, margin mucronately dentate, apex acuminate. Synflorescence terminal and in axils of upper leaves, divaricately paniculiform, with few to several capitula. Capitula with usually 10–12 florets; peduncle usually less than 1 cm. Involucre 1.1–1.4 × 0.3–0.5 cm. Phyllaries tinged purplish red; outer phyllaries ovate to lanceolate, largest 5–6 × ca. 1 mm, glandular hairy, apex acute to obtuse; inner phyllaries ca. 8, glabrous to sparsely glandular hairy, apex rounded to obtuse. Florets purplish red. Achene pale to dark purple, cylindric to subfusiform, 4–5 mm, basally more attenuate than apically, somewhat attenuate below pappus disk. Pappus ca. 8 mm. Fl. and fr. Aug–Dec.

Forests, forest margins; 1300–2800 m. Yunnan [N Myanmar].

2. Notoseris scandens (J. D. Hooker) N. Kilian, **comb. nov.**

藤本紫菊 teng ben zi ju

Basionym: *Prenanthes scandens* J. D. Hooker in Bentham & J. D. Hooker, Gen. Pl. 2: 527. 1873.

Vines, herbaceous, perennial. Stem scandent, ± zigzag, flexible, apically branched and glandular hairy, leafy. Stem leaves with petiole 1–4 cm, unwinged, glandular hairy, basally not widened; leaf blade ovate, triangular-ovate, or lanceolate, 4–15 × 2–4[–7] cm, both surfaces ± glandular hairy, margin mucronately dentate, apex acuminate. Synflorescence terminal and in axils of upper leaves, divaricately corymbosely paniculiform, with several to many capitula. Capitula with usually 5–8 florets; peduncle usually less than 1 cm. Involucre 11–14 × 2–3 mm. Phyllaries tinged purplish red; outer phyllaries ovate to linear-lanceolate, largest 4–6 × ca. 1 mm, glandular hairy, apex acute; inner phyllaries 4 or 5, glabrous or sparsely glandular hairy, apex acute. Florets blue [?or dull violet to reddish purple]. Achene pale [?to dark purple], cylindric to subfusiform, 4–5 mm, basally more attenuate than apically, somewhat attenuate below pappus disk. Pappus ca. [0.7–]1 cm. Fl. and fr. Nov–Dec.

Forests, forest margins; 900–2000 m. Xizang, Yunnan [NE India].

3. Notoseris nanchuanensis C. Shih, Acta Phytotax. Sin. 27: 457. 1989.

金佛山紫菊 jin fo shan zi ju

Herbs 40–80 cm tall, perennial. Stem erect, branched apically, glabrous, leafy. Lower and middle stem leaves with petiole to 5 cm, winged, basally not widened and not clasping; leaf blade triangular to rhombic, 7–9.5 × 5.5–6 cm, undivided, base hastate to cuneate, margin mucronulately dentate, apex acuminate. Upper stem leaves similar to middle stem leaves or sessile, lanceolate to irregularly rhombic, 10–12 × 2–4 cm; uppermost leaves linear, 1.5–2.5 cm. Synflorescence narrowly paniculiform, with numerous capitula and capillaceous branches. Capitula with ca. 5 florets; peduncle capillaceous. Involucre ca. 10 × 2 mm. Phyllaries purple, abaxially glabrous; outer phyllaries ovate to lanceolate, largest ca. 3 × 1 mm, apex acute; inner phyllaries 5, apex obtuse to rounded. Florets purple. Achene subfusiform, ca. 5 mm. Pappus ca. 7 mm. Fl. and fr. Aug–Sep.

• Mountain slopes; 1500–2000 m. Chongqing (Nanchuan).

4. Notoseris guizhouensis C. Shih, Acta Phytotax. Sin. 25: 196. 1987.

全叶紫菊 quan ye zi ju

Herbs. Stem solitary, erect, branched apically, glabrous, leafy. Middle stem leaves with petiole to 10 cm, distinctly winged, basally not widened and not clasping; leaf blade narrowly ovate, to 10 × 4.5 cm, undivided, base cuneate, margin mucronulately dentate, apex acuminate. Upper stem leaves sessile, narrowly elliptic, lanceolate, or narrowly elliptic-lanceolate, 8.5–17 × 1.5–4.5 cm. Synflorescence paniculiform, with numerous capitula and capillaceous branches. Capitula with ca. 5 florets; peduncle capillaceous. Involucre 12–14 × 2–3 mm. Phyllaries purplish red, abaxially glabrous; outer phyllaries broadly ovate to lanceolate, largest ca. 5 × 1–1.5 mm, apex obtuse to acute; inner phyllaries 5. Florets purplish red. Achene subfusiform. Pappus ca. 8 mm. Fl. and fr. Sep. $2n = 18$*.

• Mountain slopes, shaded and moist areas by trails, thickets; ca. 2000 m. Chongqing, Guizhou (Pu'an).

5. Notoseris yunnanensis C. Shih, Acta Phytotax. Sin. 25: 200. 1987.

云南紫菊 yun nan zi ju

Herbs, 1–2.7 m tall. Stem solitary, erect, branched apically, glabrous, leafy. Middle stem leaves glabrous; petiole 5–20 cm, unwinged; leaf blade ovate, 16–22 × 12–15 cm, lyrately pinnatisect, margin mucronulately dentate; lateral lobes 1–3 pairs, narrowly elliptic, 6–10 × 2–5 cm, apex obtuse; terminal lobe rhombic to elliptic, 10–13 × 4–10 cm, base cuneate, apex acuminate. Upper stem leaves with shorter petiole to sessile, usually smaller and less divided to undivided, otherwise similar to middle stem leaves. Synflorescence paniculiform, with numerous capitula. Capitula with 4 or 5 florets. Involucre ca. 10 × 2.5–3 mm at anthesis, to 1.2 cm in fruit. Phyllaries purplish red, abaxially glabrous, apex obtuse; outer phyllaries linear-lanceolate to narrowly elliptic, largest 4–6 × ca. 1 mm; inner phyllaries 5. Florets purple. Achene ca. 5 mm, basally more attenuate than apically. Pappus 7–8 mm. Fl. and fr. Sep–Oct.

• Dense forests; 1200–2200 m. S Yunnan (Yanshan).

6. Notoseris macilenta (Vaniot & H. Léveillé) N. Kilian, **comb. nov.**

光苞紫菊 guang bao zi ju

Basionym: *Prenanthes macilenta* Vaniot & H. Léveillé, Bull. Soc. Bot. France 53: 550. 1906; *Notoseris psilolepis* C. Shih.

Herbs 30–130 cm tall, perennial. Stem solitary, erect, branched apically, glabrous or glandular hairy, leafy. Basal, lower, and middle stem leaves with petiole 8–25 cm, unwinged, basally not or slightly widened; leaf blade ovate, triangular-ovate, or more rarely suborbicular, 7–30 × 4.5–23 cm, adaxially ± glandular hairy, base cordate, truncate, or cuneate, margin mucronulately dentate, apex acute to acuminate. Upper stem leaves similar to middle stem leaves but smaller and with petiole shorter and often apically cuneately winged; leaf blade triangular to narrowly rhombic, basally usually cuneate, apically acute to acuminate. Uppermost leaves sessile, narrowly rhombic to narrowly elliptic, base cuneate, apex acuminate. Synflorescence paniculiform, with numerous capitula. Capitula with 5 florets. Involucre ca. 12 × 2–3 mm at anthesis, ca. 1.5 cm in fruit. Phyllaries purple, abaxially glabrous; outer phyllaries triangular-ovate to linear-lanceolate, longest ca. 7 × 1 mm; inner phyllaries 5, apex acute. Florets purplish red. Achene 5–6 mm, basally more attenuate than apically. Pappus 8–9 mm. Fl. and fr. Sep–Nov.

• By water in mountain valleys, forests; 800–2300 m. Chongqing, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Yunnan.

The name *Prenanthes macilenta* predates the previously accepted name *Notoseris psilolepis*. *Notoseris macilenta* is closely related to *N. melanantha* and is distinguished by its leaves undivided throughout.

7. Notoseris melanantha (Franchet) C. Shih, Acta Phytotax. Sin. 25: 198. 1987.

黑花紫菊 hei hua zi ju

Lactuca melanantha Franchet, J. Bot. (Morot) 9: 291. 1895; *Notoseris formosana* (Kitamura) C. Shih; *N. gracilipes* C. Shih; *N. henryi* (Dunn) C. Shih; *N. rhombiformis* C. Shih; *Prenanthes formosana* Kitamura; *P. henryi* Dunn.

Herbs 0.5–2 m tall, perennial. Stem solitary, erect, apically branched and glabrous or glandular hairy, leafy. Lower and middle stem leaves with petiole 3–17 cm, ± unwinged, basally not widened; leaf blade pinnatipartite to pinnatisect or lyrately so, rarely some leaves undivided, margin mucronulately dentate (sometimes very coarsely so) and sometimes ± sinuate; lateral lobes 1–3 pairs, opposite to subopposite, elliptic, irregularly rhombic, or obovate, 1–10 × 0.5–6 cm, base truncate, cuneate, or subpetiolulate, apex obtuse to acute; terminal lobe broadly elliptic, triangular-ovate, or rhombic, 4–22 × 3–20 cm, base cordate, truncate, or cuneate, apex obtuse, rounded, or acute. Upper stem leaves similar to middle stem leaves but with shorter petiole to sessile, smaller and less or not divided. Synflorescence narrowly paniculiform, with numerous capitula. Capitula with 5(or 6) florets. Involucre ca. 12 × 2–3 mm at anthesis, to 1.6 cm in fruit. Phyllaries purplish, abaxially glabrous; outer phyllaries triangular, linear-elliptic, or lanceolate, largest 4–6 × 1–1.5 mm, apex acute; inner phyllaries 5, apex ± rounded. Florets bluish purple to pink. Achene 4–6 mm, basally more attenuate than apically. Pappus 7–9 mm. Fl. and fr. Jun–Dec. $2n = 18$*.

• Forests, forest margins; 1300–2700 m. Chongqing, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Taiwan, Yunnan.

Notoseris melanantha is here treated in a wide sense, including several other species previously distinguished only by rather subtle leaf and indumentum features. As here treated, it is well characterized by its pinnatipartite to pinnatisect leaves with a broad, triangular to triangular-ovate or broadly rhombic terminal lobe and its 1.2–1.6 cm involucres with 5 inner phyllaries. Comparing the type material of *N. melanantha* and *N. henryi*, which were apparently described independently of each other a few years apart, with a larger number of specimens referable to either of them, it becomes evident that a continuous variation in leaf shape closely knits all of these specimens. The rich type material of *N. melanantha* represents a form with pinnatipartite to pinnatisect lower and middle stem leaves, the rachis of which is distinctly to broadly winged at least between the broad, triangular-ovate terminal lobe and the upper pair of lateral lobes and narrowly winged to unwinged between the pairs of lateral lobes, and the lateral lobes of which have a broad base. The syntypes of *N. henryi*, *A. Henry 7022* and *A. Henry 11214*, in contrast, have pinnatisect lower and middle stem leaves with usually unwinged rachis, lateral lobes with narrow or even subpetiolulate base, and a broad, triangular-ovate to rhombic terminal lobe. This latter leaf shape appears to be much more common. As *N. melanantha* predates the name *N. henryi* for a few years, the former is the correct name for the commonest and most widespread *Notoseris* species. Three further species, *N. formosana*, *N. gracilipes*, and *N. rhombiformis*, apparently each represent only part of this continuous variation, making their delimitation practically impossible. Of these, *N. rhombiformis* refers to plants with a broad, distinctly rhombic terminal lobe separated by the unwinged rachis from the uppermost pair of lateral lobes, a form also represented by the syntype *A. Henry 11214* and approximately by part of the material of the syntype *A. Henry 7022* of *N. henryi*, while *N. gracilipes* and *N. formosana* refer to pinnatisect-leafy plants with a broadly triangular terminal lobe and were moreover distinguished by indumentum characters.

8. Notoseris porphyrolepis C. Shih, Acta Phytotax. Sin. 25: 201. 1987.

南川紫菊 nan chuan zi ju

Herbs 0.7–1.5 m tall, perennial. Stem solitary, erect, branched apically, glabrous, leafy. Basal and middle stem leaves with petiole ca. 4.5 cm, unwinged, basally not widened; leaf blade pinnatipartite to subpinnatisect, margin mucronulately dentate and lobe margin mucronate or with 1 large triangular tooth on one side; lateral lobes 2 or 3 pairs, narrowly elliptic to narrowly rhombic, 3–4 × 1–1.5 cm, base truncate, apex acute to acuminate; terminal lobe narrowly elliptic to obliquely narrowly elliptic, 3–4 × 1–1.5 cm, apex acute to acuminate. Upper stem leaves narrowly elliptic to narrowly elliptic-lanceolate, ca. 5.5 × 1 cm, undivided, apex acuminate. Synflorescence paniculiform, with numerous capitula. Capitula with ca. 5 florets. Involucre 13–15 × 2–3 mm. Phyllaries purple, abaxially glabrous, apex rounded to obtuse; outer phyllaries lanceolate to linear-lanceolate, longest ca. 6 × 1–1.5 mm; inner phyllaries 5. Florets purple. Achene ca. 5 mm, basally more attenuate than apically. Pappus ca. 8 mm. Fl. and fr. Sep. $2n = 18$*.

• Forests on mountain slopes; 1800–1900 m. Chongqing (Nanchuan), Guizhou.

Notoseris porphyrolepis is closely related to *N. melanantha* and mainly distinguished by the leaf shape, as given in the key.

9. Notoseris wilsonii (C. C. Chang) C. Shih, Acta Phytotax. Sin. 25: 202. 1987.

峨眉紫菊 e mei zi ju

Prenanthes wilsonii C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 5: 322. 1934.

Herbs to 1 m tall, perennial. Stem erect, apically branched and glandular hairy, basally glabrous, leafy. Lower and middle stem leaves with petiole 3.5–8 × 2–2.5 cm, ± unwinged and base slightly widened in lower leaves, narrowly winged and base sometimes somewhat auriculately widened in middle leaves; leaf blade pinnatipartite to pinnatisect and sometimes lyrately so, margin ± sinuate and mucronulately dentate and sometimes sublobately so; lateral lobes 1–4 pairs, opposite or alternate, sessile to subpetiolulate, ovate, triangular-ovate, or elliptic, 1–7 × 1–4 cm, often unequal, upper ones sometimes subdividing terminal lobe; terminal lobe triangular, triangular-ovate, or rhombic, 7–12 × 3–10 cm, base truncate to cuneate, margin sometimes lobulate, apex acute to acuminate. Upper stem leaves similar to middle stem leaves but sessile or with shorter usually broader winged petiole, sometimes smaller and fewer. Synflorescence paniculiform, with numerous capitula. Capitula with 4 or 5 florets. Involucre 9–10 × ca. 2 mm. Phyllaries purple, glabrous; outer phyllaries triangular-ovate to linear-lanceolate, largest 4–5 mm; inner phyllaries 5. Florets purplish blue. Achene 4–6 mm, apically usually more attenuate than basally. Pappus 6–7 mm, exserted from involucre at maturity. Fl. and fr. May–Jul.

• Forests, forest margins; 1000–2800 m. Sichuan (Emei Shan, Wenchuan).

10. Notoseris triflora (Hemsley) C. Shih, Acta Phytotax. Sin. 25: 202. 1987.

三花紫菊 san hua zi ju

Lactuca triflora Hemsley, J. Linn. Soc., Bot. 23: 485. 1888; *Prenanthes triflora* (Hemsley) C. C. Chang.

Herbs, to 1 m tall, perennial. Stem solitary, erect, branched apically, sparsely glandular hairy, leafy. Lower and middle stem leaves with petiole to 17 cm, narrowly winged, basally usually slightly widened; leaf blade lyrately pinnatipartite to subpinnatisect, margin ± sinuate and mucronulately dentate; lateral lobes 1 or 2(or 3) pairs, ± elliptic, 2–6 × 1–4 cm, base cuneate to petiolulate, apex rounded to obtuse; terminal lobe triangular to triangular-ovate, 12–19 × 11–20 cm, base shallowly cordate, hastate, cuneate, or rounded, apex acuminate to acute. Upper stem leaves with petiole shorter, basally slightly widened, or distinctly widened and ± auriculately clasping or ± sessile and auriculately clasping; leaf blade smaller and often less divided, otherwise similar to middle stem leaves; uppermost leaves narrowly elliptic, narrowly rhombic, or broadly linear, undivided. Synflorescence paniculiform, with numerous capitula. Capitula with 3 or 4 florets. Involucre 10–12 × 1.5–2 mm. Phyllaries purple, glabrous; outer phyllaries narrowly ovate to linear-lanceolate, longest ca. 5 × 1 mm, apex acute; inner phyllaries 3 or 4, apex obtuse to acute. Florets bluish purple. Achene 4–5 mm, basally more attenuate than apically. Pappus ca. 7 mm. Fl. and fr. Jul–Oct. $2n = 18$*.

• Grasslands, forests; 1400–3000 m. Chongqing, Sichuan (Emei Shan), Yunnan (Tengchong).

Notoseris triflora seems to have a scattered, disjunct distribution in C and SW China. It is apparently closely related to **Notoseris khasiana** (C. B. Clarke) N. Kilian, **comb. nov.** (basionym: *Prenanthes khasiana* C. B. Clarke, Compos. Ind. 273. 1876), which has a scattered distribution in NW Myanmar, NE India (Assam), and perhaps Bhutan. The available material of *N. triflora* shows some variation with respect to leaf shape; therefore, a comparative study of its disjunct populations, as well as those of *N. khasiana*, would be desirable.

61. LACTUCA Linnaeus, Sp. Pl. 2: 795. 1753.

莴苣属 wo ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Agathyrsus D. Don; *Lactucopsis* Schultz Bipontinus ex Visiani; *Lagedium* Soják; *Mulgedium* Cassini; *Phaenixopus* Cassini; *Pterocypsela* C. Shih; *Scariola* F. W. Schmidt; *Steptorhamphus* Bunge.

Herbs, perennial or annual, more rarely subshrubs (only *Lactuca orientalis* in China). Stems usually leafy. Leaves pinnate or undivided. Capitula with 4–30 or more florets. Involucre narrowly cylindric. Phyllaries glabrous or hairy; outer phyllaries gradually longer centripetally, ± imbricate, often ca. 1/2 as long as inner phyllaries or even ± approaching them in length; inner phyllaries usually 3, 5, or 8, ± linear-lanceolate to linear, often of unequal length in fruit. Receptacle naked. Florets some shade of yellow or blue. Achene narrowly or broadly ellipsoid, body subcompressed to compressed, between 2 thicker or wider lateral ribs with 1 to several slender ribs on either side; beak usually present, stout, slender, or filiform. Pappus white or sometimes with a faint yellow tinge, single, of slender scabrid bristles [or double with an additional outer row of minute hairs].

Probably ca. 50–70 species: mostly in C and SW Asia, Europe, North America; 12 species (one endemic, one introduced) in China.

The circumscription of the genus is not yet settled, and species numbers given in the literature therefore vary greatly. The concept of the genus applied here on the basis of molecular and morphological studies by N. Kilian et al. (in prep.) is wider than the one adopted in FRPS (80(1): 233–239. 1997) and includes, as far as China is concerned, the former segregates *Mulgedium*, *Pterocypsela*, and *Scariola*.

1a. Subshrubs, stems whitish, rigid, and intricately and divaricately branched; stem leaf bases with linear auricles adnately long decurrent on stem; capitula with 4(or 5) florets ..... 8. *L. orientalis*

1b. Annual to perennial herbs, stems not as above; stem leaf bases never adnately decurrent on stem; capitula with usually 8–30 florets.

2a. Achene body strongly compressed with distinctly winged margin.

3a. Inner phyllaries 5(or 6); achene with 3(–5) prominent ribs on either side ..... 4. *L. raddeana*

3b. Inner phyllaries ca. 8; achene with 1(or 2) prominent rib(s) on either side.

4a. Leaves not clasping or scarcely clasping stem ..... 6. *L. indica*
4b. Middle and upper stem leaves distinctly clasping stem.
5a. Achene beak stout, 0.1–0.5 mm, apically pale ..... 5. *L. triangulata*
5b. Achene beak filiform, 2–3.5 mm, pale to greenish ..... 7. *L. formosana*
2b. Achene body strongly compressed to subcompressed but margin not winged.
6a. Achene subcompressed, very narrowly ellipsoid, apically attenuate or contracted into a stout 1–2 mm beak.
7a. Lower and middle stem leaves usually pinnately lobed, base usually narrowed and semiamplexicaul; achene with 5–7 prominent ribs on either side between marginal ribs, marginal ribs slightly thicker than other main ribs ..... 9. *L. tatarica*
7b. Lower and middle stem leaves entire or more rarely sinuate-dentate to pinnately lobed, base usually semiamplexicaul to auriculate; achene with 4 or 5 narrow ribs in middle third of either face and with very thick marginal ribs ..... 10. *L. sibirica*
6b. Achene compressed, apically contracted into a filiform (2–)4–12 mm beak.
8a. Beak of achene 10–12 mm, base with rodlike appendages; achene body with 1 rib on either side; involucre to 2.3 cm in fruit ..... 1. *L. undulata*
8b. Beak of achene to 5 mm, base without appendages; achene body with 3–9 ribs on either side; involucre to 1.6 cm in fruit.
9a. Florets blue; achene body with 3–5 ribs on each side.
10a. Lower leaves obovate to elliptic, always pinnately lobed with broader segments; capitula ca. 6 mm at anthesis, to 1.3 cm in fruit; achene beak white ..... 2. *L. dissecta*
10b. All leaves linear, margin entire or lower ones pinnately lobed with linear entire segments; capitula 9–10 mm at anthesis, to 1.6 cm in fruit; achene beak greenish ..... 3. *L. dolichophylla*
9b. Florets yellow; achene body with 5–9 ribs on each side.
11a. Stem leaves undivided, abaxially with smooth midrib; phyllaries usually erect in fruit; achene with 5–7 ribs on each surface ..... 11. *L. sativa*
11b. Stem leaves pinnately lobed, abaxially usually with prickly setose midrib; phyllaries usually reflexed in fruit; achene with 7–9 ribs on each surface ..... 12. *L. serriola*

1. Lactuca undulata Ledebour, Icon. Pl. 2: 12. 1830.

飘带果 piao dai guo

Lactuca undulata var. *albicaulis* C. H. An; *L. undulata* var. *pinnatipartita* Turczaninow.

Herbs 10–35 cm tall or more, annual. Stems solitary or few, erect, divaricately branched from base or higher up, glabrous. Leaves glaucous green to glaucous; lower and middle stem leaves oblanceolate to narrowly elliptic, 2–5 × 1–2 cm, glabrous, base clasping stem and auriculate, margin sinuate-dentate to pinnatisect; lateral lobes 2–6 pairs; terminal lobe lanceolate to elliptic. Upper stem leaves smaller and less or not divided; uppermost stem leaves linear-lanceolate, margin entire or subentire, apex acuminate. Capitula numerous, terminal, with 8–12 florets; peduncle wiry, usually shorter than capitulum. Involucre narrowly cylindric and 7–9 mm at anthesis, longish ovoid and to 2.3 × 0.5–0.6 cm in fruit. Phyllaries glabrous, with an apical purplish spot; outer phyllaries ovate to linear-lanceolate, longest ca. 3/4 as long as inner phyllaries, apex acute; inner phyllaries ca. 5, apex subobtuse to acute. Florets pale blue to purple. Achene body pale to dark brown, obovoid, ca. 3 mm, compressed, with 1 rib on either side; beak whitish, filiform, 1–1.2 cm, base with 2 rodlike pendent appendages. Pappus 4–5 mm. Fl. and fr. May–Sep. $2n = 18$.

Moist areas on mountain slopes, mountain valleys; 500–2000 m. Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, SC Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

2. Lactuca dissecta D. Don, Prodr. Fl. Nepal. 164. 1825.

裂叶莴苣 lie ye wo ju

Lactuca auriculata Candolle.

Herbs ca. 40 cm tall, annual. Stem solitary, erect, simple or divaricately branched from base; branches slender, glabrous. Leaves glabrous, base sagittately to auriculately clasping stem. Lower and middle stem leaves obovate, spatulate, or elliptic, 3–7 × 1–3.5 cm, pinnatipartite to subpinnatisect, margin entire or sparsely dentate; lateral lobes 3–6 pairs, rhombic, flabelliform, or orbicular, apex rounded to acute; terminal lobe rhombic, apex acute. Upper stem leaves lanceolate to linear-lanceolate, smaller, less or not divided, apex acuminate. Synflorescence corymbiform, with some to numerous capitula. Capitula with ca. 15 florets; peduncle capillaceous, usually longer than capitulum. Involucre narrowly cylindric and ca. 6 mm at anthesis, longish ovoid and to 1.3 × 0.3–0.4 cm in fruit. Phyllaries abaxially purplish red, glabrous, apex acute; outer phyllaries ovate to linear-lanceolate, approaching inner phyllaries to 3/4 their length; inner phyllaries ca. 5. Florets blue to bluish purple [or pale yellowish]. Achene body pale brown to blackish, obovoid, ca. 2.5 mm, compressed, with 3 ribs on either side; beak white, filiform, 4–4.5 mm. Pappus 3–4 mm. Fl. and fr. Jun. $2n = 16$.

Grasslands; ca. 2000 m. Xinjiang, ?Xizang [Afghanistan, Bhutan, India (Sikkim), Kashmir, Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan; SW Asia].

3. Lactuca dolichophylla Kitamura in H. Hara, Fl. E. Himalaya, 341. 1966.

长叶莴苣 chang ye wo ju

Mulgedium sagittatum Royle, Ill. Bot. Himal. Mts. 252, t. 61, f. 2. 1835; *Lactuca handeliana* S. Y. Hu; *L. longifolia* Candolle (1838), not Michaux (1803); *L. wallichiana* Tuisl, nom. illeg. superfl.

Herbs ca. 1 m tall, annual or biennial. Stem solitary, erect, paniculate apically, glabrous. Lower stem leaves linear to linear-lanceolate, undivided or pinnately lobed, base sagittately clasping stem, apex acuminate; lobes when present linear, apex acute. Upper stem leaves undivided, smaller, otherwise similar to lower leaves. Synflorescence paniculiform, with numerous capitula. Capitula with 12–20 florets; peduncle wiry. Involucre narrowly cylindric and 9–10 mm at anthesis, ovoid and to 1.6 × 0.8 cm in fruit. Phyllaries apically purplish red, abaxially glabrous, apex acute; outer phyllaries triangular-ovate to linear-lanceolate, approaching inner phyllaries to 3/4 their length; inner phyllaries ca. 5. Florets blue. Achene body dark brown, narrowly ellipsoid to obcolumnar, 4.5–5 mm, compressed, with 3–5 ribs on either side; beak greenish, filiform, 2.5–3 mm. Pappus 6–7 mm. Fl. and fr. Sep. $2n = 16$.

Thickets; ca. 3200 m. Xizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan].

4. Lactuca raddeana Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 19: 526. 1874.

毛脉翅果菊 mao mai chi guo ju

Lactuca alliariifolia H. Léveillé & Vaniot; *L. elata* Hemsley; *L. raddeana* var. *elata* (Hemsley) Kitamura; *L. vaniotii* H. Léveillé; *Prenanthes hieraciifolia* H. Léveillé; *Pterocypsela elata* (Hemsley) C. Shih; *P. raddeana* (Maximowicz) C. Shih.

Herbs 0.8–2 m tall, biennial or perennial. Roots ramose. Stem solitary, erect, basal half ± densely hispid, apical half glabrous and branched. Lower and middle stem leaves with basal portion cuneate or winged petiole-like, 2–10 cm; apical portion ovate, elliptic, or triangular, 5–16 × 2–8.5 cm, undivided, pinnatipartite, or lyrately pinnatipartite, ± hispid, margin dentate and coarsely sinuate-dentate; lateral lobes 1–3 pairs, elliptic, apex acute; terminal lobe triangular, ovate-triangular, or subrhombic, apex acute. Upper stem leaves with basal portion shorter, winged, and petiole-like to cuneate, apical portion ovate, elliptic, or lanceolate. Synflorescence narrowly paniculate, with numerous capitula on wiry branches. Capitula with 8–11 florets. Involucre cylindric, 8–10 mm at anthesis, 9–11 × 4–5 mm in fruit. Phyllaries often pale purplish red; outer phyllaries triangular-ovate to lanceolate, largest ca. 5 × 1–2 mm, apex obtuse; inner phyllaries 5(or 6), apex obtuse. Florets bright yellow. Achene 3–4 mm; body reddish to dark brown, ellipsoid, compressed, broadly winged, 1.5–2 mm wide, with 3(–5) prominent ribs on either side, apically contracted into a concolorous or apically pale stout 0.2–0.4 mm beak. Pappus 6–7 mm, ± caducous. Fl. and fr. May–Oct. $2n = 18$.

Forests, forest margins, thickets, moist areas on mountain slopes, mountain valleys, fields, trailsides; 200–3000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan [Japan, Korea, E Russia, Vietnam].

Although the range of variation in leaf shape is considerable, plants with undivided leaves (formerly referred to as *Lactuca elata*) and those with pinnatipartite leaves represent extremes of a ± continuous variation and indicate a certain genetic plasticity in this respect. Probably the various leaf shapes are a response to environmental factors. It is also indicative that comparable variation in leaf shape can also be observed in *L. indica* and *L. formosana*.

5. Lactuca triangulata Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 177. 1859.

翼柄翅果菊 yi bing chi guo ju

Lactuca triangulata var. *sachalinensis* Kitamura; *Pterocypsela triangulata* (Maximowicz) C. Shih.

Herbs to 1 m tall or more, biennial or perennial. Roots ramose. Stem solitary, usually purplish red, erect, branched in apical half or third, glabrous. Lower and middle stem leaves ± glabrous, margin with unequal and triangular teeth; basal portion winged petiole-like, 6–13 cm, base broadly auriculately to hastately clasping stem; apical portion triangular, broadly ovate, or broadly ovate-cordate, 8.5–13 × 9–16 cm. Upper stem leaves similar to middle stem leaves or basally shortly cuneate or winged petiole-like and auriculately or sagittately clasping and apically elliptic to rhombic. Uppermost leaves with semiamplexicaul base. Synflorescence rather narrowly paniculiform, with numerous capitula. Capitula with 10–16 florets. Involucre cylindric, 1–1.1 cm at anthesis, to 1.5 × 0.5–0.6 cm in fruit. Outer phyllaries narrowly triangular to lanceolate, longest ca. 7 × 1 mm, apex acute; inner phyllaries 8, usually purplish red, apex acute to obtuse. Florets yellow. Achene 4–6 mm; body blackish, reddish, or dark brown, ellipsoid, compressed, broadly winged, 2–2.5 mm wide, with 1(or 2) prominent rib on either side, apically contracted into an apically pale stout 0.1–0.5 mm beak. Pappus 6–8 mm, caducous. Fl. and fr. Jun–Sep. $2n = 18$.

Grasslands on mountain slopes, mountain forests, forest margins, trailsides; 700–1900 m. Hebei, Heilongjiang, Jilin, Liaoning, Shanxi [Japan, Korea, SE Russia].

6. Lactuca indica Linnaeus, Mant. Pl. 2: 278. 1771.

翅果菊 chi guo ju

Brachyramphus sinicus Miquel; *Lactuca amurensis* Regel & Maximowicz ex Regel; *L. brevirostris* Champion ex Bentham; *L. cavaleriei* H. Léveillé; *L. indica* f. *indivisa* (Maximowicz) H. Hara; *L. indica* f. *runcinata* (Maximowicz) Kitamura; *L. kouyangensis* H. Léveillé; *L. laciniata* (Houttuyn) Makino (1903), not Roth (1797); *L. squarrosa* (Thunberg) Miquel; *L. squarrosa* var. *dentata* Komarov; *L. squarrosa* f. *indivisa* Maximowicz; *L. squarrosa* var. *integrifolia* Komarov; *L. squarrosa* var. *laciniata* (Houttuyn) Kuntze; *L. squarrosa* f. *runcinata* Maximowicz; *L. squarrosa* var. *runcinatopinnatifida* Komarov; *Prenanthes laciniata* Houttuyn; *P. squarrosa* Thunberg; *Pterocypsela indica* (Linnaeus) C. Shih; *P. laciniata* (Houttuyn) C. Shih.

Herbs 0.4–2 m tall, annual or perennial. Roots narrowly thickened. Stem solitary, stout, erect, branched apically, glabrous. Lower and middle stem leaves 13–37 × 0.5–20 cm, glabrous, base semiamplexicaul to weakly amplexicaul, margin entire or sparsely dentate, apex obtuse to acuminate; shape and incision extremely variable; shape ranging from linear-lanceolate, linear-elliptic, lanceolate, spatulate, to elliptic; incision ranging from entire, pinnatifid, deeply pinnatifid, to bipinnatifid, with segments mostly narrow, linear, falcate, triangular-lanceolate, or

elliptic, apex acute to acuminate. Upper leaves smaller, linear-lanceolate, linear, or elliptic, less incised to entire. Synflorescence paniculiform to racemiform-paniculiform, with numerous capitula. Capitula with usually 20–30 florets. Involucre cylindric, 1–1.1 cm at anthesis, 1.2–1.5 × 0.6–0.8 cm in fruit. Phyllaries usually with a purplish margin, apex usually obtuse to rounded; outer phyllaries ovate to lanceolate, longest ca. 6 × 1.5–2 mm; inner phyllaries 8. Florets pale yellow, bluish purple on drying. Achene 3–5 mm; body reddish brown, dark brown, or blackish brown, ellipsoid, compressed, broadly winged, 1.2–2.5 mm wide, with 1 prominent rib on either side, apically contracted into an apically pale to greenish subfiliform 0.4–1.6 mm beak. Pappus 7–8 mm, caducous. Fl. and fr. Apr–Nov. $2n = 18$*.

Mountain valleys, forests, forest margins, thickets, ravines, grasslands, fields, wastelands; 200–3000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Philippines, E Russia, Thailand, Vietnam; introduced elsewhere].

Lactuca indica is one of the commonest species of tribe Cichorieae in China. Leaf shape shows a similarly strong variation as that in *L. raddeana* and is in a quite similar way ± continuous. Leaf shape is therefore not suitable for species delimitation in this group of species. In China, *L. indica* also shows considerable variation in achene beak length; therefore, the differences with *L. formosana* are sometimes not so clear-cut. See note under the latter species.

7. Lactuca formosana Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 19: 525. 1874.

台湾翅果菊 tai wan chi guo ju

Lactuca morii Hayata; *L. sonchus* H. Léveillé & Vaniot; *Pterocypsela formosana* (Maximowicz) C. Shih; *P. sonchus* (H. Léveillé & Vaniot) C. Shih.

Herbs 0.5–1.5 m tall, annual or ?perennial. Roots ramose. Stem solitary, erect, loosely branched apically, ± hirsute, glabrescent. Lower and middle stem leaves with narrow petiole-like amplexicaul basal portion to 5 cm or with conspicuously expanded and semiamplexicaul base; leaf blade elliptic, lanceolate, or oblanceolate, 8–18 × 4–8 cm, hirsute, main rib echinulate, undivided and with coarsely dentate margin or pinnatifid with 2–5 pairs of elliptic to broadly falcate lateral lobes, faintly to strongly dentate on margin, and a lanceolate or triangular terminal lobe. Upper stem leaves similar to middle stem leaves, margin mostly ± entire. Synflorescence loosely corymbose, with ca. 10 to many capitula. Capitula with usually 25–30 florets. Involucre cylindric, 1–1.1 cm at anthesis, to 1.8 × 0.8 cm in fruit. Phyllaries acute to acuminate at apex; outer phyllaries broadly obovate to lanceolate, longest ca. 8 × 1–2 mm; inner phyllaries 8. Florets yellow. Achene 4.5–6.5 mm; body reddish brown, dark brown, or blackish brown, ellipsoid, compressed, broadly winged, 2–2.3 mm wide, with 1 prominent rib on either side, apically contracted into a usually pale to greenish filiform 2–3.5 mm beak. Pappus 7–8 mm, caducous. Fl. and fr. Apr–Nov. $2n = 18$*.

• Grasslands on mountain slopes and in valleys, thickets or forests on mountain slopes, fields, along trails; 100–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Ningxia, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang.

Lactuca formosana is similar to *L. raddeana*, *L. triangulata*, and *L. indica*, and the leaf shape of *L. formosana* in mainland China shows some variation. Instead of the typically lyrate-pinnatifid leaves with irregularly incised to dentate margin, plants sometimes have narrow, weakly pinnatifid leaves more similar to those of *L. indica*. However, usually both species can be distinguished by the shape of the synflorescence (corymbiform in *L. formosana*, paniculiform to racemiform-paniculiform in *L. indica*) and the indumentum of stem and leaves (hirsute and with echinulate main rib in *L. formosana*, glabrous in *L. indica*). Conspicuous, occasionally occurring plants with all or most leaves undivided, as are sometimes the upper stem leaves in usually pinnately lobed plants, have been treated as a separate species, *Lactuca sonchus* or *Pterocypsela sonchus*, respectively (e.g., FRPS 80(1): 231. 1997), but are here considered as a mere form of *L. formosana*, easily recognizable by the distinctive long beak of this species.

8. Lactuca orientalis (Boissier) Boissier, Fl. Orient. 3: 819. 1875.

雀苣 que ju

Phaenopus orientalis Boissier, Voy. Bot. Espagne 2: 390. 1841; *Lactuca viminea* J. Presl & C. Presl var. *erostris* Regel; *Scariola orientalis* (Boissier) Soják.

Subshrubs (10–)20–60 cm tall, glabrous or subglabrous, spinescent, branched from base. Stems whitish, rigid, intricately and divaricately branched. Leaves glaucous green. Basal leaves rosulate, sinuate-dentate to pinnately lobed; lateral lobes 2–4 pairs, triangular, retrorse, apex acute. Stem leaves similar to basal leaves but smaller, less incised, and basally with linear auricles adnately long decurrent on stem. Capitulum solitary, terminal and pedunculate or lateral and sessile, with 4(or 5) florets; peduncle (when present) subulate, remaining as a spine after shedding of capitulum. Involucre narrowly cylindric, 7–10 mm at anthesis, to 1.5 cm in fruit. Phyllaries green to bluish purple; outer phyllaries ovate, abaxially pubescent; inner phyllaries 3(or 4), apex obtuse. Florets pale yellow. Achene 7–8 mm; body brownish, narrowly ellipsoid, 1–1.3 mm wide, with 5–7 ribs on either side; beak concolorous, stout, 2–3 mm. Pappus 7–8 mm, caducous. $2n = 18, 36$.

Mountain slopes and scree, on clay or loamy soil, on lime deposits, on gravel, in dry ravines; below 3800 m. Xinjiang [Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan; SW Asia].

Lactuca orientalis reaches China apparently only in the extreme northwest. No material from China was seen; the description is based on material from outside of China and the habitat data is from Fl. URSS (29: 321. 1964).

9. Lactuca tatarica (Linnaeus) C. A. Meyer, Verz. Pfl. Casp. Meer. 56. 1831.

乳苣 ru ju

Sonchus tataricus Linnaeus, Mant. Pl. 2: 572. 1771; *Agathyrsus tataricus* (Linnaeus) D. Don; *Crepis charbonnelii* H. Léveillé; *Lactuca multipes* H. Léveillé & Vaniot; *Lagedium tataricum* (Linnaeus) Soják; ?*Mulgedium alatoicum* C. H. An; *M. roborovskii* Tzvelev; *M. runcinatum* Cassini; *M. tataricum* (Linnaeus) Candolle; *S. lactucoides* Bunge.

Herbs 15–60 cm tall, perennial, with a taproot, roots shoot bearing. Stem erect; branched apically, glabrous, leafy mainly in basal part. Leaves grayish green to glaucous, rigid, glabrous.

Lower and middle stem leaves elliptic, narrowly elliptic, or linear, 6–19 × 2–6 cm, narrowed toward base, pinnatisect, pinnatifid, or coarsely dentate, apex acute to obtuse; lateral lobes 2–5 pairs, subelliptic to triangular, margin entire, denticulate, or spinulose; terminal lobe lanceolate to narrowly triangular, margin entire, denticulate, or spinulose. Upper stem leaves similar to middle stem leaves but smaller and less incised. Synflorescence racemiform to corymbosely paniculiform, almost leafless, usually with numerous capitula. Capitula with ca. 20 florets. Involucre cylindric, 1.1–1.4 × 0.3–0.5 cm at anthesis, to 2 cm in fruit. Phyllaries usually tinged purplish red, glabrous, apex acute to obtuse; outer phyllaries ovate to lanceolate; inner phyllaries ca. 8. Florets usually purplish blue to blue, rarely white. Achene 5–6 mm; body dark gray, columnar to very narrowly ellipsoid, subcompressed, with 5–7 ribs on either side, apically attenuate or contracted into a concolorous or pale stout 1–2 mm beak. Pappus ca. 1 cm. Fl. and fr. Jun–Sep. $2n = 18$.

Riverbanks and terraces, by lakes, meadows, by fields, consolidated sand dunes, gravelly places; 1200–4300 m. Gansu, Hebei, Henan, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Xinjiang, Xizang [Afghanistan, NW India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, C and W Russia, Tajikistan, Uzbekistan; SW Asia, Europe, North America].

Lactuca tatarica is a very widespread and considerably variable species. *Mulgedium roborovskii* is considered not to exceed the variation of the species and is included here. *Mulgedium alatoicum* is tentatively included here from the insufficient original description, as no type material has been seen.

10. Lactuca sibirica (Linnaeus) Bentham ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 19: 528. 1874.

山莴苣 shan wo ju

Sonchus sibiricus Linnaeus, Sp. Pl. 2: 795. 1753; *Lagedium sibiricum* (Linnaeus) Soják; *Mulgedium kamtschaticum* Ledebour; *M. sibiricum* (Linnaeus) Lessing.

Herbs 50–100 cm tall, perennial, with a taproot. Stem usually pale purplish red, erect, branched apically, glabrous, regularly leafy. Leaves thin, glabrous, abaxially glaucous green, adaxially green. Lower and middle stem leaves sessile, lanceolate, narrowly elliptic-lanceolate, or narrowly oblong-lanceolate, 10–26 × 2–3 cm, undivided or more rarely sinuate-dentate to pinnately lobed, base attenuate, auriculately or sagittately clasping, margin entire to faintly denticulate, apex acute to acuminate. Upper stem leaves similar to middle stem leaves but smaller. Synflorescence corymbiform to corymbosely paniculiform, with many capitula. Capitula with ca. 20 florets. Involucre cylindric, 0.9–1.3 cm. Phyllaries often purplish tinged or mottled; outer phyllaries triangular-ovate to lanceolate, apex acute; inner phyllaries ca. 8, apex subobtuse. Florets blue, rarely white. Achene brown to olive green, narrowly ellipsoid, ca. 4 mm, subcompressed, either marginal rib almost as thick as ca. 1/3 of achene diam., middle third with 4 or 5 narrow ribs on either side, apically attenuate or with a ca. 1 mm beak. Pappus 5–7 mm. Fl. and fr. Jul–Sep. $2n = 18$*.

Forests, forest margins, meadows, riverbanks, moist places, by lakes; 300–2100 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Xinjiang [Japan, Kazakhstan, Korea, Mongolia, Russia; N and NE Europe].

11. Lactuca sativa Linnaeus, Sp. Pl. 2: 795. 1753.

莴苣 wo ju

Lactuca scariola Linnaeus var. *sativa* (Linnaeus) Moris.

Herbs 25–100 cm tall, annual or biennial. Stem solitary, whitish, yellowish green, or glaucous green, erect, branched apically, glabrous. Leaves green, glabrous, rather soft. Basal and lower stem leaves sessile, oblanceolate to elliptic-oblanceolate, 6–15 × 1.5–6.5 cm, undivided, base cordate to sagittate and semiamplexicaul, margin sinuate-dentate, apex acute, acuminate, or rounded. Upper stem leaves similar to lower stem leaves or lanceolate, smaller; uppermost leaves ovate, very small, base cordate to sagittate and clasping, margin entire. Synflorescence corymbosely paniculiform, with very numerous capitula. Capitula with usually 10–30 florets. Involucre narrowly cylindric and 0.9–1.3 cm at anthesis, ovoid and ca. 6 mm in diam. in fruit. Phyllaries green to pale yellowish green, glabrous, usually erect in fruit, apex obtuse; outer phyllaries broadly triangular to lanceolate, approaching inner phyllaries in length; inner phyllaries ca. 8. Florets yellow. Achene body pale brown, narrowly obovoid, ca. 4 mm, compressed, with 5–7 ribs on either side; beak white, filiform, 2–4 mm. Pappus 3–4 mm. Fl. and fr. Feb–Sep. $2n = 18$*.

Cultivated throughout China [probably originating from E Mediterranean to SW Asia].

Lactuca sativa was first known in cultivation in ancient Egypt. It is widely cultivated as a vegetable in China. Leaves of the species contain Vitamins A, B9, C, and K and can be eaten as a salad. *Lactuca sativa* has many cultivars, which are usually treated as varieties. *Lactuca sativa* var. *angustata* Irish ex Bremer is the most commonly cultivated variety in China, where the thick stems are cooked as a vegetable.

12. Lactuca serriola Linnaeus, Cent. Pl. 2: 29. 1756.

野莴苣 ye wo ju

Lactuca altaica Fischer & C. A. Meyer; *L. scariola* Linnaeus.

Herbs 50–80 cm tall, annual. Stem solitary, pale, erect, usually branched only apically, glabrous or prickly setose in basal part. Leaves rather rigid, usually held in vertical plane in sunshine, midrib abaxially often prickly setose. Lower and middle stem leaves oblanceolate to narrowly elliptic, 3–7.5 × 1–4.5 cm, pinnatifid, pinnatisect, or more rarely not divided and leaf broadly linear, base auriculately clasping, margin spinulose; lateral lobes usually 3–6 pairs, truncate, falcate, triangular-falcate, or ovate-falcate; terminal lobe triangular-ovate, rhombic, or broadly linear. Uppermost stem leaves smaller, otherwise similar to middle stem leaves or lanceolate, linear-lanceolate, or linear, margin entire. Synflorescence paniculiform and much branched to almost racemiform in meager plants, with numerous capitula. Capitula with 15–25 florets. Involucre narrowly cylindric and 8–10 mm at anthesis, ovoid and ca. 6 mm in diam. in fruit. Phyllaries usually reflexed in fruit, apex acute; outer phyllaries ovate to lanceolate, approaching inner phyllaries in length; inner phyllaries ca. 8. Florets yellow. Achene body pale brown, narrowly obovoid, ca. 3.5 mm, compressed, with 7–9 ribs on either side; beak whitish, filiform, 3.5–5 mm. Pappus ca. 5 mm, ± caducous. Fl. and fr. Jun–Aug. $2n = 18$.

Wastelands, roadsides, gravel areas on floodplains, rock crevices, grasslands on mountain slopes, mountain valleys; 500–2000 m. Taiwan (introduced), Xinjiang [Afghanistan, N India, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, W Russia, Tajikistan; N and NE Africa, SW Asia, Europe].

Because molecular analyses supported the earlier assumptions on morphological grounds that *Lactuca altaica* cannot be delimited from *L. serriola* they are treated as conspecific.

Lactuca serriola was first recorded in Taiwan in 2007 (C. M. Wang & C. H. Chen, Taiwania 55: 331–333. 2010) and seems to be naturalized there. It has also been introduced to S Africa, NE Asia, Australia, North America, Pacific islands (New Zealand), the Russian Far East, and S South America.

62. LAUNAEA Cassini in F. Cuvier, Dict. Sci. Nat. 25: 321. 1822.

栓果菊属 shuan guo ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Ammoseris Endlicher; *Brachyramphus* Candolle; *Hexinia* H. L. Yang; *Lomatolepis* Cassini; *Microrhynchus* Lessing; *Paramicrorhynchus* Kirpicznikov; *Rhabdotheca* Cassini.

Herbs, perennial, often rosulate, sometimes acaulescent, (almost) glabrous. Stem erect, ascending-erect, procumbent, or creeping. Leaves undivided and subentire or sinuate-dentate to pinnately divided. Synflorescence corymbiform or paniculiform, with few to numerous capitula or sometimes capitulum solitary. Capitula with 5–20(–30) florets. Involucre cylindric. Phyllaries with indistinct to conspicuous white scarious margin; outer phyllaries in several series, gradually longer centripetally, ± imbricate with longest 1/2–3/4 as long as inner ones; inner phyllaries 5–8, ± equal in length, ± linear-lanceolate. Receptacle naked. Florets yellow. Achene whitish, grayish, blackish, or brownish, homomorphic and all with 5 main ribs or dimorphic and inner with 4 and outer with 5 main ribs, usually accompanied by 2 secondary ribs, smooth or transversely wrinkled, apex truncate to attenuate. Pappus white, of equal faintly scabrid bristles, caducous with pappus disk or persistent.

Fifty-four species: Africa, C, S, and SW Asia, S Europe; four species (one endemic) in China.

1a. Subshrubs; flowering stems hardened, intricately and divaricately branched, erect, with numerous capitula on subulate and after shedding of capitula subspinescent peduncles ..... 2. *L. polydichotoma*
1b. Herbs; flowering stems herbaceous, creeping, procumbent, or erect, weak, if divaricately branched then never intricate and never with subulate later subspinescent peduncles.
2a. Plants with flagelliform branching runners on nodes with small leaf rosettes and solitary pedunculate capitula ..... 4. *L. sarmentosa*
2b. Plants with procumbent to erect stems or acaulescent.
3a. Phyllaries (especially inner ones) with narrow to inconspicuous white scarious margin; achene 4–7 mm, homomorphic, with 5 main ribs; pappus persistent ..... 1. *L. acaulis*
3b. Phyllaries (especially outer ones) with broad and conspicuously white scarious margin; achene 2–4 mm, dimorphic, inner ones whitish to grayish with 4 thick main ribs, outer ones brownish to grayish, ± compressed, and with 5 main ribs; pappus caducous with pappus disk ..... 3. *L. procumbens*

1. Launaea acaulis (Roxburgh) Babcock ex Kerr in Craib, Fl. Siam. 2: 299. 1936.

光茎栓果菊 guang jing shuan guo ju

Prenanthes acaulis Roxburgh, Fl. Ind., ed. 1832, 3: 403. 1832; *Crepis acaulis* (Roxburgh) J. D. Hooker; *Lactuca glabra* Candolle; *Launaea glabra* (Candolle) Franchet; *Microrhynchus glaber* Wight; *Youngia acaulis* (Roxburgh) Candolle.

Herbs 10–35 cm tall, perennial, subacaulescent or caulescent, rosulate, glabrous. Rootstock thick, woody, with shoot-bearing roots. Stems few to some, slender, ascending-erect, sparsely branched or simple, leafless or rarely with a few leaves near base. Rosette leaves (sometimes a few extended to basal portion of flowering shoot) spatulate to lanceolate, 5–14 × 0.5–1 cm, base cuneate, margin denticulate and subentire to shallowly sinuate-dentate, apex acute, obtuse, or rounded. Synflorescence sparsely corymbiform, with 1 to a few capitula. Capitula with usually 10–14 florets. Involucre cylindric, 1.2–1.5 cm at anthesis, to 1.7 cm in fruit. Phyllaries with narrow or indistinct scarious margin; outer phyllaries triangular-ovate to lanceolate, longest ca. 1/2 as long as inner phyllaries; inner phyllaries 5–9. Achene whitish, homomorphic, columnar, cylindric, or subfusiform, 4–7 mm, with 5 main ribs, apex truncate. Pappus 6–8 mm, persistent. Fl. and fr. Apr–May. $2n = 18$.

Roadsides on mountain slopes, wastelands, sparsely forested steppes; 300–3600 m. Guangxi, Guizhou, Hainan, Sichuan, Yunnan [Bangladesh, Bhutan, India, Kashmir, Laos, Myanmar, Nepal, N Thailand, N Vietnam].

2. Launaea polydichotoma (Ostenfeld) Amin ex N. Kilian, Englera 17: 166. 1997.

河西菊 he xi ju

Chondrilla polydichotoma Ostenfeld in Hedin, S. Tibet 6(3): 29. 1922; *Hexinia polydichotoma* (Ostenfeld) H. L. Yang; *Zollikoferia polydichotoma* (Ostenfeld) Iljin.

Herbs 15–50 cm tall, perennial, spheroid. Caudex without residue of fibrous and lacerate sheath, with many stems. Stems erect, hardened to herbaceous, intricately and divaricately branched from base. Lower stem leaves sessile, linear, 0.5–4 × 0.2–0.5 cm, base semiamplexicaul, apex obtuse; leaves higher up on stem reduced and narrowly spatulate to narrowly lan-

ceolate and finally reduced to ovate-acute bracts. Synflorescence divaricately paniculiform, with numerous capitula. Capitula with 5–11 florets; peduncle subulate and after shedding of capitulum hardened and subspinescent. Involucre cylindric, 9–12 × 2–3 mm. Phyllaries glabrous, with indistinct scarious margin; outer phyllaries triangular-ovate to lanceolate, longest ca. 3/4 as long as inner phyllaries; inner phyllaries (4 or)5. Achene pale yellow to yellowish brown, homomorphic, cylindric to obcolumnar, 3–5 mm, with 5 main ribs, transversely wrinkled, apex truncate. Pappus 7–10 mm, deciduous. Fl. and fr. May–Sep.

• Sandy soils, edges of sandy soils, between sand dunes; 400–2100 m. Gansu, Xinjiang.

Molecular phylogenetic analyses by N. Kilian (unpubl.) corroborate the classification of *Launaea polydichotoma* in *Launaea*, where it is closely related to *L. acanthodes* (Boissier) Kuntze of SW Asia.

3. Launaea procumbens (Roxburgh) Ramayya & Rajagopal, Kew Bull. 23: 465. 1969.

假小喙菊 jia xiao hui ju

Prenanthes procumbens Roxburgh, Fl. Ind., ed. 1832, 3: 404. 1832; *Launaea fallax* (Jaubert & Spach) Kuntze; *Microrhynchus fallax* Jaubert & Spach; *Paramicrorhynchus procumbens* (Roxburgh) Kirpicznikov; *Sonchus lakouensis* S. Y. Hu; *S. mairei* H. Léveillé (1915), not H. Léveillé (1913); ?*Youngia alashanica* H. C. Fu; *Zollikoferia fallax* (Jaubert & Spach) Boissier.

Herbs, perennial, rosulate, branched from base, procumbent to ascending. Taproot with shoot-bearing lateral roots. Stems 5–30 cm, divaricately branched, puberulent or glabrous, with few leaves or leafless. Rosette leaves spatulate, 5–7 × 2–3 cm, sinuate-dentate to variously pinnately lobed, tapering into a narrow base, margin white cartilaginous denticulate; lateral lobes 3 or 4 pairs, elliptic to triangular, apex rounded to obtuse; terminal lobe lanceolate to elliptic, apex obtuse. Stem leaves smaller, base often clasping, otherwise similar to rosette leaves. Synflorescence divaricately paniculiform, with capitula frequently clustered. Capitula with 15–20(–30) florets. Involucre cylindric, 10–12 × ca. 3 mm. Phyllaries glabrous, margin broadly white scarious, apex acute to obtuse; outer phyllaries triangular-ovate to linear-lanceolate, to 2/3 as long as inner phyllaries; inner phyllaries 8. Achenes dimorphic, 2–4 mm, apex pointed to subtruncate; outer achenes grayish to brown, ± fusiform, ± compressed, with 5 main ribs, transversely wrinkled; inner achenes whitish to grayish, columnar, with 4 thick, soft main ribs, smooth. Pappus 8–9 mm, caducous with pappus disk. Fl. and fr. Jun–Oct. $2n = 18$.

Alkaline areas, steppes, meadows, irrigated land, floodplains; 1500–2000 m. Gansu, Nei Mongol (Alxa Meng), Sichuan, Xinjiang, Yunnan [Afghanistan, India, Kashmir, Kazakhstan, Myanmar, Nepal, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

Molecular phylogenetic analyses by N. Kilian (unpubl.) corroborate his previous conclusion inferred from achene morphology (N. Kilian, Englera, 17. 1997) that *Launaea procumbens* is very closely related to the following species, *L. sarmentosa*, which provides the type of the name *Launaea*, therefore refuting its generic segregation as *Paramicrorhynchus*. The species enters China both from the south (Sichuan, Yunnan) and the northwest (Gansu, W Nei Mongol, Xinjiang). Its presence in W Nei Mongol was reported by Tzvelev (Rast. Tsentral. Azii 14b: 79. 2008). The description and illustration of *Youngia alashanica* (H. C. Fu in Ma, Fl. Intramongol., ed. 2, 4: 849. 1993) from Ejin Qi, Nei Mongol, with high probability actually also refer to *L. procumbens* and would confirm its occurrence there.

4. Launaea sarmentosa (Willdenow) Kuntze, Revis. Gen. Pl. 1: 350. 1891.

匐枝栓果菊 fu zhi shuan guo ju

Prenanthes sarmentosa Willdenow, Phytographia, 10. 1794; *Launaea pinnatifida* Cassini; *Microrhynchus sarmentosus* (Willdenow) Candolle.

Herbs, perennial, rosulate, creeping, glabrous. Taproot with trailing shoot-bearing lateral roots. Stems several, flagelliform, creeping, 20–90 cm, branched; nodes 4–15 cm apart, with adventitious roots and secondary leaf rosettes. Rosette leaves spatulate, 3–8 × 0.6–1 cm, sinuate-dentate to pinnately lobed, attenuate toward base, margin weakly to distinctly denticulate, apex acute, obtuse, or rounded. Capitulum solitary, terminating secondary leaf rosettes along stems, with usually 14–18 florets; peduncle wiry, 1–3 cm. Involucre cylindric, 1.1–1.4 cm. Phyllaries with distinct white scarious margin, apex acute to obtuse; outer phyllaries triangular-ovate to linear-lanceolate, longest ca. 1/2 as long as inner phyllaries; inner phyllaries 8. Achenes weakly dimorphic, brownish to blackish, columnar to cylindric, 3–5 mm; outer achenes with 5 thick soft ribs, smooth, apex pointed to subtruncate; inner achenes with 4 ribs. Pappus 4–8 mm, caducous with pappus disk. Fl. and fr. Jun–Sep. $2n = 18$.

Open sandy coastal areas just above high tide mark. Guangdong, ?Guangxi, Hainan [India, Indonesia (Java), Myanmar, Sri Lanka, Thailand, Vietnam; E and SE Africa, W Australia].

63. SONCHUS Linnaeus, Sp. Pl. 2: 793. 1753.

苦苣菜属 ku ju cai shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, annual, biennial, or perennial. Stem erect, not or sparsely branched below synflorescence, leafy. Leaves pinnate to undivided. Synflorescence corymbiform or paniculiform, with few to numerous capitula. Capitula with usually 70–300 florets. Involucre campanulate to broadly campanulate, as peduncle often with stipitate glandular hairs and basally ± white tomentose. Phyllaries green, glabrous or glandular hairy; outer phyllaries in several series, gradually longer centripetally, ± imbricate with longest 1/2–3/4 as long as inner ones; inner phyllaries 8–15, ± equal in length, linear-lanceolate to linear. Receptacle naked. Florets yellow. Achene

brownish, ovoid to ellipsoid, compressed, narrowed toward both ends, with (4 or)5 main ribs usually accompanied by 2 secondary ribs, smooth or transversely wrinkled. Pappus white, caducous or persistent, of numerous soft fine outer bristles intermixed with some thicker often ± easily caducous inner bristles.

About 90 species in its wider circumscription: Africa, Asia, Australia, Europe, Pacific islands (New Zealand); five species (two introduced) in China.

The revised, wider circumscription of *Sonchus* is based on molecular phylogenetic analyses by S. C. Kim et al. (Molec. Phylogen. Evol. 44: 578–597. 2007) and includes several former segregates, which, however, are not present in China.

The main diversity of this genus is in E Africa, the W Mediterranean region, and the mid-Atlantic archipelagos.

1a. Achene distinctly oblanceolate in outline, strongly or distinctly compressed, space between slender ribs much wider than main ribs; annuals (or biennials).
  2a. Achene strongly compressed, ± winged, smooth when fully mature; auricles of middle stem leaves rounded and appressed ..... 4. *S. asper*
  2b. Achene distinctly compressed, not winged, distinctly wrinkled when fully mature; auricles of middle stem leaves usually acutely prostrate ..... 5. *S. oleraceus*
1b. Achene narrowly ellipsoid, moderately to weakly compressed, space between ribs usually narrower than ribs; perennials.
  3a. Outer phyllaries triangular-ovate to lanceolate, 1.5–3 mm wide; peduncles and involucres never glandular hairy; pappus persistent, 1.1–1.2 cm ..... 1. *S. brachyotus*
  3b. Outer phyllaries ± linear-lanceolate, 1–2 mm wide; peduncles and involucres mostly glandular hairy or more rarely non-glandular; pappus persistent or caducous, 6–9 mm.
    4a. Pappus persistent; peduncles and involucres glandular hairy or not; achene ± elliptic in cross section, with 1(or 2) weakly prominent main rib(s) on either face; plants with a taproot ..... 2. *S. wightianus*
    4b. Pappus caducous ± as a unit; peduncles and involucres always glandular hairy; achene ± quadrangular in cross section, with 1 very strongly prominent main rib on either face; plants with a short thick rhizome ..... 3. *S. palustris*

1. Sonchus brachyotus Candolle, Prodr. 7: 186. 1838.

长裂苦苣菜 chang lie ku ju cai

Sonchus arenicola Voroschilov; *S. arvensis* Linnaeus subsp. *arenicola* (Voroschilov) Voroschilov; *S. arvensis* f. *brachyotus* (Candolle) Kirpicznikov; *S. arvensis* subsp. *brachyotus* (Candolle) Kitamura; *S. brachyotus* var. *potaninii* Tzvelev; *S. cavaleriei* H. Léveillé; *S. chinensis* Fischer; *S. fauriei* H. Léveillé & Vaniot; *S. taquetii* H. Léveillé.

Herbs 30–100 cm tall, perennial. Taproot with shoot-bearing lateral roots. Stem usually unbranched below synflorescence, glabrous. Basal and lower stem leaves narrowly elliptic to oblanceolate, 5–20 × 1–3(–5) cm, undivided or rarely pinnatifid to pinnatipartite, glabrous, base semiamplexicaul to shortly auriculately clasping, margin denticulate and often sinuate-dentate, apex rounded, obtuse, or subacute; lateral lobes triangular to narrowly triangular if any. Middle and upper stem leaves similar to lower leaves but smaller. Synflorescence corymbiform, with few to several capitula. Capitula with very many (usually 170–300) florets; peduncle 0.5–7 cm, slender, glabrous or more rarely white tomentose apically and glabrescent. Involucre broadly campanulate, ca. 1.5 cm, glabrous or more rarely basally faintly white tomentose. Phyllaries mostly glabrous, apex acute; outer phyllaries triangular-ovate to lanceolate, 1.5–3 mm wide. Corolla 1.6–2.6 cm. Achene narrowly ellipsoid, 2–4 mm, subcompressed, with 1–3 main ribs on either face, weakly rugose. Pappus 1.1–1.2 cm, persistent. Fl. and fr. May–Sep. $2n = 18$.

Grassy slopes in mountains, by rivers, alkaline areas; 300–4000 m. ?Fujian, Gansu, Guangdong, Guangxi, Hebei, Heilongjiang, Henan, ?Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, ?Zhejiang [Japan, Kazakhstan, Kyrgyzstan, Mongolia, SE Russia, Thailand].

The diploids *Sonchus brachyotus* and *S. wightianus* together with the diploid Mediterranean and SW to C Asian *S. maritimus* Linnaeus and the chiefly European polyploid *S. arvensis* Linnaeus (see also note under *S. wightianus*) form a group of closely related species. Identity and delimitation of *S. brachyotus*, *S. wightianus*, and *S. arvensis* (incl. *S. uliginosus* M. Bieberstein) had long been misunderstood, before Boulos (Bot. Not. 126: 155–196. 1973) clarified their taxonomy. Due to the confusion in the past, the distribution of *S. brachyotus* in China is probably still incompletely known. Two conceptual problems surrounded this species. 1) The name *S. transcaspicus* Nevski was applied (e.g., FRPS 80(1): 66. 1997) for plants of this group with glabrous, non-glandular involucres and undivided leaves, and that species was considered as widely distributed in China, except for the southeast. *Sonchus transcaspicus*, however, is a name coined for C Asian populations of *S. maritimus* (see, e.g., Kirpicznikov, Fl. URSS 29: 244–260. 1964). The alleged minor differences in leaf shape are not consistent and do not justify the recognition of two taxonomic entities, as has been concluded already by Boulos (loc. cit.) and more recently confirmed by Sennikov (Bot. Zhurn. 85(12): 90–94. 2000). The easternmost occurrences of *S. maritimus/S. transcaspicus* are in Tajikistan and Kyrgyzstan (according to Sennikov, loc. cit.) or, more likely, even further west in E Turkmenistan (Boulos, loc. cit.; Tzvelev, Rast. Tsentral. Azii 14b: 77. 2008). The species is also not given in the treatment of *Sonchus* for the immediately adjacent Chinese province of Xinjiang (C. H. An, Fl. Xinjiang. 5: 434–438. 1999). *Sonchus transcaspicus* sensu FRPS (80(1): 66. 1997) instead refers to the frequent undivided-leafy form of *S. brachyotus*. The latter species, like *S. arvensis* and in contrast to *S. maritimus*, does not actually have a rhizome, although often stated in the literature, but has lateral roots that produce new shoots even after the root system has been fragmented. Moreover, *S. maritimus/S. transcaspicus* is a species with glaucous leaves, smaller capitula with 80–150 florets, a corolla with the tube much shorter than the ligule, achene of 2–3 mm only, and

a caducous pappus. 2) The name *S. uliginosus* has been applied (e.g., FRPS 80(1): 68. 1997) for plants of this group with glabrous, non-glandular involucres and pinnately lobed leaves with broadly triangular-obovate to semiorbicular lateral lobes. For the most part, this includes plants of *S. wightianus* (also referred to as *S. wightianus* subsp. *wallichianus*). Some records, however, from the northern provinces especially, apparently refer to the rarer pinnately leafy form of *S. brachyotus*.

2. Sonchus wightianus Candolle, Prodr. 7: 187. 1838.

苣荬菜 ju mai cai

Sonchus lingianus C. Shih; *S. picris* H. Léveillé & Vaniot; *S. wallichianus* Candolle; *S. wightianus* subsp. *wallichianus* (Candolle) Boulos.

Herbs 30–150 cm tall, perennial, with a taproot. Stem branched from base or higher, glabrous below synflorescence. Basal and lower stem leaves oblanceolate to elliptic, 6–24 × 1.5–6 cm, undivided or pinnatifid to pinnatipartite, glabrous, base narrowed (in basal leaves) to auriculately clasping (in lower stem leaves), margin denticulate to mucronulately dentate, apex obtuse to acute; lateral lobes if present 2–5 pairs, lanceolate, ovate, semiorbicular, or sometimes triangular-ovate; terminal lobe narrowly ovate to elliptic, ± large, apex obtuse to acuminate. Middle and upper stem leaves elliptic to lanceolate, smaller, otherwise similar to lower leaves. Synflorescence corymbiform, with several to many capitula. Capitula with very many (usually 180–300) florets; peduncle slender, apically white tomentose, densely glandular hairy or non-glandular. Involucre broadly campanulate, 1.2–1.5 cm, base ± white villous to tomentulose and glandular hairy or not. Phyllaries with or without glandular hairs, apex long acuminate; outer phyllaries lanceolate, 1–1.5 mm wide. Corolla 1.2–1.4 cm. Achene narrowly ellipsoid, 3.5–4.5 mm, moderately compressed, ± elliptic in cross section, weakly rugose, between lateral ribs and with 1(or 2) weakly prominent main rib(s) and several secondary ribs on either face. Pappus 6–9 mm, ± persistent. Fl. and fr. Jan–Oct. $2n = 18$.

Grasslands on mountain slopes, grasslands in forests, forest margins, thickets, beside fields, moist places or near water, wastelands on mountain slopes, gravelly areas by rivers; 300–2300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Ningxia, Shaanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [NE Afghanistan, Bhutan, India, Indonesia (Java), Kashmir, Laos, Malaysia (Peninsular), Myanmar, Nepal, N Pakistan, N Philippines (Luzon), Sri Lanka, N Thailand, N Vietnam].

Sonchus wightianus has frequently been misidentified with the habitually similar *S. arvensis*, which is chiefly restricted to Europe (but also introduced to North America) and a hybridogenous species, in which a tetraploid ($2n = 36$) *S. arvensis* subsp. *uliginosus* (M. Bieberstein) Nyman (with non-glandular capitula and peduncles) and a hexaploid ($2n = 54$) *S. arvensis* subsp. *arvensis* (with glandular capitula and peduncles) are distinguished. *Sonchus arvensis* is probably derived from hybridization, in which *S. brachyotus* and/or *S. wightianus* on the maternal side and *S. maritimus* and/or *S. crassifolius* Pourret ex Willdenow on the paternal side are involved (S. C. Kim et al., Molec. Phylogen. Evol. 44: 576–597. 2007). The diploid *S. wightianus* has adaxially often reddish marginal florets and does not, in contrast to *S. arvensis* and *S. brachyotus*, produce shoot-bearing roots. Also, in *S. wightianus* plants with non-glandular or glandular peduncles and capitula occur. The former have been distinguished as *S. wightianus* subsp. *wallichianus* and referred to in FRPS (80(1): 66. 1997) as *S. uliginosus* (= *S. arvensis* subsp. *uliginosus*), but they seem to be neither geographically nor ecologically separated. Absence of glandular indumentum is a variation not uncommon in *Sonchus*, as in the case of *S. wightianus*, and apparently is without systematic value. *Sonchus lingianus*, described from China, is a mere form of *S. wightianus* with spatulate to narrowly elliptic, undivided leaves.

3. Sonchus palustris Linnaeus, Sp. Pl. 2: 793. 1753.

沼生苦苣菜 zhao sheng ku ju cai

Herbs to 1.8 m tall, perennial. Rhizome short, 4–5 cm thick. Stems stout, base ca. 3 cm in diam., branched apically. Lower stem leaves sessile, oblanceolate to lanceolate, 15–35 × 5–20 cm, undivided to pinnatipartite, glabrous, base sagittately clasping, margin denticulate, apex acuminate; lateral lobes if present 1–3 pairs, lanceolate, apex acute; terminal lobe triangular to triangular-lanceolate. Middle and upper stem leaves lanceolate; uppermost stem leaves reduced, linear-lanceolate to linear. Synflorescence corymbiform to paniculately corymbiform, with many capitula. Capitula with many (usually 70–90) florets; peduncle slender, densely glandular hairy. Involucre campanulate, to 1.5 cm. Phyllaries abaxially glandular hairy, apex acute to acuminate; outer phyllaries linear-lanceolate, 1–2 mm wide; inner phyllaries linear-lanceolate. Corolla ca. 1.2 cm. Achene narrowly ellipsoid, ca. 4 mm, weakly compressed, ± quadrangular in cross section, weakly rugose, between lateral ribs usually with 1 very strongly prominent main rib and several secondary ribs on either face. Pappus 7–8 mm, caducous ± as a unit. Fl. and fr. Jun–Sep. $2n = 18$.

By water and lakes; 400–900 m. Xinjiang [Kazakhstan, Kyrgyzstan, W Russia, Tajikistan, Turkmenistan, Uzbekistan; Europe].

4. Sonchus asper (Linnaeus) Hill, Herb. Brit. 1: 47. 1769.

花叶滇苦菜 hua ye dian ku cai

Sonchus oleraceus Linnaeus var. *asper* Linnaeus, Sp. Pl. 2: 794. 1753; *S. spinosus* Lamarck.

Herbs 20–50 cm tall, annual. Stem usually unbranched and glabrous below synflorescence. Basal and lower stem leaves extremely variable, obovate, spatulate, or elliptic, 7–13 × 2–5 cm, undivided or ± irregularly pinnatisect, glabrous, adaxially dark green and ± glossy, base attenuate and ± auriculate, margin usually densely spinulosely dentate, apex acute, acuminate, or obtuse; lateral lobes ± triangular, semiorbicular, or elliptic. Middle and upper stem leaves spatulate to lanceolate, base auriculately clasping with conspicuous rounded and appressed auricles, otherwise similar to lower leaves. Synflorescence densely corymbiform, with few to some capitula. Capitula with many florets; peduncle 0.5–5 cm, slender, glabrous or densely glandular hairy. Involucre ± campanulate, ca. 1.2 cm. Phyllaries abaxially glabrous or more rarely glandular hairy, apex acute; outer phyllaries narrowly lanceolate, 1–2 mm wide. Corolla ca. 1 cm. Achene ± broadly obcolumnar, 2–3 mm, strongly compressed, ± winged, between lateral ribs usually with 3 slender ribs on either side, space between slender ribs much wider than ribs, smooth with only lateral ribs usually antrorsely finely spinulose. Pappus ca. 7 mm, ± caducous. Fl. and fr. May–Oct. $2n = 18$.

Mountain slopes, forest margins, by water, field margins, ruderal areas; 1500–3700 m. Naturalized in Guangxi, Hubei, Jiangsu, Shandong, Sichuan, Taiwan, Xinjiang, Xizang, and Zhejiang [presumably originating from Europe and Mediterranean region].

Sonchus asper is naturalized in areas adjacent to China including Afghanistan, Bhutan, India, Japan, Kashmir, Kazakhstan, Korea, Kyrgyzstan, Nepal, Pakistan, Russia, Tajikistan, Thailand, Turkmenistan, Uzbekistan, and Vietnam. The species is also naturalized in sub-Saharan Africa, Asia, Australia, New Guinea, North and South America, and Pacific islands (New Zealand).

5. Sonchus oleraceus Linnaeus, Sp. Pl. 2: 794. 1753.

苦苣菜 ku ju cai

Sonchus ciliatus Lamarck; *S. mairei* H. Léveillé (1913), not H. Léveillé (1915).

Herbs 40–150 cm tall, annual or sometimes biennial. Stem below synflorescence simple or branched, glabrous. Basal and lower stem leaves with basal portion petiole-like and attenuate, mostly smaller than middle stem leaves, otherwise similar. Middle and upper stem leaves extremely variable, elliptic, oblanceolate, or lanceolate, 6–20 × 2–9 cm, almost entire to ± irregularly pinnatisect, soft, glabrous, adaxially dull green, base auriculately clasping with auricles usually acutely prostrate, margin ± coarsely spinulosely dentate, apex acute; lateral lobes triangular to elliptic, usually recurved, apex acute to acuminate; terminal lobe larger than others, broadly triangular, broadly hastate, or obovate-cordate. Synflorescence shortly corymbiform or racemiform, with few to several capitula. Capitula with many florets; peduncle 0.5–3(–5) cm, slender, glabrous, glandular hairy, or apically white tomentose. Involucre ± campanulate, 1–1.2 cm. Phyllaries glabrous or with few glandular hairs, apex ± obtuse; outer phyllaries triangular to narrowly lanceolate, 1–3 mm wide. Corolla 1–2 cm. Achene obcolumnar, 2.5–4 mm, distinctly compressed, between lateral ribs with 3(–5) slender ribs on either side, space between slender ribs much wider than ribs, distinctly rugose when fully mature. Pappus 6–8 mm, ± persistent. Fl. and fr. May–Dec. $2n = 32$.

Mountain slopes, forests, forest margins, fields, near water, open land, ruderal areas; 1700–3200 m. Naturalized in Anhui, Fujian, Gansu, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, and Zhejiang [presumably originating from Europe and Mediterranean region].

Sonchus oleraceus is naturalized in all countries neighboring China and is anthropogenically distributed almost worldwide.

The entire plants are used medicinally.

64. CHONDRILLA Linnaeus, Sp. Pl. 2: 796. 1753.

粉苞菊属 fen bao ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, perennial [or rarely annual], with or without basal leaf rosette, often broomlike, glabrous or with simple bristles, arachnoid hairy, or tomentose. Synflorescence of individual axes in broomlike plants sparsely racemiform or with a single terminal capitulum. Capitula with usually 5–12 florets. Involucre narrowly cylindric. Phyllaries glabrous, arachnoid hairy, or with simple bristles; outer phyllaries few, only slightly longer centripetally, longest ca. 1/4 as long as inner ones; inner phyllaries 5(–7) or ca. 8, ± equal in length, ± linear-lanceolate. Receptacle naked. Florets yellow. Achene body subcylindric, somewhat narrowed toward base, with 5 main ribs, each rib usually divided into 3 secondary ribs, apically or from middle with tubercles or scales, apically usually with a corona of 5 entire or 3-lobed ± membranous scales; beak usually present, short and stout to longer and filiform, when fully mature with or without fine transversal articulation preforming rupture of beak. Pappus white, simple, of scabrid bristles.

About 30 species: mostly in C and SW Asia and the Mediterranean region; ten species in China.

The noxious weed *Chondrilla juncea* Linnaeus has been introduced to Australia, North and South America, and Pacific islands (New Zealand) but has not yet been reported from China.

1a. Capitula with 5 or 6 florets; inner phyllaries 5(–7).
  2a. Achene with a conspicuous 0.5–1.5 mm beak, body with well-developed apical corona of scales ..... 9. *C. pauciflora*
  2b. Achene shortly attenuate into a rudimentary stout beak of 0.1–0.3 mm, body without apical corona of scales or corona at most very indistinct ..... 10. *C. ambigua*
1b. Capitula with 9–12 florets; inner phyllaries ca. 8.
  3a. Beak of mature achene without fine transversal articulation preforming rupture of beak; plants rosulate but rosette leaves withered at anthesis.
    4a. Stem leaves linear-lanceolate to linear, to 0.6 cm wide, subglabrous; stem and branches glabrous; achene body with corona of 5 variably shaped entire to weakly 3-lobed scales to 0.5 mm ..... 1. *C. brevirostris*
    4b. Stem leaves lanceolate to broadly ovate, 1–3 cm wide, pubescent; stem and branches arachnoid pubescent to tomentose; achene body with corona of 5 linear-lanceolate, entire to sometimes 3-lobed, and acute scales to 1 mm ..... 2. *C. aspera*
  3b. Beak of mature achene with fine transversal articulation preforming rupture of beak; plants never rosulate.
    5a. Achene beak articulation approximately in its middle; inner phyllaries dark green or blackish, bristles blackish if present.
      6a. Achene body below corona smooth or with isolated tubercles, beak constricted at articulation .... 3. *C. phaeocephala*
      6b. Achene body below corona with few scales, beak not constricted at articulation ..... 4. *C. ornata*

5b. Achene beak articulation distinctly below its middle, near its base, or below or slightly above upper edge of corona; inner phyllaries green, light green, or grayish green, bristles pale if present.
7a. Corona scales of achene of approximately quadrangular shape, upper margin weakly 3-lobed or entire.
8a. Achene body below corona usually without scales or more rarely with few very small toothlike scales, beak 0.8–1.5 mm ..... 5. *C. piptocoma*
8b. Achene body below corona with few rows of conspicuous quadrangular scales similar to corona scales, beak 1–2.5 mm ..... 6. *C. laticoronata*
7b. Corona scales of achene distinctly triangular and undivided or deeply divided with distinctly triangular lobes.
9a. Corona scales of achene deeply and ± equally to very unequally (with dominating middle lobe) 3-lobed; achene body below corona with few rows of tubercles and narrow scales; beak 1.3–3(–4) mm, articulation below its middle and above upper edge of corona terminating basal conical portion ..... 7. *C. leiosperma*
9b. Corona scales of achene undivided and narrowly triangular; achene body below corona with few rows of short and wide scales; beak 1.2–2.3 mm, articulation at its base near upper edge of corona ..... 8. *C. rouillieri*

1. Chondrilla brevirostris Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 3: 32. 1837.

短喙粉苞菊 duan hui fen bao ju

Chondrilla filifolia Iljin.

Herbs 30–60 cm tall, perennial, rosulate, becoming broomlike. Stem strongly erect-spreadingly branched from base, basally somewhat setaceous otherwise glabrous; branches slender, virgate. Rosette leaves spatulate to elliptic, 7–11 × 0.5–1.5 cm, withered at anthesis, runcinately pinnate, glabrous or abaxially with sparse rigid hairs. Lower and middle stem leaves lanceolate to linear, 2–11 cm × 1–5 mm, weakly but ± sharply incised or entire, glabrous or abaxially with sparse rigid hairs. Capitula with usually 9–12 florets. Involucre 1–1.2 cm, arachnoid hairy, occasionally with very few bristles. Phyllaries grayish green; outer phyllaries broadly triangular-ovate, longest ca. 2 mm; inner phyllaries 8. Achene body 4–5 mm, with a corona of 5 variably shaped entire to weakly 3-lobed erect scales of 0.2–0.5 mm, below corona with 1 to few rows of short rounded scales; beak 0.5–2.5 mm, without articulation. Pappus 6–9 mm. Fl. and fr. Jun–Sep. $2n = 15$.

Desert steppes, grasslands in forests; ca. 1300 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia (W Asian and E and S European parts)].

2. Chondrilla aspera Poiret, Encycl. Suppl. 2: 329. 1811.

硬叶粉苞菊 ying ye fen bao ju

Prenanthes aspera Schrader ex Willdenow, Sp. Pl. 3: 1539. Dec 1803, not Michaux (Mar 1803); *Chondrilla stricta* Ledebour; *Youngia aspera* (Poiret) Steudel.

Herbs 60–110 cm tall, perennial, rosulate. Stem erect, branched particularly higher up, basally densely hirsute otherwise grayish white tomentose. Rosette leaves and lower stem leaves narrowly obovate to oblanceolate, 6–18 × to 5 cm, withered at anthesis, runcinately pinnate, leathery, abaxially with arachnoid hairs and with long bristles on veins. Middle and upper stem leaves broadly ovate to lanceolate, base subamplexicaul, margin dentate, smaller than lower stem leaves but otherwise similar. Synflorescence paniculiform. Capitula with usually 9–12 florets. Involucre 1.2–1.4 cm, arachnoid hairy. Phyllaries grayish green; outer phyllaries triangular-ovate, longest ca. 2 mm; inner phyllaries 8, usually ± with bristles on midvein. Achene body 3–4 mm, apically with a corona of 5 unlobed or sometimes to ± 3-lobed erect linear-lanceolate scales to 1 mm, below corona with tubercles and short scales in several rows; beak (1–)3–4(–5) mm, without articulation. Pappus 6–8 mm. Fl. and fr. Jul–Sep.

Mountain slopes; 1100–1400 m. Xinjiang [Kazakhstan, Kyrgyzstan, SC Russia, Tajikistan].

Chondrilla canescens Karelin & Kirilov, which is distinguished from *C. aspera* chiefly by 3-lobed corona scales of the achene body (Leonova, Fl. URSS 29: 562–563. 1964), was also treated in FRPS (80(1): 296. 1997) as a species from Xinjiang but was not included by C. H. An (Fl. Xinjiang. 5: 430. 1999). According to Tzvelev (Rast. Tsentral. Azii 14b: 84. 2008) the two are probably conspecific. We follow C. H. An, treating the Chinese plants all as *C. aspera*.

3. Chondrilla phaeocephala Ruprecht, Zap. Imp. Akad. Nauk 14: 59. 1869.

暗粉苞菊 an fen bao ju

Chondrilla maracandica Bunge.

Herbs 30–70 cm tall, perennial, broomlike. Stem basally erect-spreadingly and higher up divaricately branched; branches slender, glabrous or arachnoid hairy, ± leafy. Lower stem leaves narrowly elliptic, 4–4.5 × 0.2–1 cm, early deciduous, margin subentire to weakly runcinately dentate. Middle and upper stem leaves linear-elliptic, linear, or subfiliform, 2–4 cm × 0.5–1.5 mm, margin entire. Capitula with usually 10–12 florets. Involucre 1.1–1.2 cm, arachnoid hairy and with or without blackish bristles. Phyllaries dark green to blackish; outer phyllaries triangular-ovate to lanceolate, longest ca. 2.5 mm; inner phyllaries 8, abaxially with or without long bristles along midvein. Achene body 3–5 mm, with a corona of 5 short unlobed to ± unequally 3-lobed (middle lobe longest) erect scales of ca. 0.2 mm, below corona smooth or with isolated tubercles, sometimes corona inconspicuous or absent; beak stout, 0.8–2.3 mm, constricted and with distinct fine articulation approximately in its middle. Pappus 6–7 mm. Fl. and fr. Jun–Sep.

Gravelly areas in deserts; 900–4000 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

Chondrilla maracandica, treated as a species of the flora of Xinjiang by C. H. An (Fl. Xinjiang. 5: 430. 1999; see also Leonova, Fl. URSS 29: 578. 1964; Tzvelev, Rast. Tsentral. Azii 14b: 84. 2008), appears not convincingly distinct from *C. phaeocephala* and is here tentatively considered as conspecific.

4. Chondrilla ornata Iljin, Bjull. Otdel. Kaučuk. 3: 43. 1930.

中亚粉苞菊 zhong ya fen bao ju

Herbs 40–70 cm, perennial, broomlike. Stem strongly branched from base, basally arachnoid hairy; branches yellowish green, slender, virgate, glabrous, ± leafy. Lower stem leaves narrowly elliptic to linear, early deciduous, abaxially with bristles on midrib and at margin, margin denticulate. Middle and upper stem leaves filiform, 1–3 cm × ca. 1 mm, glabrous, margin entire. Capitula with ca. 11 florets. Involucre ca. 1.1 cm, scattered arachnoid hairy. Phyllaries dark green; outer phyllaries triangular-ovate, longest ca. 1.5 mm; inner phyllaries 8. Achene body 3–5 mm, apically with a corona of 5 wide entire to weakly and obtusely 3-lobed scales of 0.1–0.2 mm, below corona with few further scales; beak stout, 0.5–1 mm, with fine articulation approximately in its middle. Pappus 5–7 mm. Fl. and fr. Jul–Sep. $2n = 20$.

Rocky gravelly slopes; 400–1000 m. Xinjiang [Kyrgyzstan].

No material of *Chondrilla ornata* has been seen by the present authors. The description is based on Iljin (loc. cit.), Leonova (Fl. URSS 29: 579. 1964), and C. H. An (Fl. Xinjiang. 5: 429. 1999).

5. Chondrilla piptocoma Fischer, C. A. Meyer & Avé-Lallemant, Index Sem. Hort. Petrop. 8: 54. 1842.

粉苞菊 fen bao ju

Chondrilla piptocoma subsp. *soongarica* (Stscheglejew) Iljin; *C. soongarica* Stscheglejew.

Herbs 35–120 cm tall, perennial, ± broomlike. Stem basally erect-spreadingly and higher up divaricately branched; branches slender, densely arachnoid hairy to more rarely ± glabrous, ± leafy. Lower stem leaves narrowly oblanceolate, 3.5–7 cm × ca. 4 mm, early deciduous, margin runcinately pinnate or sparsely dentate. Middle and upper stem leaves linear to filiform, 4–6 cm × 0.5–1 mm, glabrous or arachnoid hairy, margin entire. Capitulum with 9–12 florets. Involucre 1–1.3 cm, ± densely arachnoid hairy. Phyllaries grayish to light green; outer phyllaries narrowly triangular-ovate, longest ca. 2 mm; inner phyllaries 8. Achene body 3–5 mm, with ± quadrangular corona scales with margin weakly 3-lobed or entire, below corona without scales or with few very small toothlike scales; beak 0.8–1.5 mm, with fine articulation near its base below or slightly above upper edge of corona. Pappus 6–8 cm. Fl. and fr. Jun–Sep. $2n = 10$.

Gravelly areas on floodplains; 600–3300 m. Xinjiang [Kazakhstan, SC Russia].

According to Iljin (Bjull. Otdel. Kaučuk. 3: 36. 1930) and Leonova (Fl. URSS 29: 574. 1964) the achene body below the corona in *Chondrilla piptocoma* is without or with few scales only. Chinese material with rather well-developed scales below the corona but with a short, stout beak approaches and has been treated as *C. laticoronata* (see also FRPS 80(1): 296. 1997), necessitating a reassessment of the delimitation between both species.

6. Chondrilla laticoronata Leonova, Fl. URSS 29: 754. 1964.

宽冠粉苞菊 kuan guan fen bao ju

Herbs 20–60 cm tall, perennial, ± broomlike. Stem erect-spreadingly branched from base, basally usually densely arachnoid hairy and sometimes with sparse rigid hairs; branches light green, slender, ± leafy. Leaves glabrous or with arachnoid hairs. Lower stem leaves narrowly lanceolate, ca. 3 cm × 3–7 mm, early deciduous, margin entire or weakly dentate. Middle and upper stem leaves linear, narrowly linear, or almost filiform, 1.5–2.5(–5) cm × 0.5–2 mm, margin entire. Capitula with 9–11 florets. Involucre 1–1.3 cm, ± white tomentose. Phyllaries whitish grayish green; outer phyllaries narrowly triangular-ovate, longest ca. 2 mm; inner phyllaries 8, sometimes with a few pale bristles on midvein. Achene body 3.5–4.5 mm, with approximately quadrangular corona scales with truncate and entire to somewhat erose margin, below corona with few rows of conspicuous quadrangular scales similar to corona scales; beak 1–2.5 mm, with fine articulation near its base below or slightly above upper edge of corona. Pappus white, 6–7 mm. Fl. and fr. Jul–Sep.

Gravelly areas; 1000–2200 m. Xinjiang [Kazakhstan, SC Russia].

The delimitation between *Chondrilla laticoronata* and *C. piptocoma* should be reassessed. See note under the latter species, above.

7. Chondrilla leiosperma Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 456. 1841.

北疆粉苞菊 bei jiang fen bao ju

Chondrilla articulata L. E. Rodin; *C. brevicollis* Iljin; *C. coronifera* Iljin.

Herbs 30–120 cm tall, perennial, ± broomlike. Stem erect-spreadingly branched at base, basally ± densely arachnoid hairy, sometimes with few rigid hairs; branches slender, rather sparsely branched, glabrous or pubescent, ± leafy. Lower stem leaves narrowly elliptic to lanceolate, 3–10 × 0.4–1.2 cm, early deciduous, glabrous or arachnoid hairy, margin dentate to weakly ± runcinately pinnate to more rarely almost entire. Middle and upper stem leaves narrowly elliptic, narrowly lanceolate, or linear, 1–5(–7) cm × 1–2 mm, glabrous or with arachnoid hairs, margin entire. Capitula with 9–11 florets. Involucre 1–1.3 cm, arachnoid hairy. Phyllaries grayish green; outer phyllaries triangular-ovate, longest ca. 3 mm; inner phyllaries 8, abaxially sometimes with pale bristles on midvein. Achene body 3–5 mm, with corona scales deeply and ± equally to very unequally 3-lobed with middle lobe then dominating, below corona with few rows of tubercles and narrow scales; beak 1.3–3(–4) mm, with fine articulation below its middle and above upper edge of corona terminating basal conical portion. Pappus 5–8 mm. Fl. and fr. May–Sep. $2n = 15$.

Mountain slopes; 200–1500 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Uzbekistan].

8. Chondrilla rouillieri Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 456. 1841.

基叶粉苞菊 ji ye fen bao ju

Herbs 40–90 cm tall, perennial. Stem erect, branched particularly higher up or more rarely from base, basally usually arachnoid hairy and with sparse rigid hairs or more rarely glabrous; branches slender, virgate, glabrous or sometimes apically sparsely arachnoid hairy. Lower stem leaves narrowly elliptic to narrowly lanceolate, 4–6 × 0.3–0.6 cm, early deciduous, with bristles on margin and abaxially on midvein, margin remotely dentate. Middle and upper stem leaves linear to almost filiform, 0.5–5 × 0.1–0.4(–0.6) cm, glabrous, margin entire. Capitula with 9–11 florets. Involucre 1–1.3 cm, densely arachnoid hairy. Phyllaries grayish green to light green; outer phyllaries triangular-ovate, longest ca. 2 mm; inner phyllaries 8, sometimes with a few bristles on midvein. Achene body 3.5–4(–5) mm, with corona scales narrowly triangular and undivided, below corona with few rows of short and wide scales; beak 1.2–2.3 mm, with fine articulation at its base near upper edge of corona. Pappus 6–7 mm. Fl. and fr. Jun–Sep. $2n = 15$.

Gravelly areas in river valleys, sandy soil, forests; 700–900 m. Xinjiang [Kazakhstan, SC Russia].

9. Chondrilla pauciflora Ledebour, Fl. Altaic. 4: 148. 1833.

少花粉苞菊 shao hua fen bao ju

Chondrilla kossinskyi Iljin; *C. saisanensis* Iljin; *C. squamata* Iljin; *C. thoracifera* Iljin.

Herbs 40–110 cm tall, perennial, broomlike, basally sometimes woody. Stem ± intricately basally erect-spreadingly and higher up divaricately branched; branches slender, glabrous or sometimes apically indistinctly arachnoid hairy, ± leafy. Lower stem leaves lanceolate, 2.5–3.5 × 0.2–0.6 cm, early deciduous, glabrous, margin entire. Middle and upper stem leaves narrowly lanceolate to linear, 1–3 cm × 0.3–1.5 mm, early deciduous, glabrous, margin entire. Capitula with 5(–7) florets. Involucre 1.1–1.5 cm, sparsely arachnoid hairy especially basally. Phyllaries green to dark green; outer phyllaries broadly triangular-ovate, 1–2 mm; inner phyllaries 5(–7). Achene 5–7.5 mm; body apically with a corona of 5 erect 3-lobed to irregularly lobed scales of (0.1–)0.2–0.3 mm with lobes of ± equal length, below with 1 or 2 series of tubercles and/or scales; beak stout, 0.5–1.5(–2) mm, without articulation. Pappus 7–9 mm. Fl. and fr. May–Sep. $2n = 15$.

Gravel steppes; 500–1500 m. Xinjiang [Kazakhstan, Russia (E European part), Uzbekistan].

C. H. An (Fl. Xinjiang. 5: 433. 1999) also includes for Xinjiang *Chondrilla macrocarpa* Leonova, a species otherwise only known from Kyzyl Kum and distinguished from *C. ambigua* by its achene with a body of up to 1.1 cm. The corresponding material has not been seen by the authors, but from the distribution this report appears very questionable (see also Tzvelev, Rast. Tsentral. Azii 14b: 86. 2008); also, from the description given by C. H. An it seems that a confusion probably exists with material of *C. pauciflora*, perhaps with rather indistinctly developed corona.

10. Chondrilla ambigua Fischer ex Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 398. 1842.

沙地粉苞菊 sha di fen bao ju

Herbs 40–100 cm tall, perennial, broomlike, basally sometimes woody. Stem basally erect-spreadingly and higher up densely and intricately divaricately branched; branches slender, glabrous, ± leafy. Lower stem leaves linear-lanceolate to lanceolate, 3–7 × 0.2–0.5 cm, early deciduous, glabrous, margin entire or sometimes very scarcely dentate, apex acute. Middle and upper stem leaves linear-lanceolate to filiform, usually shorter and only 1–1.5 mm wide, otherwise like lower stem leaves. Capitula with ca. 5 florets. Involucre 1.2–1.4 cm, glabrous or sparsely arachnoid hairy especially basally. Phyllaries green to yellowish green; outer phyllaries broadly triangular-ovate, 1–2 mm; inner phyllaries 5. Achene cylindric, 5–7 mm, without or very faintly with scales or tubercles, without apical corona of scales, apically shortly attenuate into a rudimentary stout beak of 0.1–0.3 mm without articulation. Pappus 6–8 mm. Fl. and fr. May–Sep. $2n = 10$.

Sand dunes, gravel and loess areas; 300–800 m. Xinjiang [Kazakhstan, Russia (S European part), Turkmenistan, Uzbekistan].

65. CREPIS Linnaeus, Sp. Pl. 2: 805. 1753.

还阳参属 huan yang shen shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Barkhausia Moench; *Berinia* Brignoli; *Hieracioides* Vaillant; *Lepicaune* Lapeyrouse; *Soyeria* Monnier.

Herbs, perennial, biennial, or annual, rhizomatous or with a taproot. Stems leafy or leafless. Leaves pinnate or not divided, margin entire or toothed. Synflorescence corymbiform, paniculiform, or racemiform, rarely a solitary capitulum. Capitula erect, medium to large in size. Involucre cylindric to campanulate. Phyllaries in several series; outer phyllaries ± imbricate, centripetally gradually longer, longest 1/4–2/3 or more as long as inner ones; inner phyllaries usually equal in length, linear-lanceolate, abaxially usually with simple and/or glandular hairs, rarely glabrous, adaxially glabrous or with appressed silky hairs. Receptacle naked [or more rarely paleate or with bristles]. Florets yellow [or more rarely reddish purple]. Achene cylindric to fusiform, with 10–20 equal finely spinulescent or smooth and glabrous ribs, apex distinctly attenuate, constricted, or beaked. Pappus white to pale yellowish, soft to rigidulous, scabrid, persistent or caducous.

About 200 species: Africa, Asia, Europe, North America; 18 species (five endemic) in China.

1a. Plants with a horizontal, vertical, or oblique rhizome.

2a. Leaf blade of at least some leaves pinnately lobed, otherwise stem leafless; stem leafless or leafy.

3a. Stem leafless or almost so.
4a. Phyllaries abaxially densely with white arachnoid hairs, and stiff, greenish, glandular hairs along midvein; anther tube 1–2 mm ..... 1. *C. multicaulis*
4b. Phyllaries abaxially sparsely with white arachnoid hairs, and with blackish glandular hairs along midvein; anther tube 2–3 mm ..... 2. *C. elongata*
3b. Stem leafy with leaves ± clasping stem.
5a. Involucre 7–9 mm, abaxially with short blackish glandular hairs and often with setaceous simple hairs; achene 3.5–4 mm ..... 3. *C. lyrata*
5b. Involucre 10–13 mm, abaxially glabrous or sparsely white hairy (especially at apex) or with black long simple hairs on midvein; achene 4–6 mm ..... 6. *C. coreana*
2b. Leaf blade not divided and stem always leafy.
6a. Involucre 1.4–1.6 cm or longer.
7a. Stem especially apically with white arachnoid and with stiff subulate greenish hairs; leaf blade margin irregularly and coarsely toothed; involucre abaxially densely with pale stiff subulate hairs especially on midvein ..... 5. *C. sibirica*
7b. Stem sparsely apically arachnoid hairy and densely so under capitula, also with long dark green to blackish hairs; leaf blade margin subentire; involucre abaxially white arachnoid hairy and with dark green to blackish long hairs ..... 9. *C. chrysantha*
6b. Involucre 0.8–1.3 cm.
8a. Involucre 1–1.3 cm, abaxially glabrous to sparsely white hairy (especially at apex) or with black long simple hairs on midvein ..... 6. *C. coreana*
8b. Involucre 0.8–1 cm, abaxially with stipitate blackish glandular hairs on midvein ..... 17. *C. shihii*
1b. Plants without rhizomes but with a taproot.
9a. Synflorescence racemiform to very narrowly paniculiform with some to numerous capitula ..... 14. *C. napifera*
9b. Synflorescence of a solitary capitulum or corymbiform and of 2 to numerous capitula.
10a. Inner phyllaries adaxially appressed hairy (as seen with a lens).
11a. Stem leafy; leaves sagittately clasping stem, margin of upper stem leaves revolute; synflorescence of some to many capitula; involucre 0.7–0.9 cm ..... 4. *C. tectorum*
11b. Stem leafless or sparsely leafy; leaves not clasping stem, margin not revolute; synflorescence of a solitary capitulum or of few capitula; involucre 0.9–1.5 cm.
12a. Involucre 0.9–1.1 cm; phyllaries abaxially with white arachnoid hairs along midvein but without thicker yellow hairs ..... 7. *C. oreades*
12b. Involucre 1–1.5 cm; phyllaries abaxially with ± white arachnoid hairs and especially along midvein with thicker yellowish glandular or partly non-glandular hairs ..... 8. *C. crocea*
10b. Inner phyllaries adaxially glabrous (as seen with a lens).
13a. Plants only with well-developed basal leaves or with basal leaves and lower stem leaves well developed and these larger than upper stem leaves, largest leaves oblanceolate to elliptic and 2–5 cm wide.
14a. Plants subacaulescent, 3–5 cm tall ..... 18. *C. tianshanica*
14b. Plants with well-developed stems, 20–60 cm tall.
15a. Stems leafless or almost so with stem leaves (if present) much reduced and not clasping stem ..... 15. *C. subscaposa*
15b. Stems with well-developed leaves clasping stem ..... 16. *C. darvazica*
13b. Basal leaves or lower stem leaves reduced, linear-subulate, triangular, or bractlike, middle and upper stem leaves well developed, largest stem leaves lanceolate to linear and 1–25 mm wide.
16a. Middle and upper stem leaves lanceolate, elliptic, or narrowly elliptic-lanceolate, 0.3–2.5 cm wide ..... 10. *C. phoenix*
16b. Middle and upper stem leaves linear, 1–10 mm wide.
17a. Leaf blade soft in texture, dark green; stems smooth and dark green; capitula with 18–30 florets ..... 11. *C. bodinieri*
17b. Leaf blade rigid in texture, usually pale yellowish green; stems angular and pale green; capitula with 7–12 florets (only exceptionally more).
18a. Plants sparsely to moderately and divaricately branched from base, above middle, or at apex; stem leaves to 8 cm ..... 12. *C. rigescens*
18b. Plants strongly and fastigiately branched from base or below middle; stem leaves to 3 cm ..... 13. *C. lignea*

1. Crepis multicaulis Ledebour, Icon. Pl. 1: 9. 1829.

多茎还阳参 duo jing huan yang shen

Aracium multicaule (Ledebour) D. Dietrich; *Crepis multicaulis* subsp. *congesta* (Regel & Herder) Babcock; *C. multicaulis* var. *congesta* Regel & Herder; *C. multicaulis* var. *laxa*

Regel & Herder; *C. multicaulis* subsp. *subintegrifolia* Tolmatchew & Rebrikova; *C. stoliczkae* C. B. Clarke.

Herbs 8–60 cm tall, perennial, with a short ± oblique rhizome, rosulate. Stems few to numerous, rarely solitary, rather slender, erect or curved-ascending, branched apically, glabrous or basally with sparse arachnoid hairs, usually ± leafless. Rosette leaves narrowly elliptic-lanceolate, ovate-oblanceolate, elliptic, or spatulate, 3.5–11 × 0.7–2 cm, undivided or pinnatifid to pinnatipartite, both surfaces short white pubescent, base attenuate into a petiole-like portion, margin entire or sinuate-dentate, apex acute, obtuse, or rounded; lateral lobes (if present) triangular, narrowly triangular, or elliptic, gradually smaller toward leaf base, apex obtuse to acute. Stem leaves 0–2, much reduced in size, linear, margin entire. Synflorescence paniculiform or corymbosely so, with few to several capitula. Capitula with 30–40 florets; peduncle slender, often curved-erect, with dense white arachnoid hairs and stiff greenish glandular hairs. Involucre cylindric, 7–9 × 3–5 mm. Outer phyllaries triangular-ovate to lanceolate, longest to 3 mm, apex acute to obtuse; inner phyllaries 8–10, abaxially with white arachnoid hairs and stiff greenish glandular hairs along midvein, adaxially glabrous, margin scarious, apex acute to obtuse. Anther tube 1–2 mm. Achene reddish brown, fusiform, straight or subcurved, ca. 4 mm, with 10–12 ribs. Pappus white, ca. 4 mm. Fl. and fr. May–Aug. $2n = 10$.

Forests, forest margins, open places in forests, grasslands, gravelly areas by streams and water, floodplains; 1600–3600 m. Xinjiang [Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, C and SW Russia, Tajikistan; SW Asia, N Europe].

Crepis multicaulis and *C. elongata* are closely related, and their delimitation needs reassessment.

2. Crepis elongata Babcock, Univ. Calif. Publ. Bot. 14: 326. 1928.

藏滇还阳参 zang dian huan yang shen

Crepis tibetica Babcock.

Herbs, perennial, with a horizontal or oblique rhizome. Stem solitary to few, 25–65 cm tall, erect, unbranched or moderately branched from basal third or higher up, with conspicuously erect and usually rather long branches, apically ± densely with blackish long glandular hairs. Leaves mostly basal, rosulate to crowded, oblanceolate to elliptic, (3–)5–16(–22) × 0.8–2.2 cm including a winged petiole 1/3–1/2 rest of leaf, both faces with long yellowish hairs, base cuneate-attenuate to abruptly narrowed, margin sinuate-dentate to pinnatifid with triangular segments, apex obtuse to rounded. Stem leaves 0–2, similar to basal leaves or bractlike and reduced, ± linear, margin entire. Synflorescence corymbiform to paniculately corymbiform, with (1–)3–12 capitula. Capitula with 30–40 florets; peduncle slender, 0.5–5 cm, sparsely to more densely white tomentose and with ± dense blackish glandular hairs. Involucre green to dark green, cylindric to campanulate, 7–11 × 3–5 mm. Phyllaries abaxially sparsely arachnoid hairy and with blackish glandular hairs along midvein; outer phyllaries triangular-ovate to lanceolate, longest to 1/2 (sometimes even more) as long as inner ones, apex acuminate to acute; inner phyllaries 12–14, apex acuminate. Anther tube 2–2.5 mm. Style branches dark (± blackish when dry). Achene ± dark brown, fusiform, 4–5 mm, with 10 ribs, distinctly attenuate toward apex. Pappus white, ca. 4 mm. Fl. and fr. Jun–Aug.

Mountain slopes, thickets, forests, forest margins, meadows; 2600–4200 m. W Sichuan (Kangding), Xizang, Yunnan [Bhutan, NE India, Nepal].

Babcock's names *Crepis elongata* and *C. tibetica* are of equal priority. The first synonymization of the latter with the former name in FRPS (80(1): 114. 1997) has therefore established the priority of *C. elongata* over *C. tibetica*.

3. Crepis lyrata (Linnaeus) Froelich in Candolle, Prodr. 7: 170. 1838.

琴叶还阳参 qin ye huan yang shen

Hieracium lyratum Linnaeus, Sp. Pl. 2: 803. 1753.

Herbs 20–80[–110] cm tall, perennial, with a short slender ± oblique rhizome and short caudex. Stem solitary, erect, sparsely and shortly branched apically, sparsely pubescent with yellow glandless hairs, sparsely leafy. Basal and lower stem leaves narrowly obovate to spatulate and gradually attenuate into a winged petiole-like basal portion, 10–22[–30] × 3–6 cm, almost undivided to lyrately pinnatisect, sparsely pubescent with short yellow hairs, base narrow to narrowly auriculate-amplexicaul, margin sinuate-dentate and denticulate; lateral lobes ovate, triangular-ovate, or elliptic, apex rounded to more rarely acute; terminal lobe ovate to lanceolate, much larger than lateral lobes, apex acute to rounded. Middle stem leaves spatulate to lanceolate, similar to lower stem leaves but smaller, base broader and more clasping; uppermost stem leaves bractlike. Synflorescence small, corymbiform, with few capitula. Capitula with 35–45 florets; peduncle slender, with dense short blackish glandular hairs. Involucre dark green, campanulate, 7–9 × 4–8 mm. Phyllaries abaxially with short blackish glandular and often with setaceous simple hairs; outer phyllaries linear, longest 1/4–1/2 as long as inner ones, apex acute; inner phyllaries adaxially glabrous, apex acute. Anther tube ca. 3.5 mm. Achene brown, fusiform, 3.5–4 mm, with 20 slender ribs, apex slightly constricted. Pappus white, 4–5 mm, persistent. Fl. Jun–Jul. $2n = 12$.

Moist meadows, stream banks; 1200–2400 m. Xinjiang [Kazakhstan, C Russia].

4. Crepis tectorum Linnaeus, Sp. Pl. 2: 807. 1753.

屋根草 wu gen cao

Hieracioides tectorum (Linnaeus) Kuntze.

Herbs 30–90 cm tall, annual or biennial, ± rosulate, with taproot. Stem usually solitary, erect, branched from base or middle, subglabrous to arachnoid pubescent, sparsely glandular and with white bristles, leafy. Basal and lower stem leaves linear-lanceolate, lanceolate, or oblanceolate and attenuate into a winged petiole-like basal portion, 5–15 × 0.5–1 cm, undivided or more rarely sinuate to pinnatisect, subglabrous to pubescent with glandular and simple hairs, base cuneate-attenuate, margin sparsely dentate, apex acute; lobes (if present) lanceolate to linear. Middle stem leaves similar to lower stem leaves but usu-

ally undivided and rather without a petiole-like basal portion, base ± sagittately clasping. Upper stem leaves linear-lanceolate to linear, margin entire and revolute; uppermost stem leaves bractlike. Synflorescence corymbiform to corymbosely paniculiform, with some to many capitula. Capitula with 30–70 florets. Involucre narrowly cylindric to narrowly campanulate, 7.5–8.5 × 5–7 mm in fruit. Phyllaries abaxially with sparse arachnoid and stipitate glandular hairs; outer phyllaries linear, longest 1/3–1/2 as long as inner ones, apex acute; inner phyllaries adaxially appressed hairy, margin white scarious, apex acute. Anther tube 2.5–3 mm. Achene dark or purplish brown, fusiform, 3–4 mm, with 10 ribs, apically contracted. Pappus white, ca. 4 mm. Fl. and fr. Jul–Oct. $2n = 8$.

Forest margins, grasslands in valleys, fields, wastelands; 900–1800 m. Heilongjiang, Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia; Europe].

5. Crepis sibirica Linnaeus, Sp. Pl. 2: 807. 1753.

西伯利亚还阳参 xi bo li ya huan yang shen

Aracium sibiricum (Linnaeus) Schultz Bipontinus; *Crepis ruprechtii* Boissier; *Hapalostephium sibiricum* (Linnaeus) D. Don; *Hieracioides ruprechtii* (Boissier) Kuntze; *Hieracium sibiricum* (Linnaeus) Lamarck; *Lepicaune sibirica* (Linnaeus) K. Koch; *Sonchus caucasicus* Biehler; *S. flexuosus* Ledebour; *Soyeria sibirica* (Linnaeus) Monnier.

Herbs 0.5–1.5 m tall, perennial, with stout horizontal to oblique rhizomes. Stem solitary, stout, apically rather sparsely branched, especially apically with white arachnoid hairs and stiff subulate greenish hairs, leafy. Basal leaves and lower stem leaves with a winged petiole 6–15 cm or more; leaf blade narrowly oblong-elliptic, oblong-ovate, ovate, or elliptic, 16–20 × 5.5–10 cm, abaxially scabrid and white hispid and hirsute on veins, adaxially glabrous, margin hispid, base abruptly narrowed to rarely attenuate, margin ± coarsely dentate, apex acute to acuminate. Middle stem leaves similar to lower stem leaves but petiole shorter, more broadly winged, dentate, and basally clasping; leaf blade ovate to lanceolate, basally attenuate. Upper stem leaves sessile and smaller, otherwise similar to middle stem leaves; uppermost stem leaves elliptic to linear-lanceolate, reduced in size, margin entire. Synflorescence laxly corymbiform, with few to several capitula. Capitula many flowered; peduncle (1–)2–15 cm, stout. Involucre campanulate, ca. 1.5[–2] × 1–1.5 cm, dark green in fruit. Phyllaries abaxially with dense stiff subulate hairs especially on midvein; outer phyllaries ovate-lanceolate to narrowly elliptic-lanceolate, longest more than 1/2 as long as inner ones, apex acute to obtuse; inner phyllaries adaxially glabrous, apically subacute. Achene dark brown to reddish brown, fusiform, 9–10 mm, subcurved, with 20 ribs, apically attenuate. Pappus white or pale yellowish white, 8–9 mm. Fl. and fr. May–Sep.

Mountain slopes, forest margins, forests, thickets, grasslands in forests; 1000–2700 m. Heilongjiang, Liaoning, Nei Mongol, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; E Europe].

6. Crepis coreana (Nakai) H. S. Pak, Fl. Coreana 7: 378. 1999.

宽叶还阳参 kuan ye huan yang shen

Hieracium coreanum Nakai, Bot. Mag. (Tokyo) 29: 9. 1915.

Herbs 25–55 cm tall, perennial, with a short ± oblique rhizome. Stem solitary, erect, branched from middle or in apical portion, rarely unbranched, sparsely arachnoid hairy sometimes mixed with black rigid hairs especially in synflorescence. Basal leaves present at anthesis; petiole 1.5–11.5 cm, winged; leaf blade spatulate to elliptic, 4–8 × 2–3.5 cm, glabrous or sparsely arachnoid hairy, margin sharply and pectinately dentate to rarely lyrately pinnatifid, base cuneately attenuate, apex obtuse, rounded, or acute. Lower stem leaves with winged petiole 3.5–6 cm, base subclasping or not; leaf blade elliptic, 7–13 × 2–2.5 cm, margin sharply and pectinately dentate, otherwise similar to basal leaves. Middle stem leaves sessile, elliptic, 7–11.5 × 2–4 cm, base cordate and clasping, apex acute to acuminate, otherwise similar to lower stem leaves. Upper stem leaves similar to middle stem leaves but smaller upward on stem and apex more acuminate. Synflorescence corymbiform, with few to several capitula. Capitula with many florets; peduncle 1.5–4 cm or more. Involucre dark green to blackish, broadly cylindric to campanulate, 1–1.3 × 0.7–1 cm. Phyllaries abaxially glabrous or sparsely white hairy (especially at apex) or with black long simple hairs on midvein, apex acute; outer phyllaries narrowly triangular to lanceolate, longest ca. 6[–7] mm. Anther tube 3.5–4 mm. Achene ± cylindric to fusiform, 4–6 mm. Pappus white, ca. 6 mm. Fl. and fr. Jul–Sep.

Forests, forest margins, meadows, steppes; 1600–2200 m. Jilin, Liaoning [NE Korea].

Crepis coreana was originally described and until recently included in *Hieracium*. H. S. Pak (Fl. Coreana 7: 378. 1999) and Sennikov and I. D. Illarionova (Bot. Zhurn. 86(3): 37–59. 2001) first stated its actual affinity to *Crepis* and transferred the species correspondingly. It is possibly related to *C. sibirica*.

7. Crepis oreades Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 2: 32. 1842.

山地还阳参 shan di huan yang shen

Crepis oreades var. *cinerascens* Fischer & C. A. Meyer; *Hieracioides oreades* (Schrenk ex Fischer & C. A. Meyer) Kuntze.

Herbs 10–25[–30] cm tall, perennial, rosulate, with taproot sometimes shoot-bearing. Caudex 1–3 cm, covered with brown leaf bases of former leaves, simple or branched and thus with 1 or few leaf rosettes. Stems one or a few, slender, ascending to erect, simple or forked, sparsely white arachnoid hairy apically [sometimes additionally with long dark green to blackish glandular hairs], usually ± leafless. Rosette leaves numerous, oblanceolate to elliptic, 4–8 × 0.5–1 cm, shallowly pinnatifid to pinnatisect, abaxially weakly white arachnoid hairy [sometimes additionally with glandular hairs], base attenuate into a petiole-like portion, margin sinuate-dentate or entire; lateral lobes narrowly triangular, lanceolate, or sublinear, apex acute; terminal lobe triangular to lanceolate, apex acute. Stem leaves 0–2, ± linear, reduced in size, margin entire, apex acute. Capitula 1 or 2 per stem, with many florets. Involucre narrowly campanulate, 9–12 × 5–8 mm. Phyllaries abaxially white arachnoid hairy especially along midvein [sometimes additionally with long dark green to blackish glandular hairs]; outer phyllaries linear-lanceolate, longest ca. 5 mm, apex acute; inner phyllaries ca. 12, adaxially appressed hairy, margin scarious, apex acute. Anther tube ca. 4 mm. Achene orangish brown, fusiform, 5–6 mm,

straight or subcurved, with 10–15 ribs, apex weakly attenuate. Pappus white, 4–6 mm. Fl. Jul.

Gravelly areas on mountain slopes; 1000–3800 m. Qinghai, Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan].

The diploid *Crepis oreades* and the tetraploid, hybridogenous *C. crocea* (presumably *C. oreades* × *C. bungei* Ledebour ex Candolle) are very similar. In China, *C. oreades* is of much more restricted distribution, and the very limited material seen is of the (typical) form with involucres and peduncles exclusively white arachnoid hairy, whereas in adjacent Kyrgyzstan and Tajikistan the form (described as *C. oreades* var. *cinerascens*) additionally with blackish glandular hairs on involucres and peduncles prevails.

8. Crepis crocea (Lamarck) Babcock, Univ. Calif. Publ. Bot. 19: 400. 1941.

北方还阳参 bei fang huan yang shen

Hieracium croceum Lamarck, Encycl. 2: 360. 1786; *Berinia crocea* (Lamarck) Schultz Bipontinus; *Crepis aurea* Reichenbach var. *crocea* (Lamarck) Candolle; *C. gmelinii* Schultes var. *grandifolia* Tausch; *C. pallasii* Turczaninow, nom. illeg. superfl.; *C. turczaninowii* C. A. Meyer; *Hieracioides crocea* (Lamarck) Kuntze.

Herbs 8–30 cm tall, perennial, rosulate, with taproot frequently shoot-bearing. Caudex 0.5–2 cm, simple or usually very shortly branched and thus with 1 or few leaf rosettes, covered with brown leaf bases of former leaves. Stems 1 or a few, slender, ascending to erect, simple or 1- to few forked, arachnoid hairy and with yellow longer and shorter strong glandular and non-glandular hairs especially apically, usually ± leafless. Rosette leaves numerous, oblanceolate to elliptic, 2.5–10 × 1–2.5 cm, shallowly pinnatifid to pinnatisect, both faces white arachnoid hairy and with strong yellowish glandular hairs, base attenuate into a petiole-like portion, margin sinuate-dentate or entire; lateral lobes narrowly triangular, lanceolate, or sublinear, apex acute; terminal lobe triangular to lanceolate, apex acute. Stem leaves 0–3, reduced in size, undivided, otherwise similar to rosette leaves or sessile. Capitula 1–4 per stem, with many florets. Involucre narrowly campanulate, 1–1.5 × 0.7–1 cm. Phyllaries green in fruit, abaxially with arachnoid hairs and with yellowish to yellowish green, strong, longer and shorter glandular and non-glandular hairs along midvein; outer phyllaries linear-lanceolate, longest 5–8 mm; inner phyllaries 12–14, adaxially weakly appressed hairy, margin conspicuously scarious, apex acute. Anther tube 4.5–5.5 mm. Achene dark to blackish brown, fusiform, 5–6 mm, straight or subcurved, with 10–15 ribs, apically attenuate. Pappus white, 7–8 mm. Fl. and fr. May–Aug.

Mountain slopes, loess hills, wastelands; 800–2900 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Shanxi [Mongolia, E Russia].

Crepis pallasii is a homotypic synonym of *Hieracium croceum*.

9. Crepis chrysantha (Ledebour) Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 11: 96. 1838.

金黄还阳参 jin huang huan yang shen

Hieracium chrysanthum Ledebour, Fl. Altaic. 4: 129. 1833; *Berinia chrysantha* (Ledebour) Schultz Bipontinus; *Crepis polytricha* (Ledebour) Turczaninow; *Hieracioides chrysantha* (Ledebour) Kuntze; *Hieracium frigidum* Steven ex Candolle; *H. polytrichum* Ledebour; *Soyeria chrysantha* (Ledebour) D. Dietrich.

Herbs 10–25 cm tall, perennial, with a vertical to oblique rhizome. Stems solitary or several, green or basally tinged with purple, unbranched or 1-branched, sparsely arachnoid hairy but apically densely so under capitula and with dark green to blackish long hairs. Basal leaves crowded, oblanceolate, narrowly elliptic-oblanceolate, or spatulate, 3–7 × 0.4–1.5 cm, glabrous or adaxially sparsely arachnoid hairy, base attenuate into a petiole-like portion, margin sinuate-dentate to subentire, apex obtuse. Stem leaves 2 or 3(or 4), similar to basal leaves but smaller and narrower, base attenuate, margin subentire, apex obtuse to acute. Capitulum solitary or 2, many flowered. Involucre dark green to blackish, campanulate, 1.4–1.6 × 0.8–1.2 cm. Phyllaries abaxially white arachnoid hairy and with dark green to blackish long hairs, apex acute to obtuse; outer phyllaries lanceolate, longest to 2/3 as long as inner ones, spreading-erect; inner phyllaries 15–18, adaxially appressed hairy. Anther tube 4–5 mm. Achene reddish brown to dark purple, fusiform, ca. 7 mm, straight or subcurved, with 12–15 ribs, apically attenuate. Pappus white, 5–7 mm, persistent. Fl. and fr. Jul–Sep.

Gravelly areas on floodplains, stony slopes; 500–1500 m. Xinjiang [Kazakhstan, Mongolia, Russia].

10. Crepis phoenix Dunn, J. Linn. Soc., Bot. 35: 511. 1903.

万丈深 wan zhang shen

Herbs 15–70 cm tall, perennial, with a strong taproot. Caudex woody, simple or branched, leafless. Stem dark green, erect, apically branched and setose, basally glabrous and with few scalelike leaves only in and above middle with well-developed leaves. Lower scalelike stem leaves lanceolate, 0.5–2 × ca. 0.3 mm, apex acute. Middle stem leaves sessile, lanceolate, narrowly elliptic, or narrowly elliptic-lanceolate, 2–8 × 0.3–2.5 cm, glabrous to setose, base cuneate, margin entire or sinuate-dentate, apex acute. Upper stem leaves similar to middle stem leaves but smaller, uppermost ones bractlike. Synflorescence corymbiform, with few to some capitula. Capitula with 20–25 florets; peduncle shorter or slightly longer than capitulum, slender. Involucre cylindric, 8–11 × 3–4 mm. Phyllaries abaxially somewhat tomentose and setose on midvein; outer phyllaries linear to linear-lanceolate, longest to 1/2 as long as inner ones, apex acute to obtuse; inner phyllaries 12–14, adaxially glabrous, margin broadly scarious, apex obtuse. Anther tube 4–5 mm. Achene brown, fusiform, 4–5 mm, with 10 ribs, apically attenuate. Pappus white, 5.5–6.5 mm. Fl. and fr. Jul–Oct.

● Mountain slopes; ca. 2000 m. Yunnan.

The entire plants are used medicinally.

Crepis phoenix and the following three species of fairly restricted distribution in chiefly S China are closely related and seem to form a complex, in which introgression and hybridization and diploid and polyploid cytotypes in all species occur. Delimitation of species in this complex is difficult and has already been stated as tentative by Babcock (Univ. Calif. Publ. Bot. 22: 632ff. 1947). A revision of the complex based on field and population studies is still needed.

11. Crepis bodinieri H. Léveillé, Bull. Géogr. Bot. 25: 15. 1915.

果山还阳参 guo shan huan yang shen

Herbs 40–50 cm tall, perennial, with a strong taproot. Caudex woody, simple or branched, leafless. Stems solitary or several, green, dark green, or tinged with purple, erect, apically branched, smooth, glabrous, basally only with a few scalelike leaves, in and above middle with well-developed leaves. Lower scalelike stem leaves linear-lanceolate, 5–10 × 1–3 mm. Middle stem leaves sessile, linear, 2–14 × 0.1–1 cm, abaxially somewhat canescent tomentulose, margin entire and revolute, apex acute to acuminate. Upper stem leaves similar to middle stem leaves but smaller, uppermost ones bractlike. Synflorescence corymbiform, with few to some capitula. Capitula with 18–30 florets; peduncle shorter or slightly longer than capitulum, slender. Involucre cylindric, 8–10 × 3–4 mm. Phyllaries tomentulose; outer phyllaries linear to linear-lanceolate, longest 1/2–2/3 as long as inner ones, apex acute; inner phyllaries adaxially glabrous, apex obtuse. Anther tube ca. 4 mm. Achene brown, fusiform, ca. 4 mm, with 14 ribs, apically attenuate. Pappus white, 4–6 mm. Fl. and fr. Jun–Jul.

• Forests, thickets; 1500–2900 m. Xizang, Yunnan.

See remarks under *Crepis phoenix*, above.

12. Crepis rigescens Diels, Notes Roy. Bot. Gard. Edinburgh 5: 202. 1912.

还阳参 huan yang shen

Crepis rigescens subsp. *lignescens* Babcock.

Herbs 20–60 cm tall, perennial, with a strong taproot. Caudex woody, simple or branched, leafless. Stems solitary or several, erect, basally woody, sparsely to moderately and ± divaricately branched from base, middle, or near apex; branches sulcate to angular, yellowish striate, leafy, lower ones often sterile. Leaves pale yellowish green, glabrous; basal leaves very small, scalelike; middle stem leaves sessile, linear, 3–8 × 0.1–5 cm, rigid in texture, margin entire and revolute, apex acute. Synflorescence ± divaricately corymbiform, with few to several capitula. Capitula with 10–12 (sometimes more) florets. Involucre narrowly cylindric, 8–9 × 2–2.5 mm. Phyllaries glabrous or arachnoid hairy; outer phyllaries linear to lanceolate, longest ca. 1/2 as long as inner ones, apex acute; inner phyllaries with white scarious margin, apex acute. Anther tube ca. 3.5(–4.5) mm. Achene dark brown, fusiform, ca. 4 mm, with 10–16 ribs, apically attenuate. Pappus white, 4–5 mm. Fl. and fr. Feb–Jul.

Forest margins, along streams, wastelands, roadsides; 1600–3000 m. Sichuan, Yunnan [N Myanmar].

See note under *Crepis phoenix*, above.

13. Crepis lignea (Vaniot) Babcock, Univ. Calif. Publ. Bot. 22: 644. 1947.

绿茎还阳参 lü jing huan yang shen

Lactuca lignea Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 318. 1903.

Herbs 15–40 cm tall, perennial, with a strong taproot. Caudex woody, simple or branched, leafless. Stem dark green to grayish green, erect, usually strongly and fastigiately branched from base or below middle; branches numerous, sulcate and angular. Leaves pale yellowish green, glabrous; basal and lower stem leaves inconspicuous, triangular to bractlike, apex acute; middle stem leaves filiform, to 3 × 0.5 cm, glabrous, margin entire. Uppermost stem leaves linear-subulate, bractlike, glabrous. Synflorescence virgately corymbiform, congested, with rather many capitula. Capitula with 7–12 florets. Involucre narrowly cylindric, 7–9 × 1.5–2.5 mm, glabrous or especially basally with sparse arachnoid and short glandular hairs. Outer phyllaries linear to lanceolate, longest 1/3–1/2 as long as inner ones; inner phyllaries adaxially glabrous, margin scarious, apex acute. Anther tube ca. 3.5 mm. Achene brown, fusiform, 4–5 mm, subcurved, with 10–12 equal ribs, apex attenuate or with beak to 1.5 mm. Pappus white, 4–5 mm. Fl. and fr. Feb–Aug.

Sunny mountain slopes; 1500–2700 m. Guangxi, Guizhou, Sichuan, Yunnan [Laos, N Thailand, S Vietnam].

The roots of *Crepis lignea* are used medicinally.

See note under *Crepis phoenix*, above.

14. Crepis napifera (Franchet) Babcock, Univ. Calif. Publ. Bot. 22: 629. 1947.

芜菁还阳参 wu jing huan yang shen

Lactuca napifera Franchet, J. Bot. (Morot) 9: 292. 1895; *Prenanthes chaffanjonii* H. Léveillé.

Herbs 40–150 cm tall, perennial, rosulate. Taproot cylindric to narrowly turniplike, ca. 1 cm in diam. Caudex 0.5–3 cm, woody, sometimes branched, with rather sparse leaf rosette and below covered with bases of old leaves and brown lanate. Stem slender, erect, unbranched in proximal portion, usually leafless, apically with narrow synflorescence. Rosette leaves obovate to oblanceolate, 5–26 × 2–6.5 cm, on both faces with short stiff subulate hairs, base attenuate into a 0.5–3 cm petiole-like portion, margin entire or sinuate-dentate to shallowly pinnatifid with orbicular to broadly triangular segments, apex obtuse to rounded and mucronulate or more rarely acute. Stem leaves (if present in lower part) similar to rosette leaves but smaller. Synflorescence racemiform to very narrowly paniculiform, with some to numerous capitula. Capitula with 5–10 florets; peduncle filiform, 1–5 mm. Involucre cylindric, 7–9 × 2–3 mm. Phyllaries green to dark green, ciliate near and at apex otherwise both faces glabrous; outer phyllaries lanceolate, longest 1/3–1/2 as long as inner ones, apex acute; inner phyllaries 5(or 6), apex acute to obtuse. Anther tube 3.5–4 mm. Style branches dark (blackish) upon drying. Achene pale brown, cylindric to fusiform, ca. 4 mm, with 10 ribs, apically attenuate. Pappus yellowish white, ca. 4 mm. Fl. and fr. Jun–Oct.

• Mountain slopes, forests in river valleys; 1400–3300 m. Guizhou, Sichuan, Yunnan.

15. Crepis subscaposa Collett & Hemsley, J. Linn. Soc., Bot. 28: 78. 1890.

抽茎还阳参 chou jing huan yang shen

Herbs 30–50 cm tall, perennial, rosulate. Taproot woody.

Caudex woody, with rather sparse leaf rosette and 1–3 stems. Stems erect, apically sparsely branched and white pubescent, almost leafless. Rosette leaves oblanceolate to elliptic, 5–10 × 2–3 cm, both surfaces pubescent with short glandular hairs, base attenuate into a short winged petiole-like portion, margin denticulate and irregularly sinuate to dentate, apex obtuse to acute. Stem leaves (if present) few, remote, bractlike, narrowly lanceolate, apex acute. Synflorescence laxly corymbose, with few to some capitula. Capitula with 20–30 florets; peduncle wiry, 1–4 cm. Involucre broadly cylindric to narrowly campanulate, 7–10 × 4–6 mm. Phyllaries sparsely pubescent with white partly glandular hairs; outer phyllaries lanceolate to linear-lanceolate, longest ca. 1/2 as long as inner ones, apex acute; inner phyllaries with short blackish rigid subulate hairs on midvein, adaxially glabrous, apex obtuse. Achene dark brown, fusiform, 5–6.5 mm, with 10–12 echinulate ribs, apically strongly attenuate. Pappus white or pale yellowish, 4–5 mm. Fl. and fr. Jul–Aug.

Mountain slopes, moist pastures, fields; 1400–2200 m. Yunnan [N Laos, N Myanmar].

16. Crepis darvazica Kraschenninikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 182. 1933.

新疆还阳参 xin jiang huan yang shen

Crepis rigida Waldstein & Kitaibel var. *songorica* Karelin & Kirilov; *C. songorica* (Karelin & Kirilov) Babcock.

Herbs 20–60 cm tall, perennial, with a taproot. Stems solitary or more rarely 2–4, from a short woody caudex, erect, sparsely branched apically or rarely from middle, sparsely white arachnoid hairy and especially proximally with rigid subulate partly glandular hairs, covered with leaf bases of former leaves, leafy. Basal and lower stem leaves elliptic-oblanceolate to oblanceolate, 5–24 × 2–5 cm, both faces with rigid mostly glandular hairs but especially abaxially, base attenuate, margin sinuate-dentate, apex obtuse to acute. Middle and upper stem leaves ovate to narrowly elliptic-lanceolate, base auriculately clasping, margin sparsely dentate or entire, apex acute to acuminate, otherwise similar to lower leaves; uppermost stem leaf reduced, bractlike. Synflorescence laxly corymbiform, with few to several capitula. Peduncle 1–6 cm, straight or slightly curved. Involucre campanulate, 1.2–1.6 × 0.6–1 cm. Phyllaries abaxially white arachnoid hairy and especially basally and along midvein with ± dense yellowish brown short rigid glandular hairs; outer phyllaries triangular-ovate, triangular, or lanceolate, longest 1/3–2/3 as long as inner ones, apex ± acute; inner phyllaries 12–14, adaxially glabrous, margin scarious, apex obtuse. Anther tube 4.5–5.5 mm. Achene dark reddish brown, fusiform, 7–10 mm, with 16–20 ribs. Pappus white, 8–10 mm. Fl. and fr. Jun–Aug.

Rocky or gravelly mountain slopes; 1300–2600 m. Xinjiang [E Kazakhstan, Kyrgyzstan, Tajikistan].

Crepis darvazica has been reported generally from the border range between China, E Kyrgyzstan, and NE Tajikistan (Czerepanov, Fl. URSS 29: 633. 1966), but so far no substantiated records from Chinese territory are known (C. H. An, Fl. Xinjiang. 5: 456. 1999). The above description is based on material from E Kazakhstan and the descriptions by Czerepanov (loc. cit.) and Babcock (Univ. Calif. Publ. Bot. 22: 426. 1947).

17. Crepis shihii Tzvelev, Bot. Zhurn. 92: 1749. 2007.

全叶还阳参 quan ye huan yang shen

Crepis integrifolia C. Shih, Acta Phytotax. Sin. 33: 191. 1995, not Vest (1820).

Herbs, perennial, with a horizontal rhizome. Stem solitary, ca. 25 cm tall, slender, erect, apically sparsely branched and with blackish stipitate glandular hairs, leafy. Basal leaves incompletely known, lanceolate, small, margin entire or subentire, withered at anthesis. Lower and middle stem leaves sessile, lanceolate to oblanceolate, 3.5–5 × 1–2 cm, glabrous, base auriculately clasping, margin entire, apex rounded and mucronulate. Upper stem leaves bractlike, lanceolate. Synflorescence laxly corymbiform, with 3–5 capitula. Capitula with 20–30 florets; peduncles usually 1–9 cm, slender. Involucre cylindric to narrowly campanulate, 8–10 × 4–6 mm. Phyllaries green to blackish green, abaxially with blackish stipitate glandular hairs on midvein; outer phyllaries lanceolate, longest to 4 mm; inner phyllaries 8–10?, adaxially glabrous. Anther tube 3–3.5 mm. Style branches yellow. Achene yellowish brown, fusiform, ca. 5 mm, with 15 ribs, apex truncate. Pappus white, ca. 6 mm. Fl. and fr. Aug.

• Grasslands; 1300–1400 m. N Xinjiang (Altay Shan).

Crepis shihii is a conspicuous species of unclear affinities only known from the type collection and superficially appears to be a diminutive version of *C. darvazica*.

18. Crepis tianshanica C. Shih, Acta Phytotax. Sin. 33: 190. 1995.

天山还阳参 tian shan huan yang shen

Pseudoyoungia tianshanica (C. Shih) D. Maity & Maiti; *Tibetoseris tianshanica* (C. Shih) Tzvelev.

Herbs 3–5 cm tall, perennial. Stem erect or ascending-erect, pubescent, leafy. Leaves oblanceolate, 2.5–4 × 0.5–0.8 cm, lyrately pinnatipartite to pinnatisect, both faces sparsely pubescent or abaxially glabrous, base attenuate or abruptly narrowed into a petiole-like portion; lateral lobes 3 or 4 pairs, triangular, rhomboid, or irregularly rhomboid, margin entire, apex acute, obtuse, or rounded; terminal lobe elliptic, ovate, hastate, or sagittate, apex obtuse to acute. Capitula 2, terminal. Involucre cylindric to narrowly campanulate, ca. 1.2 cm. Phyllaries dark, abaxially sparsely arachnoid hairy and with blackish multicellular hairs on midvein; outer phyllaries narrowly elliptic-lanceolate, longest more than 1/2 as long as inner ones, apex acute; inner phyllaries adaxially glabrous, apex acute to obtuse. Achene not seen when mature. Pappus white, ca. 4 mm. Fl. Jul.

• Mountain slopes; ca. 2600 m. Xinjiang (Tian Shan).

Crepis tianshanica is an insufficiently known species due to the lack of mature achenes in the single collection known. For the time being, we follow the generic assignment to *Crepis* by Sennikov (Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 105: 66–69. 2000), rather than to *Askellia* ("ex affinitate *C. flexuosae*," C. Shih, Acta Phytotax. Sin. 33: 190. 1995) or *Youngia* (D. Maity & Maity, Compositae Newslett. 48: 33. 2010, under *Pseudoyoungia*).

66. YOUNGIA Cassini, Ann. Sci. Nat. (Paris) 23: 88. 1831.

黄鹌菜属 huang an cai shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Pseudoyoungia D. Maity & Maiti.

Herbs, perennial or annual, acaulescent or caulescent, often ± rosulate, glabrous or somewhat to sparsely arachnoid hairy or pubescent. Synflorescence corymbiform or paniculiform-corymbiform, exceptionally secundly racemiform. Capitula with 5–25 florets. Involucre cylindric, cylindric-campanulate, campanulate, or broadly cylindric. Phyllaries abaxially glabrous or more rarely somewhat arachnoid hairy, very rarely glandular; outer phyllaries few to several, centripetally longer, at most 1/4(–1/2) as long as inner ones; inner phyllaries usually linear-lanceolate, equal in length, midvein subapically crested and corniculate or flat. Receptacle naked. Florets yellow. Achene ± fusiform, columnar, or ± cylindric, inconspicuously compressed or subcompressed, with 4 or 5 main ribs each accompanied by (1 or)2 or more slender secondary ribs, ribs usually finely spiculate especially apically, apex attenuate or rarely with a stout short beak. Pappus white, rarely gray or pale brownish, scabrid.

About 30 species: E Asia; 28 species (22 endemic) in China.

The circumscription of *Youngia* has recently been changed by Sennikov and I. D. Illarionova (Komarovia 5: 96. 2008) based, in particular, on carpological analyses. Three species groups have been segregated into three newly established separate genera: *Crepidifolium*, *Sonchella*, and *Tibetoseris*. *Crepidifolium* includes Babcock and Stebbins's (Publ. Carnegie Inst. Washington 484: 25. 1937) single species of their (not validly published) *"Y.* sect. *Crepidopsis,"* meanwhile divided into three separate species. Most recent molecular phylogenetic analyses of the Crepidinae by J. W. Zhang et al. (in prep.) on the one hand confirmed that *Crepidifolium* is not part of *Youngia*, but on the other hand revealed that it is actually nested within *Crepidiastrum*, see there. *Sonchella* unites *Y. stenoma* of Babcock and Stebbins's (not validly published) *"Y.* sect. *Stenophytum"* and a second species formerly treated as *Prenanthes angustifolia* or *Crepis pratensis*. This genus has been confirmed in the molecular phylogenetic analyses by J. W. Zhang et al. (in prep.) as independent and is treated as such here. *Tibetoseris* included the five species of Babcock and Stebbins's (not validly published) *"Y.* sect. *Desiphyllum"* and a few later additions from China. *Tibetoseris* was most recently recircumscribed by D. Maity and Maiti (Compositae Newslett. 48: 22–42. 2010) to include only *T. depressa*, while the other species, considered from morphology as unrelated, were segregated into the newly established genus *Pseudoyoungia*. While their assumption of *Tibetoseris* being diphyletic has been confirmed in the molecular phylogenetic analyses by J. W. Zhang et al. (in prep.), the exclusion of the species united in *Pseudoyoungia* from *Youngia* has not; they appear clearly nested in *Youngia*. *Pseudoyoungia* is here therefore sunk in the synonymy of *Youngia*. Finally, examination of the type material of *Y. blinii*, considered as an unusual and isolated species of *Youngia* since its inclusion by Babcock and Stebbins (Univ. Calif. Publ. Bot 18(11): 227–229. 1943, as *Y. setigera*), revealed that it is grossly misplaced in *Youngia* but conveniently fits into *Dubyaea*, where it is transferred in the present treatment. The genus is still in need of a revision at species level. Many species are known from few collections only and their justifications need to be confirmed by a thorough study of character variation on the basis of more material. The current treatment should be used with critical caution.

1a. Plants ca. 5(–8) cm tall, very rarely taller (to 15 cm) and acaulescent or stem very short and branched within or slightly above leaf rosette with capitula few to several, clustered; involucre 8–12 mm with longest outer phyllary 1/3–1/2(–2/3) as long as inner ones.
2a. Peduncle slender; involucre 1.2–1.6 cm; pappus 10–11 mm ..... 3. *Y. simulatrix*
2b. Peduncle capillaceous; involucre 0.8–1.1 cm; pappus 5–7 mm.
3a. Phyllaries abaxially arachnoid hairy ..... 6. *Y. sericea*
3b. Phyllaries abaxially glabrous.
4a. Involucre 10–11 mm; longest outer phyllary 1/3–2/3 as long as inner ones; inner phyllaries adaxially appressed pubescent ..... 7. *Y. conjunctiva*
4b. Involucre 8–10 mm; longest outer phyllary 1/3–1/2 as long as inner ones; inner phyllaries adaxially glabrous.
5a. Longest outer phyllary to 1/3 as long as inner ones; midvein of inner phyllaries subapically plane ..... 4. *Y. gracilipes*
5b. Longest outer phyllary to 1/2 as long as inner ones; midvein of inner phyllaries subapically crested or corniculate ..... 5. *Y. cristata*
1b. Plants caulescent, usually very distinctly so, or if stem very short then capitula not clustered but all borne distinctly above leaf rosette and longest outer phyllary usually at most 1/4 as long as inner ones (if 1/3–1/2(–2/3) as long see *Y. conjunctiva* above); involucre 5–13 mm.
6a. Pappus ash-gray, yellowish brown, or pale brown.
7a. Pappus ash-gray; synflorescence corymbiform on a stem with well-developed distant leaves.
8a. Peduncle and involucre ± shortly glandular hairy (rarely glabrous); midvein of inner phyllaries subapically always plane; style branches yellow upon drying ..... 1. *Y. cineripappa*
8b. Peduncle and involucre glabrous; midvein of some inner phyllaries subapically crested or corniculate; style branches brown or green upon drying ..... 2. *Y. atripappa*
7b. Pappus yellowish brown or pale brown; synflorescence corymbiform on a leafless stem, or else not corymbiform.

9a. Synflorescence corymbiform; capitula erect, with ca. 5 florets; involucre 6–7 mm ..... 27. *Y. szechuanica*
9b. Synflorescence secundly racemiform; capitula nodding, with 10–20 florets; involucre 10–13 mm ..... 28. *Y. racemifera*

6b. Pappus white.
10a. Involucre 4–7 mm; synflorescence (except in depauperate plants) moderately to richly branched, with some, many, or numerous capitula; inner phyllaries with midvein subapically strictly plane.
11a. Leaves undivided; basal leaves with petiole to 15 cm, as long as hastate-cordate blade ..... 22. *Y. longipes*
11b. Leaves except early basal ones always pinnately lobed; basal leaves with basal petiole-like portion much shorter than remainder of leaf.
12a. Basal, lower, and middle stem leaves bipinnately lobed, lateral lobes as broad as terminal lobe ..... 21. *Y. rosthornii*
12b. Leaves at most pinnately lobed, lateral lobes usually much narrower and smaller than terminal lobe.
13a. Plants annual to perennial; stem leaves always well developed, pinnatipartite to pinnatisect, lateral lobes of all leaves ovate or elliptic, terminal lobe long acuminate; involucre 6–7.5 mm; achene 2.5–3 mm ..... 20. *Y. heterophylla*
13b. Plants strictly annual; stem leaves mostly soon reduced and undivided, or if well developed and pinnately lobed then lateral lobes triangular or rhomboidal, terminal lobe obtuse, acute, or shortly acuminate; involucre 4–5(–7) mm; achene 1.5–2.5 mm.
14a. Achene light brown, dark reddish, or purplish brown, apex strongly attenuate; pappus persistent ..... 24. *Y. japonica*
14b. Achene clear red, apex contracted into a stout 0.2–0.4 mm beak; pappus ± deciduous.
15a. Involucre 4–6 mm; pappus 2.5–3 mm ..... 25. *Y. erythrocarpa*
15b. Involucre 6–7 mm; pappus 3–4 mm ..... 26. *Y. rubida*

10b. Involucre (6–)7–10(–13) mm; synflorescence poorly to moderately branched, with few, some, or more rarely with many capitula; inner phyllaries either all with midvein plane or some with midvein subapically crested or corniculate.
16a. Midvein of all inner phyllaries plane.
17a. Inner phyllaries adaxially glabrous; later basal and stem leaves pinnatifid to pinnatipartite, rachis often pectinate between lateral lobes ..... 17. *Y. wilsonii*
17b. Inner phyllaries adaxially appressed pubescent; later basal and stem leaves pinnatisect, rachis not pectinate between lateral lobes.
18a. Lobes of pinnate leaves basally often with a large tooth; achene 3–3.5 mm ..... 18. *Y. henryi*
18b. Lobes of pinnate leaves entire; achene 2–3 mm.
19a. Plants delicate, 10–30 cm tall; involucre ca. 7 mm; achene 2–2.5 mm ..... 15. *Y. hastiformis*
19b. Plants usually rather robust, to 60 cm tall; involucre 7–11 mm; achene 2.5–3 mm ..... 16. *Y. prattii*
16b. Midvein of at least some inner phyllaries subapically crested or corniculate.
20a. Rosette leaves contracted or attenuate into a very long (to 9 cm) inconspicuously winged petiole-like basal portion at least as long as or longer than remainder of leaf ..... 19. *Y. terminalis*
20b. Rosette leaves without petiole-like portion, or if with one then distinctly shorter than remainder of leaf.
21a. Involucre 8–13 mm; inner phyllaries adaxially pubescent; pappus 5–9 mm.
22a. Plants to 100 cm tall; involucre (0.8–)0.9–1.3 cm; longest outer phyllaries 1.5–3 mm ..... 8. *Y. paleacea*
22b. Plants at most 30 cm tall; involucre 0.8–1 cm; longest outer phyllaries ca. 1.5 mm ..... 9. *Y. pilifera*
21b. Involucre 6–8 mm; inner phyllaries adaxially glabrous or appressed pubescent; pappus 2.5–5.5 mm.
23a. Stem very slender or capillaceous, almost leafless or leafless with 1–5 capitula.
24a. Involucre ca. (7–)8 mm; pappus 5–5.5 mm ..... 14. *Y. kangdingensis*
24b. Involucre 6–7 mm; pappus 2–5 mm.
25a. Plants delicate, 3–10 cm tall; rosette leaves 1–7 × 0.3–1 cm; stem capillaceous; pappus 4–5 mm ..... 13. *Y. yilingii*
25b. Plants more robust, 10–15 cm tall; rosette leaves 5–10 × 1–2 cm; stem slender; pappus ca. 2.5 mm ..... 23. *Y. bifurcata*
23b. Stem usually more robust, usually with few leaves and more than 5 capitula.

26a. Achene 2–2.5 mm; inner phyllaries adaxially pubescent.
27a. Leaves pubescent; longest outer phyllary to 1 mm; inner phyllaries adaxially densely appressed hairy ..... 12. *Y. mairei*
27b. Leaves glabrous; longest outer phyllary 1–2 mm; inner phyllaries adaxially sparsely appressed hairy ..... 15. *Y. hastiformis*
26b. Achene 3–4 mm; inner phyllaries adaxially glabrous or with only few appressed hairs.
28a. Stems especially at bifurcations, peduncles, and abaxial face of leaves brown arachnoid hairy; synflorescence with to 25 capitula ..... 10. *Y. fusca*
28b. Stems, peduncles, and leaves mostly rather sparsely pale or white arachnoid hairy; synflorescence with less than 10 capitula ..... 11. *Y. lanata*

1. Youngia cineripappa (Babcock) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 60. 1937.

鼠冠黄鹌菜 shu guan huang an cai

Crepis cineripappa Babcock, Univ. Calif. Publ. Bot. 14: 325. 1928.

Herbs 40–150 cm tall, perennial. Rhizome horizontal or oblique?, with fleshy fibrous roots. Caudex short. Stems mostly solitary or more rarely few, erect, branched only apically, glabrous, leafy. Basal leaves obovate to oblanceolate, 6–25 × 2–4(–6) cm, undivided to pinnatifid or lyrately pinnatifid, glabrous, base attenuate into a cuneately winged petiole-like portion to 1/3 as long as leaf, margin subentire to sinuate-dentate, apex acute to obtuse; lateral lobes 4 or 5 pairs, triangular, broadly triangular-ovate, or elliptic, apex acute, obtuse, or rounded and mucronate; terminal lobe narrowly triangular, apex long acuminate. Stem leaves elliptic to lanceolate, 5–19 × 2–4(–7) cm, base attenuate into a short cuneately winged petiole-like portion, otherwise like basal leaves; uppermost stem leaves linear to subulate, reduced in size. Synflorescence corymbiform, with few to many capitula. Capitula with 14–20 florets; peduncle slender, usually with stipitate glandular hairs, rarely subglabrous. Involucre cylindric, 7–8 mm. Outer phyllaries 5 or 6, ovate to narrowly triangular, longest 1–1.5 mm, apex acute; inner phyllaries 8, abaxially with or rarely without stipitate glandular hairs on midvein, adaxially glabrous, midvein subapically plane, margin white scarious, apex obtuse to acute. Anther tube greenish to blackish. Style branches yellow upon drying. Achene brown, subfusiform, ca. 3.5 mm, subcompressed, ribs finely spiculate, somewhat more attenuate toward apex than base. Pappus grayish, 4–5 mm. Fl. and fr. Jun–Oct.

Moist areas by water in mountain valleys, grasslands on mountain slopes, sparse forests, thickets; 600–3000 m. Guangxi, Guizhou, Sichuan, Yunnan [NE India, ?Myanmar, N Vietnam].

2. Youngia atripappa (Babcock) N. Kilian, **comb. nov.**

纤细黄鹌菜 xian xi huang an cai

Basionym: *Crepis atripappa* Babcock, Univ. Calif. Publ. Bot. 14: 324. 1928; *C. gracilis* J. D. Hooker & Thomson ex C. B. Clarke; *Youngia gracilis* (J. D. Hooker & Thomson ex C. B. Clarke) Babcock & Stebbins (1937), not Miquel (1861); *Y. stebbinsiana* S. Y. Hu, nom. illeg. superfl.

Herbs 20–40 cm tall, perennial. Stem solitary, very slender, flexuous, erect, branched only apically, glabrous, leafy. Basal and lower stem leaves oblanceolate, 4–13 × 1–3 cm, both faces finely pubescent, base attenuate into a short cuneately winged petiole-like portion, margin coarsely sinuate-dentate, apex acuminate. Upper stem leaves similar to lower ones but smaller and elliptic to lanceolate; uppermost stem leaves linear or subulate, reduced in size. Synflorescence rather densely corymbiform, with few to several capitula. Capitula with ca. 15 florets; peduncle 1–1.5 cm, slender, glabrous. Involucre cylindric, 8–9 mm. Outer phyllaries 6 or 7, broadly ovate, ca. 1 mm, apex acute to obtuse; inner phyllaries 8, both faces glabrous, midvein subapically crested, margin white scarious, apex acute to obtuse. Anther tube and style branches green to blackish upon drying. Achene dark brown, subfusiform, ca. 4 mm, somewhat more attenuate toward apex than base, ribs finely spiculate. Pappus grayish, 4–5 mm. Fl. and fr. Jul–Aug.

Forest margins, thickets, grassy cliffs; ?3000–?3600 m. SE Xizang [Bhutan, India (Sikkim)].

The epithet of the earliest legitimate name of this species, *Crepis gracilis*, is not available in *Youngia*, because of *Y. gracilis* Miquel, and the corresponding combination by Babcock and Stebbins is thus illegitimate. Instead, the epithet of *C. atripappa*, which was included as a synonym by Babcock and Stebbins, is available and has to be taken up (*Vienna Code*, Art. 11.4). *Youngia stebbinsiana*, published by S. Y. Hu (Quart. J. Taiwan Mus. 22: 37. 1969) as a replacement name for *Y. gracilis* of Babcock and Stebbins, was thus nomenclaturally superfluous when published and is therefore illegitimate.

3. Youngia simulatrix (Babcock) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 39. 1937.

无茎黄鹌菜 wu jing huang an cai

Crepis simulatrix Babcock, Univ. Calif. Publ. Bot. 14: 329. 1928; *C. smithiana* Handel-Mazzetti; *Pseudoyoungia ladyginii* (Tzvelev) D. Maity & Maiti; *P. simulatrix* (Babcock) D. Maity & Maiti; ?*Taraxacum altune* D. T. Zhai & C. H. An; *Tibetoseris ladyginii* Tzvelev; *T. simulatrix* (Babcock) Sennikov.

Herbs less than 5(–8) cm tall, perennial, rosulate, subacaulescent, with ?taproot and lateral shoot-bearing roots giving rise to secondary rosette shoots. Caudex short, unbranched or weakly branched, with residues of old leaf bases. Rosette leaves oblanceolate, 1–6 × 0.5–1.5 cm, both faces glabrous or abaxially somewhat pilose and adaxially puberulent, base attenuate into a petiole-like portion, margin entire to sinuate-dentate or more rarely pinnatifid, apex acute, rounded, or shortly acuminate; lobes (if present) triangular-ovate, apex obtuse to acute. Capitula 1–10, clustered, directly from axils of rosette leaves or from a branched, 5–10 mm stalk, each with 13–20 florets; peduncle 0.2–2(–6) cm, slender, glabrous or pilose. Involucre

cylindric, 1.2–1.6 cm. Phyllaries dark green to pale yellowish green, abaxially glabrous, margin white scarious; outer phyllaries imbricate, ovate to lanceolate, longest 1/3–1/2 as long as inner ones, apex obtuse to acute; inner phyllaries 8–12, adaxially glabrous, apex acute. Anther tube and style yellow upon drying. Achene dark brown, ± fusiform, ca. 4 mm, ± compressed, apex truncate. Pappus white, 1–1.1 cm, persistent. Fl. and fr. Jul–Oct.

Grasslands on mountain slopes, gravelly areas on floodplains, grassy beaches in river valleys; 2700–5000 m. Gansu, Qinghai, Sichuan, Xizang [India (Sikkim), Nepal].

Tibetoseris ladyginii and *Taraxacum altune* are regarded as synonyms of *Youngia simulatrix* following Sennikov and I. D. Illarionova (Komarovia 5: 91. 2008) and not Ge and Zhai (Novon 9: 47. 1999).

4. Youngia gracilipes (J. D. Hooker) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 40. 1937.

细梗黄鹌菜 xi geng huang an cai

Crepis gracilipes J. D. Hooker, Fl. Brit. India 3: 396. 1881; *Pseudoyoungia angustifolia* (Tzvelev) D. Maity & Maiti; *P. gracilipes* (J. D. Hooker) D. Maity & Maiti; *Tibetoseris angustifolia* Tzvelev; *T. gracilipes* (J. D. Hooker) Sennikov; *T. gracilipes* subsp. *duthiei* D. Maity et al.

Herbs 3–10[–15] cm tall, perennial, rosulate, subacaulescent or dwarf, with taproot and lateral shoot-bearing roots giving rise to secondary rosette shoots. Caudex short, with residues of old leaf bases, not or weakly branched. Rosette leaves oblanceolate, elliptic, or narrowly elliptic, 2–5 × 0.3–1 cm, pinnatifid to pinnatipartite and sometimes lyrately so, sparsely pubescent, base attenuate into a petiole-like portion, margin entire to weakly sinuate-dentate; lateral lobes 3–6 pairs, opposite to subopposite, ovate to elliptic but basal lobes usually toothlike, apex rounded to obtuse; terminal lobe elliptic, apex rounded to obtuse. Capitula 3–14, clustered, directly from axils of rosette leaves or on a stalk, with 12–20(–30?) florets; stalk 1–4 cm, capillaceous, branched, sometimes reduced-leafy; peduncle capillaceous, 1–8 cm, ± pilose to apically ± tomentose, ± bracteate. Involucre broadly cylindric, 8–10 mm. Phyllaries dark to blackish green, abaxially glabrous; outer phyllaries lanceolate to linear-lanceolate, longest to 1/3 as long as inner ones, apex acute; inner phyllaries 8–10, adaxially glabrous, margin scarious, subapically usually plane, apex acute. Anther tube greenish to blackish. Style yellow upon drying. Achene dark, fusiform, ca. 4 mm, apex truncate. Pappus white, 5–7 mm, persistent. Fl. and fr. Jun–Sep.

Forests, forest margins, grasslands; 2700–4800 m. Sichuan, Xizang [Bhutan, N India, Nepal].

Plants in which a delicate, sparsely branched stem with 2 or more capitula and 1 or more leaves is developed have been described as a separate subspecies (under the name *Tibetoseris gracilipes* subsp. *duthiei*) from India, Nepal, and China (Xizang). Corroborating Babcock and Stebbins (Publ. Carnegie Inst. Washington 484: 42. 1937), we have the impression that such plants merely represent more robust forms and that the transitions are fluent. *Tibetoseris angustifolia*, described from a single collection, differs according to the protologue only by narrower leaves, which hardly justifies its recognition as a separate species. The following two species appear very close to *Youngia gracilipes*, and their delimitation should be reassessed on the basis of more material.

5. Youngia cristata C. Shih & C. Q. Cai, Acta Phytotax. Sin. 33: 186. 1995.

角冠黄鹌菜 jiao guan huang an cai

Pseudoyoungia cristata (C. Shih & C. Q. Cai) D. Maity & Maiti; *Tibetoseris cristata* (C. Shih & C. Q. Cai) Sennikov.

Herbs 3–5 cm tall, perennial, rosulate, subacaulescent. Taproot and lateral shoot-bearing roots giving rise to secondary rosette shoots. Caudex short, unbranched or weakly branched, with residues of old leaf bases. Rosette leaves oblanceolate, 2–4 × ca. 1 cm, pinnatifid to pinnatipartite, sparsely tomentose, base attenuate into a petiole-like portion, margin entire; lateral lobes 4–6 pairs, narrowly triangular but basal lobes usually toothlike, apex acute; terminal lobe with apex acute to acuminate. Capitula 3–14, clustered, directly from axils of rosette leaves or from a stalk, with 12–18 florets; stalk short, capillaceous, branched; peduncle capillaceous, 1–4 cm, ± pilose to apically ± tomentose, ± bracteate. Involucre cylindric, 8–10 mm. Phyllaries dark to blackish green, abaxially glabrous; outer phyllaries ovate to lanceolate, longest to 1/2 as long as inner ones, apex obtuse to acute; inner phyllaries 8–10, adaxially glabrous, margin scarious, subapically crested or corniculate, apex acute. Anther tube greenish upon drying. Achene not seen when mature. Pappus white, ca. 7 mm. Fl. Aug.

• Mountain slopes; ca. 3900 m. SE Xizang (Zayü).

6. Youngia sericea C. Shih, Komarovia 5: 48. 2007.

绢毛黄鹌菜 juan mao huang an cai

Pseudoyoungia sericea (C. Shih) D. Maity & Maiti; *Tibetoseris sericea* (C. Shih) Sennikov.

Herbs 3–6 cm tall, perennial, rosulate, subacaulescent. Taproot and lateral shoot-bearing roots giving rise to secondary rosette shoots. Caudex short, unbranched or weakly branched, with residues of old leaf bases. Rosette leaves oblanceolate to narrowly elliptic, 2–5 × 0.4–1.5 cm, pinnatipartite, base attenuate into a petiole-like portion; lateral lobes 4 or 5 pairs, opposite to obliquely opposite, narrowly triangular, basally broadly falcate; terminal lobe narrowly elliptic, elliptic-triangular, or orbicular, apex acute, obtuse, or rounded. Capitula 3–9, clustered, directly from axils of rosette leaves or on a stalk, with 9–15 florets; stalk capillaceous, short, branched; peduncle capillaceous, 1–3 cm, arachnoid hairy to tomentose, ± bracteate. Involucre cylindric, ca. 1 cm. Phyllaries dark green in fruit, arachnoid hairy; outer phyllaries narrowly ovate to lanceolate, longest ca. 1/3 of inner ones, apex obtuse to acute; inner phyllaries ca. 8, adaxially glabrous, margin broadly white membranous, apex acute to obtuse. Achene dark brown to blackish, subfusiform, 3.5–4 mm, apex truncate. Pappus white, ca. 6 mm, persistent. Fl. and fr. Jun–Sep.

• Gravelly mountain slopes, rocky slopes; 3300–3400 m. SE Xizang (Zayü).

From the place of its first publication (C. Shih, Acta Phytotax. Sin. 33: 185. 1995), the name *Youngia sericea* was not validly published because two specimens of different gatherings were simultaneously designated as types (see *Vienna Code*, Art. 37.1 and 37.2). The name was validated with its original authorship in a nomenclatural note by Sennikov in 2007, as given above.

7. Youngia conjunctiva Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 37. 1937.

甘肃黄鹌菜 gan su huang an cai

Crepis parva (Babcock & Stebbins) Handel-Mazzetti; *Pseudoyoungia conjunctiva* (Babcock & Stebbins) D. Maity & Maiti; *P. parva* (Babcock & Stebbins) D. Maity & Maiti; *Tibetoseris conjunctiva* (Babcock & Stebbins) Sennikov; *T. parva* (Babcock & Stebbins) Sennikov; *Youngia parva* Babcock & Stebbins.

Herbs 4–12 cm tall, perennial, rosulate. Taproot and short woody caudex with residues of old leaf bases. Stem solitary, erect, branched apically or from near base, densely tomentose but glabrescent with age, distantly leafy. Rosette leaves oblanceolate, 1.5–6 × 0.5–1.2 cm, both faces tomentulose to glabrescent, base attenuate into a petiole-like portion and semi-amplexicaul, margin sinuately to runcinately dentate and/or runcinately pinnatifid, apex obtuse to acute; lobes (if present) narrowly triangular, apex acute to acuminate. Stem leaves none or few, similar to rosette leaves but smaller, with narrower lobes, and apex acuminate. Synflorescence laxly corymbiform, with 4–8 capitula. Capitula with 13–18 florets; peduncle 1–6 cm, slender, densely tomentose. Involucre cylindric to campanulate, 1–1.1 cm. Phyllaries dark to blackish green, ciliate otherwise abaxially glabrous, apex acute; outer phyllaries lanceolate to linear-lanceolate, longest 1/3–1/2(–2/3) as long as inner ones; inner phyllaries 10–12, adaxially densely pubescent with appressed shiny hairs. Anther tube apically or entirely greenish. Style yellow upon drying. Achene not seen when mature. Pappus white, ca. 7 mm. Fl. Jul–Aug.

• Grassy slopes; 3800–4500 m. SW Gansu, N Sichuan.

Youngia conjunctiva and *Y. parva*, both only known from the type collections and simultaneously described by Babcock and Stebbins (Publ. Carnegie Inst. Washington 484: 35, 37. 1937), are strikingly similar in all features, except minor differences in the habit, and are from the same larger region adjacent to that of the supposed next relatives. The type of *Y. parva* has an apically branching stem of 2–3 cm, that of *Y. conjunctiva* one of 8–10 cm; their architecture, however, is basically identical. For these reasons it appears not justified to treat them as separate species, and they are here considered as conspecific. Doubts about their distinctness had already been expressed by Sennikov and I. D. Illarionova (Komarovia 5: 91. 2008). Additional collections and further studies of this apparently rare species would be desirable. Its systematic position in *Youngia* also needs confirmation.

8. Youngia paleacea (Diels) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 67. 1937.

羽裂黄鹌菜 yu lie huang an cai

Crepis paleacea Diels, Notes Roy. Bot. Gard. Edinburgh 5: 202. 1912; *C. yunnanensis* Babcock; *Youngia paleacea* subsp. *smithii* Babcock & Stebbins; *Y. paleacea* subsp. *yunnanensis* (Babcock) Babcock & Stebbins.

Herbs 30–100 cm tall, perennial. Taproot woody. Caudex often with residues of old leaf bases. Stem solitary, slender, erect, branched from near base or only apically, glabrous or very sparsely white tomentose, distantly leafy or more rarely almost leafless. Basal and lower stem leaves oblanceolate, elliptic, or narrowly elliptic, 2–19 × 0.5–4 cm, pinnatifid, pinnatipartite, or runcinately or lyrately so, both surfaces ± pubescent with pale brown hairs, base attenuate into a winged petiole-like portion; lateral lobes 2–7 pairs, opposite to obliquely opposite, ± broadly triangular to triangular-ovate, margin entire or sinuate-dentate, apex acute, long acute, obtuse, or rounded and often mucronate; terminal lobe lanceolate, triangular, or falcate, margin dentate or entire. Middle and upper stem leaves similar to lower ones but smaller, narrower, and divided or undivided; uppermost stem leaves reduced, undivided, and bractlike. Synflorescence corymbiform, with few to many capitula. Capitula with 9–16 florets; peduncle usually 0.5–3 cm, slender. Involucre cylindric, (0.8–)0.9–1.3 cm. Outer phyllaries broadly ovate to lanceolate, longest 1.5–2(–3) mm, apex acute; inner phyllaries ca. 8, abaxially glabrous, adaxially appressed hairy, midvein subapically crested or corniculate, margin white scarious, apex acute. Anther tube greenish. Style branches yellow upon drying. Achene dark brown to blackish, subfusiform, 3–4 mm, ribs finely spiculate, apex attenuate. Pappus white, 5–7(–9) mm. Fl. and fr. May–Sep. $2n = 32$*.

• Forests on mountain slopes, mountain valleys, forest margins, thickets, grassy slopes; 1800–3800 m. Gansu, Sichuan, Xizang, Yunnan.

Youngia paleacea is a fairly polymorphic species, probably representing a polyploid complex as was first noted by Babcock and Stebbins (Publ. Carnegie Inst. Washington 484: 68. 1937). Further studies are required also for the following species, *Y. pilifera*.

9. Youngia pilifera C. Shih, Acta Phytotax. Sin. 33: 183. 1995.

糙毛黄鹌菜 cao mao huang an cai

Herbs 8–30 cm tall, perennial, caudex often with residues of old leaf bases. Stem slender, erect, branched from base or middle third, almost leafless; branches sericeous below, glabrous above. Basal leaves elliptic, ovate-elliptic, broadly ovate, oblanceolate, or orbicular, 2–5 × 0.6–1.5 cm, lyrately pinnatipartite or undivided, densely strigose, base attenuate or constricted into a winged petiole-like portion, apex rounded to obtuse; lateral lobes 2–4 pairs, triangular to elliptic, margin entire, apex acute, rounded, or obtuse; terminal lobe elliptic, hastate, or irregularly hastate, much larger than lateral ones, margin entire or retrorsely dentate, apex rounded to obtuse. Stem leaves 1 or 2, narrowly elliptic to linear, reduced in size, apex long acuminate. Synflorescence corymbiform to paniculiform-corymbiform, with few to some capitula. Capitula with ca. 11 florets. Involucre narrowly cylindric, 8–10 mm. Phyllaries dark green, abaxially glabrous; outer phyllaries broadly ovate, longest ca. 1.5 mm, apex acute to obtuse; inner phyllaries ca. 8, adaxially appressed hairy, midvein subapically crested or corniculate, margin white scarious, apex acute to obtuse. Achene not seen when mature. Pappus white, ca. 5 mm. Fl. Jul.

• Thickets in mountain valleys, moist areas in river valleys; 3200–3600 m. W Sichuan (Kangding).

Youngia pilifera is close to the polymorphic *Y. paleacea* and possibly only a delicate dwarf morph of the latter. See also note under *Y. paleacea*.

10. Youngia fusca (Babcock) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 76. 1937.

厚绒黄鹌菜 hou rong huang an cai

Crepis fusca Babcock, Univ. Calif. Publ. Bot. 14: 327. 1928; *C. blinii* H. Léveillé (1915), not H. Léveillé (1914).

Herbs 20–40 cm tall, perennial, rosulate. Taproot slender. Caudex with residues of old leaf bases. Stem solitary, erect, branched from near base or higher up, sparsely brown arachnoid hairy and somewhat more densely so at bifurcations, distantly leafy. Rosette and lower stem leaves oblanceolate, 4–10 × 1–3 cm, lyrately or runcinately pinnatipartite to pinnatisect, abaxially ± strongly brown arachnoid hairy, adaxially short brown crinkled hairy, base attenuate into a short ± winged petiole-like portion and semiamplexicaul, margin sinuate-dentate; lateral lobes ovate, triangular, or elliptic, apex obtuse to acute; terminal lobe obovate, ovate, or broadly triangular, apex obtuse to acute. Middle stem leaves (if any) ± elliptic, smaller, otherwise similar to lower leaves; upper stem leaves linear, subulate, or bractlike, reduced in size, usually not divided. Synflorescence corymbiform, with to 25 capitula. Capitula with 10–12 florets; peduncle capillaceous, 0.2–2.5 cm, ± brown arachnoid hairy. Involucre narrowly cylindric, 7–8 mm, abaxially glabrous. Outer phyllaries broadly ovate, longest 1–1.5 mm, apex subacute; inner phyllaries 8, adaxially glabrous or only with a few appressed hairs, midvein often subapically crested, margin narrowly white scarious, apex subacute. Anther tube green. Style branches yellow upon drying. Achene dark brown, columnar, 3–3.5 mm, ribs finely spiculate, apex attenuate. Pappus white, 4–5 mm. Fl. and fr. May–Sep.

• By streams, trailsides in thickets, mountaintops; 2000–3500 m. Guizhou, Yunnan.

11. Youngia lanata Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 76. 1937.

绒毛黄鹌菜 rong mao huang an cai

Youngia nujiangensis C. Shih.

Herbs 9–30 cm tall, perennial, rosulate. Taproot slender, with shoot-bearing lateral roots. Caudex short, with residues of old leaf bases. Stems solitary or few, slender, ± erect, pale arachnoid hairy especially at bifurcations, sparsely leafy. Rosette leaves obovate to oblanceolate, 3–10 × 0.5–1.5 cm, almost undivided, or ± lyrately pinnatifid to pinnatisect, abaxially pale arachnoid hairy, adaxially pubescent with short pale crinkled hairs, base attenuate into a short ± winged petiole-like portion, margin sinuate-dentate, apex obtuse to acute; lateral lobes ovate to triangular, apex rounded to acute and mucronulate. Stem leaves 1–3, linear, reduced in size, undivided. Synflorescence corymbiform, with few to less than 10 capitula. Capitula with 9–11 florets; peduncle capillaceous, 4–15 mm, ± white arachnoid hairy. Involucre narrowly cylindric, 6–8 mm, in fruit to 9 mm, abaxially glabrous. Outer phyllaries ovate, longest 1–1.5 mm, apex acute; inner phyllaries 8, adaxially glabrous, midvein often subapically with small crest or claw, margin white scarious, apex acute. Anther tube greenish yellow. Style branches yellow upon drying. Achene dark brown, fusiform, ca. 3.5 mm, subcompressed, ribs finely spiculate. Pappus white, 3.5–5 mm. Fl. May–Jun.

• Among rocks, rock crevices, wastelands; 1700–2700 m. Yunnan.

Comparison of material determined by Babcock as *Youngia lanata*, which includes the isotype of *Y. nujiangensis* (GH), revealed both taxa to be conspecific. Part of the inner phyllaries of the type collection of *Y. nujiangensis* are subapically crested or corniculate as in *Y. lanata*.

12. Youngia mairei (H. Léveillé) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 77. 1937.

东川黄鹌菜 dong chuan huang an cai

Crepis mairei H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 531. 1913.

Herbs 15–25 cm tall, perennial, rosulate. Taproot slender. Caudex with residues of old leaf bases. Stem solitary, slender, erect, branched from middle third or higher, glabrous. Rosette leaves oblanceolate, 3–7 × 1–1.5 cm, undivided, both faces finely pubescent with yellow or brown many-celled hairs, base attenuate into a short petiole-like portion, margin mucronately sinuate-dentate, apex acute to acuminate. Stem leaves few, linear, reduced in size. Synflorescence corymbiform, with few to several capitula. Capitula with ca. 12 florets; peduncle capillaceous, 0.5–1.2 cm, ± subtomentulose. Involucre cylindric to narrowly campanulate, 6–7 mm, abaxially glabrous. Outer phyllaries ovate, longest ca. 1 mm; inner phyllaries 8, adaxially pubescent with very shortly appressed shiny hairs, midvein subapically often somewhat crested, margin ± white scarious, apex acute and ciliate. Anther tube and style branches yellow upon drying. Achene brownish purple, columnar, ca. 2.5 mm, ribs finely spiculate, apically subattenuate. Pappus white, 3.5–4 mm. Fl. Jun.

• Among rocks; ca. 2600 m. Yunnan.

Youngia mairei is only known from the type collection made in 1912 and is close to *Y. lanata* and *Y. fusca*.

13. Youngia yilingii C. Shih, Acta Phytotax. Sin. 33: 186. 1995.

艺林黄鹌菜 yi lin huang an cai

Herbs 3–10 cm tall, perennial, rosulate, delicate. Caudex strong, branching with age, with residues of old leaf bases. Stem solitary, capillaceous, simple or 1- or 2-branched from near base or higher up, sparsely hairy, leafless. Basal leaves spatulate, elliptic, or oblanceolate, 1–7 × 0.3–1 cm, both faces glabrous or sparsely white tomentose but abaxially glabrescent, undivided, weakly pinnatifid with 1 or 2 pairs of obtusely triangular to lanceolate lateral lobes, or pinnatipartite to pinnatisect with 2–6 opposite or alternate pairs of triangular to ovate, rounded to acute lateral lobes, base attenuate into a petiole-like portion, margin entire to sinuate-dentate, apex obtuse to acute. Capitulum solitary or synflorescence laxly corymbiform, with 2–5 capitula. Capitula with 9–15 florets. Involucre narrowly campanulate, 6–7 mm. Phyllaries abaxially glabrous; outer phyllaries narrowly ovate, longest 1–1.5 mm, apex acute to obtuse; inner phyllaries 8, adaxially sparsely appressed hairy, midvein subapically mostly somewhat crested or corniculate, apex ± acute. Anther tube and style branches yellow upon drying. Achene dark brown, fusiform, 2.5–3 mm, ribs finally spiculate, apex attenuate. Pappus white, 4–5 mm. Fl. and fr. May–Jun.

• Rocky slopes, rocks; 3000–3100 m. NW Yunnan (Zhongdian).

The original description of the apparently rare *Youngia yilingii* is based on a single collection from Zhongdian Xian of plants to 5 cm tall with entire to at most weakly pinnatifid, not more than 10 × 3 mm leaves. Another collection from the same county (*B. Alden et al., Kunming Edinburgh Gothenburg Exped. 579*, CAL 795201!) is considered also to belong to this remarkable species. It indicates that the leaf shape of the species shows some variation even in the same individual. In this collection only the early leaves of a rosette are similar to the ones described for *Y. yilingii*, while the later ones are larger and all pinnatipartite to pinnatisect as described above.

14. Youngia kangdingensis C. Shih, Acta Phytotax. Sin. 33: 186. 1995.

康定黄鹌菜 kang ding huang an cai

Herbs 7–20 cm tall, perennial. Taproot with shoot-bearing lateral roots. Stem solitary, slender, erect, sparsely branched from near base or middle. Basal leaves obovate, oblanceolate, or elliptic, 2–5.5 × 5–1.5 mm, pinnatipartite to pinnatisect, sparsely pubescent, base attenuate into a short petiole-like portion, margin sinuate-dentate; lateral lobes 1–4 pairs, broadly triangular, small; terminal lobes elliptic to obliquely triangular, margin entire, apex rounded, obtuse, or acute and mucronulate. Stem leaves absent or very few, similar to basal leaves but smaller or more strongly reduced. Synflorescence corymbiform, with usually 3–5 capitula. Capitula with ca. 15 florets; peduncle capillaceous, mostly 1–5 cm. Involucre narrowly cylindric, ca. (7–)8 mm. Phyllaries abaxially glabrous; outer phyllaries triangular to ovate, longest ca. 1 mm, apex obtuse; inner phyllaries 8, adaxially sparsely appressed hairy, midvein subapically mostly somewhat crested or corniculate, apex acute. Achene brown, fusiform, ca. 3.5 mm, apex strongly attenuate. Pappus white, 5–5.5 mm. Fl. and fr. Jul.

• Thickets; 1800–3300 m. W Sichuan (Kangding).

Youngia kangdingensis and the following five species appear to be more closely related to each other, and all are insufficiently known with respect to the extent of their variation, distribution, and actual delimitation.

15. Youngia hastiformis C. Shih, Acta Phytotax. Sin. 33: 185. 1995.

顶戟黄鹌菜 ding ji huang an cai

Herbs 10–30 cm tall, perennial. Taproot with lateral shoot-bearing roots. Stem solitary, slender, erect, branched from lower third or higher up, glabrous, sparsely leafy. Basal and lower stem leaves obovate to oblanceolate, 1–5.5 × 0.5–2 cm, glabrous, base attenuate into a petiole-like portion; first leaves undivided and sinuate-dentate; following leaves runcinately or lyrately pinnatipartite with small lateral lobes and a large obovate terminal lobe; later leaves pinnatisect with lateral lobes 1–4 pairs, opposite or alternate, ± triangular to lanceolate, and apex acute to acuminate, with terminal lobe narrowly triangular to triangular-hastate and small. Middle stem leaves (if any) similar to lower stem leaves; upper stem leaves linear-elliptic to linear, reduced in size. Synflorescence laxly corymbiform, with usually 5–12 capitula. Capitula with 9–14 florets; peduncle capillaceous, 0.5–5 cm, glabrous or sparsely white arachnoid hairy. Involucre narrowly cylindric, ca. 7 mm. Phyllaries abaxially glabrous; outer phyllaries ovate to lanceolate, longest 1–2 mm, apex acute; inner phyllaries 8, adaxially sparsely appressed hairy, midvein subapically plane (or somewhat crested or corniculate?), apex ± acute. Achene dark brown, fusiform, 2–2.5 mm, ribs finally spiculate, apex attenuate. Pappus white, ca. 5 mm. Fl. and fr. Apr–Jul.

• By streams, moist open areas; 2500–4000 m. Sichuan (Heishui, Xiangcheng).

The original description of the little-known *Youngia hastiformis*, based on a single collection from Heishui Xian, has been supplemented by two collections from Xiangcheng Xian made at somewhat higher elevations (*D. E. Boufford et al. 28388A* and *28925*), which are apparently also referable to this species. See also note under *Y. kangdingensis*.

16. Youngia prattii (Babcock) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 81. 1937.

川西黄鹌菜 chuan xi huang an cai

Crepis prattii Babcock, Univ. Calif. Publ. Bot. 14: 331. 1928.

Herbs 15–60 cm tall, perennial, ± rosulate. Caudex with residues of old leaf bases. Stem solitary, ± slender, erect, branched from middle, glabrous, distantly sparsely leafy. Rosette leaves and lower stem leaves oblanceolate to narrowly elliptic, 5–13 × 1–3 cm, lyrately or runcinately pinnatifid to pinnatisect, glabrous, base attenuate into a ± winged petiole-like portion, margin subentire to sinuate-dentate; lateral lobes 3–6 pairs, opposite to obliquely opposite, ovate, triangular, linear-lanceolate, or falcate, central ones largest and others gradually smaller, lowermost ones usually toothlike; terminal lobe broadly triangular, linear-lanceolate, or narrowly linear, apex obtuse, acute, or long acuminate. Middle and upper stem leaves similar to lower stem leaves or reduced in size and undivided. Synflorescence corymbiform, with few to many capitula. Capitula with 9–12 florets; peduncle usually 0.5–3 cm, very slender. Involucre narrowly cylindric, 7–9 mm, to 1.1 cm in fruit. Phyllaries abaxially glabrous; outer phyllaries ovate, longest 1–2 mm, apex obtuse; inner phyllaries ca. 8, adaxially pubescent with appressed hairs, midvein subapically plane, margin scarious, apex obtuse to acute. Anther tube dark green. Style branches ± yellow upon drying. Achene brown, subfusiform to columnar, 2.5–3 mm, ribs finely spiculate, apex attenuate. Pappus white, 4–5 mm. Fl. and fr. Jun–Sep.

• Thickets or grasslands on mountain slopes; 1500–2700 m. Henan, Hubei, ?Shanxi, Sichuan.

See note under *Youngia kangdingensis*.

17. Youngia wilsonii (Babcock) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 79. 1937.

栉齿黄鹌菜 zhi chi huang an cai

Crepis wilsonii Babcock, Univ. Calif. Publ. Bot. 14: 331. 1928.

Herbs 13–40 cm tall, perennial, ± rosulate. Caudex with residues of old leaf bases. Stems solitary or few, erect to curved-erect, branched from middle third or higher, glabrous. Rosette leaves and lower stem leaves oblanceolate, 5–10 × 1–2.5 cm, undivided or pinnatifid to pinnatipartite, margin sharply

sinuate-dentate; lateral lobes 4–6 pairs, opposite to obliquely opposite and usually with a pair of teeth between them, broadly to narrowly triangular, apex acute; terminal lobe linear to narrowly triangular, apex acute to acuminate. Middle and upper stem leaves linear, reduced in size. Synflorescence corymbiform, with several to many capitula. Capitula with 9–14 florets; peduncle usually 0.5–3 cm, very slender, arcuate. Involucre narrowly cylindric, 7–9 mm. Phyllaries abaxially glabrous; outer phyllaries ovate, longest 1–2 mm, apex acute to obtuse; inner phyllaries 8, margin white scarious, adaxially glabrous, midvein subapically plane, apex acute to obtuse. Anther tube greenish. Style branches yellow upon drying. Achene pale brown, subfusiform to columnar, 3–3.5 mm, ribs finely spiculate, apex attenuate. Pappus white, 4–5 mm. Fl. and fr. Jun–Sep.

• Grasslands; ca. 1500 m. Chongqing (Chengkou), Henan, Hubei.

See note under *Youngia kangdingensis*.

18. Youngia henryi (Diels) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 83. 1937.

长裂黄鹌菜 chang lie huang an cai

Crepis henryi Diels, Bot. Jahrb. Syst. 29: 633. 1901.

Herbs 15–80 cm tall, perennial, rosulate, with shoot-bearing roots. Caudex with residues of old leaf bases. Stem solitary, erect, branched from middle third or higher, glabrous, distantly leafy. Rosette leaves distinctly dimorphic, to 6(–10) × 2(–3) cm, glabrous, base with a sometimes brown lanate petiole-like portion. Early leaves broadly ovate, undivided and coarsely sinuate-dentate to pinnatifid, base contracted into a petiole-like portion; lateral lobes 1–6 pairs, triangular, apex acute; terminal lobe large, apex acute. Later leaves oblanceolate, elliptic, or lanceolate, pinnatipartite to pinnatisect, base attenuate into a petiole-like portion; lateral lobes 4–6 pairs, narrowly lanceolate to linear, margin basally often with large teeth, apex acute; terminal lobe narrowly lanceolate to linear, apex acute. Lower and middle stem leaves few, lanceolate, pinnatisect, similar to latest rosette leaves. Synflorescence laxly corymbiform, with few to many capitula. Capitula with 7–10 florets; peduncle capillaceous, usually 1–4 cm. Involucre narrowly cylindric, 7–9 mm. Phyllaries abaxially glabrous; outer phyllaries ovate, longest to 2.5 mm, apex obtuse; inner phyllaries 7 or 8, adaxially sparsely pubescent with appressed hairs, midvein subapically plane, margin white scarious, apex acute to obtuse. Anther tube green. Style branches yellow upon drying. Achene pale brown, subfusiform to columnar, 3–3.5 mm, ribs finely spiculate, apex attenuate. Pappus white, 4.5–5 mm. Fl. and fr. Jul–Aug.

• Grasslands on mountain slopes; 1500–2000 m. Hubei, Shaanxi, Sichuan.

See notes under *Youngia terminalis* and *Y. kangdingensis*.

19. Youngia terminalis Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 85. 1937.

大头黄鹌菜 da tou huang an cai

Herbs 20–50 cm tall, perennial, rosulate. Caudex with residues of old leaf bases. Stem very slender, erect, sparsely branched from middle third or higher, glabrous, almost leafless; branches arcuate. Rosette leaves obovate to oblanceolate, to 12 × 3 cm, undivided or lyrately pinnatifid, glabrous, base contracted or attenuate into a very long (to 9 cm) inconspicuously winged petiole-like portion, margin entire to coarsely sinuate-dentate; lateral lobes (if present) 1–4 pairs, triangular, small, apex obtuse; terminal lobe orbicular to ovate, base truncate to subsagittate, apex obtuse to acute. Stem leaves few, linear-lanceolate, reduced in size. Synflorescence laxly corymbiform, with few to several capitula. Capitula with 11–13 florets; peduncle slender to capillaceous, 1.5–12 cm. Involucre narrowly cylindric, 7–8 mm; outer phyllaries ovate, longest ca. 1.5 mm; inner phyllaries 8, adaxially finely appressed pubescent, midvein subapically somewhat crested or tuberculate, margin scarious, apex acute and white ciliate. Anther tube green. Style branches yellow upon drying. Achene dark brown, subfusiform to columnar, ca. 3 mm, ribs obscurely spiculate or muricate, apex attenuate. Pappus white, ca. 4 mm. Fl. and fr. Jul–Aug.

• Grasslands on mountain slopes; 1000–1800 m. W Sichuan (Kangding).

Youngia terminalis is only known from two late 19th century gatherings made by Soulié. The original material preserved at B was destroyed during WWII. No other material has been traced so far, and the above description is based on the original description and a photograph and drawings of the original material. It is apparently closely related to *Y. henryi* and perhaps only a form of the latter from shaded moist habitats. See also note under *Y. kangdingensis*.

20. Youngia heterophylla (Hemsley) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 87. 1937.

异叶黄鹌菜 yi ye huang an cai

Crepis heterophylla Hemsley, J. Linn. Soc., Bot. 23: 475. 1888; *C. bockiana* Diels.

Herbs 30–110 cm tall, annual to ?perennial. Stems solitary or few, erect, branched usually in apical third, glabrous or sparsely hairy. Basal and lower stem leaves oblanceolate, to 32 × 11 cm, lyrately pinnatipartite or sometimes undivided, both faces glabrous or ± pubescent with short hairs, base attenuate into a ± unwinged very variable in length (much longer when leaf undivided) petiole-like portion, margin sinuate-dentate; lateral lobes 1–8 pairs, opposite to obliquely opposite, elliptic to ovate, base truncate to attenuate and sometimes petiolulate, apex acute, obtuse, or rounded; terminal lobe elliptic, ovate, or lanceolate, much larger than lateral lobes, apex ± acute. Middle stem leaves similar to lower leaves but smaller and less (or more rarely not) divided, terminal lobe long acuminate; upper stem leaves narrowly elliptic, lanceolate, or linear-lanceolate, reduced in size. Synflorescence paniculiform-corymbiform, with many capitula. Capitula with 11–25 florets; peduncle capillaceous, usually 0.5–2 cm. Involucre cylindric, 6–7.5 mm. Phyllaries abaxially glabrous; outer phyllaries ovate, longest to 1(–2) mm, apex acute; inner phyllaries ca. 8, adaxially appressed pubescent, midvein subapically plane, margin narrowly white scarious, apex acute. Anther tube green. Style branches yellow upon drying. Achene dark brownish purple, fusiform, 2–3 mm, ribs apically finely spiculate, apex attenuate. Pappus white, 3–4 mm. Fl. and fr. Apr–Oct.

• Forests, forest margins, wastelands; 400–2300 m. Chongqing, Gansu, Guangdong, Guangxi, ?Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan.

"*Crepis? bockiana* Diels" (Bot. Jahrb. Syst. 29: 633. 1901) is based on the collection from Nanchuan, Chongqing, *Bock & von Rosthorn 1593*, which according to Babcock (Univ. Calif. Publ. Bot. 22: 916. 1947), who investigated a corresponding sheet from B, is a mixed gathering of a fragment with leaves and buds of *Youngia heterophylla* and a second completely sterile fragment with a single leaf of an unknown species. The sheet at B was apparently destroyed in 1943 and no other material of this collection is present at O, where the original set of the Bock and Rosthorn material is preserved. Therefore, the name is here treated as a synonym of *Y. heterophylla*. See also note under *Y. rosthornii*.

Youngia heterophylla may be confused with leafy-stemmed forms of *Y. japonica* subsp. *longiflora*. The latter, however, is strictly annual, its stem leaves have rather triangular or rhombic lateral lobes and an acute or shortly acuminate terminal lobe, and the pappus is of a single series of bristles only (vs. several bristles in a second series in *Y. heterophylla*).

21. Youngia rosthornii (Diels) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 92. 1937.

多裂黄鹌菜 duo lie huang an cai

Crepis rosthornii Diels, Bot. Jahrb. Syst. 29: 632. 1901; *C. japonica* (Linnaeus) Bentham f. *foliosa* Matsuda.

Herbs to 1 m tall or more, ?annual. Stem erect, branched above middle, glabrous, leafy. Basal leaves not seen. Lower and middle stem leaves broadly elliptic to ovate in outline, 11–20 × 7–14 cm, bipinnately compound, primary division pinnatisect; lateral lobes 3 or 4 pairs, opposite to obliquely opposite, oblanceolate, elliptic, irregularly elliptic, or lanceolate, to 5 cm, irregularly pinnatifid to pinnatisect, base ± winged petiolulate, apex acute to acuminate; primary terminal lobe similar in shape and size to lateral lobes; secondary lateral lobes few, irregularly ovate, triangular-ovate, or elliptic. Upper stem leaves similar to middle stem leaves but smaller and with narrower lobes or linear-lanceolate, reduced in size, and undivided. Synflorescence paniculiform-corymbiform, with many capitula. Capitula with ?20–25 florets; peduncle capillaceous, usually 0.5–3 cm. Involucre cylindric, ca. 6 mm. Phyllaries abaxially glabrous; outer phyllaries ovate, longest ca. 1 mm, apex ± acute; inner phyllaries ca. 8, adaxially ± appressed pubescent, midvein subapically plane, margin narrowly white scarious, apex acute. Anther tube green. Style branches yellow upon drying. Achene dark brownish purple, fusiform, ca. 2 mm, ribs apically finely spiculate, apex attenuate. Pappus white, 3–4 mm. Fl. and fr. Jun–Oct.

• Mountain slopes; 500–1500 m. Chongqing, Guangdong, Hubei, Sichuan, Zhejiang.

Distinction of *Youngia rosthornii* from *Y. heterophylla* is not without doubt because forms of the latter occur that approach the leaf division of the former. *Youngia rosthornii* may represent only an extreme form of *Y. heterophylla*.

22. Youngia longipes (Hemsley) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 92. 1937.

戟叶黄鹌菜 ji ye huang an cai

Crepis longipes Hemsley, J. Linn. Soc., Bot. 23: 476. 1888.

Herbs 80–100 cm tall, annual. Stem erect, branched from middle third or higher, glabrous, distantly leafy. Basal leaves with petiole to 15 cm; leaf blade cordate-hastate to sometimes ovate, to 15 × 5 cm, glabrous, margin sinuate-denticulate, apex acute, obtuse, or rounded. Stem leaves with gradually shorter petiole upwardly on stem, leaf blade smaller than in basal leaves and otherwise similar or lyrately pinnatisect; lateral lobes 1 or 2 pairs, alternate, narrowly ovate; terminal lobe broadly triangular, apex acuminate; uppermost leaves linear-lanceolate, reduced in size. Synflorescence paniculiform-corymbiform, with many capitula. Capitula with 15–20 florets. Involucre cylindric, 5–6 mm. Phyllaries abaxially glabrous; outer phyllaries ovate, longest less than ca. 1 mm, apex acute; inner phyllaries 8, adaxially appressed pubescent, midvein subapically plane, margin narrowly white scarious, apex acute. Achene pale red, finely mottled with yellow, fusiform, ca. 2 mm, ribs apically finely spiculate, apex strongly attenuate. Pappus white, ca. 4 mm. Fl. and fr. Jun.

• Sandy areas, valleys; 1000–1500 m. Hubei, Zhejiang.

23. Youngia bifurcata Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 89. 1937.

顶凹黄鹌菜 ding ao huang an cai

Herbs 12–13 cm tall, perennial, rosulate. Stems several, very slender, arcuate-erect or stoloniform, remotely 2-furcate, densely pubescent with pale brownish hairs especially at bifurcations, almost leafless. Rosette leaves and (if present) first basal leaf oblanceolate, to 10 × 2 cm, lyrately pinnatifid to lyrately pinnatipartite, pale ± brownish pubescent especially abaxially on midvein, base attenuate into a short narrowly winged petiole-like portion, margin faintly mucronulately sinuate-dentate or entire, apex obtuse; lateral lobes 3–5 pairs, semiorbicular to broadly triangular, ± retrorse, gradually diminishing in size toward leaf base, apex rounded and mucronulate; terminal segment ovate to elliptic. Synflorescence of 1–5 ± distant capitula. Capitula with ca. 12 florets; peduncle very slender. Involucre cylindric, 6–7 mm, glabrous. Outer phyllaries pale yellowish, ovate, longest ca. 2 mm, ± fleshy, apex acute to obtuse; inner phyllaries 8, adaxially pubescent with appressed hairs, midvein subapically crested, apex acute and white ciliate. Anther tube green. Style branches yellow upon drying. Achene dark reddish brown, fusiform, 3–3.5 mm, compressed, ribs spiculate apically, apex attenuate. Pappus white, 1.5–2.5 mm, ± deciduous. Fl and fr. Apr–May.

• Cultivated land; ca. 2500 m. Yunnan (Dongchuan).

Youngia bifurcata is only known from the type collection made by E. E. Maire sometime in the first third of the 20th century.

24. Youngia japonica (Linnaeus) Candolle, Prodr. 7: 194. 1838.

黄鹌菜 huang an cai

Herbs usually 10–150 cm tall, annual. Stems solitary or few, erect, branched from base, middle, or only apically, glabrous or basally often ± hairy, ± leafy or leafless. Basal leaves ± oblanceolate, to 15(–25) × 4(–6) cm, lyrately pinnatipartite or

pinnatisect, rarely not divided; glabrous or somewhat hairy, base attenuate into a longer or shorter narrowly winged to ± unwinged petiole-like portion, margin sinuate-dentate; lateral lobes few to many, ovate, rhombic, or elliptic, gradually smaller toward leaf base; terminal lobe ovate, ovate-lanceolate, or obovate, much larger than lateral ones, apex rounded to acute. Stem leaves similar to basal leaves, abruptly or gradually reduced to bracts upward on stem. Synflorescence corymbiform to paniculiform-corymbiform, usually with many to numerous capitula. Capitula with 10–20 florets; peduncle capillaceous. Involucre cylindric, 4–7 mm. Phyllaries abaxially glabrous; outer phyllaries ovate to triangular, longest less than 1.5 mm, apex acute; inner phyllaries adaxially appressed pubescent, midvein subapically plane, margin ± white scarious, apex acute. Anther tube dark green. Style branches yellow upon drying. Achene light brown to dark reddish or purplish brown, fusiform, 1.5–2.5 mm, ribs finely spiculate, apex strongly attenuate. Pappus white, 2.5–3.5 mm. Fl. and fr. Feb–Dec.

Mountain slopes, mountain valleys, ravines, forests, forest margins, grasslands, moist areas, by water, stream banks, trailsides, roadsides, disturbed places, densely grassy areas by houses or roads, field margins, as a weed in gardens and fields; below 100–4500 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [present in all easterly and southerly neighboring countries; originating probably from China and introduced pantropically, extending into adjacent subtropical regions].

Youngia lyrata (= *Y. pseudosenecio*) and *Y. longiflora* (= *Y. taiwaniana*) are treated here as *Y. japonica* subsp. *elstonii* and *Y. japonica* subsp. *longiflora*, respectively, of a wider *Y. japonica*, following Babcock and Stebbins (Publ. Carnegie Inst. Washington 484: 97–98. 1937). While *Y. japonica* subsp. *longiflora* seems a fairly well-characterized taxon, the delimitation between *Y. japonica* subsp. *japonica* and *Y. japonica* subsp. *elstonii* appears questionable in view of frequent transitions and a probably scattered distribution pattern.

1a. Involucre 6–7 mm; anther tube more than ca. 3 mm; achene 2–2.5 mm .... 24c. subsp. *longiflora*
1b. Involucre 4–5.5 mm; anther tube not more than ca. 2 mm; achene 1.5–2 mm.
  2a. Stem leaves none, 1, or 2 (rarely more) otherwise abruptly reduced to bracts; anther tube usually more than 1.5 mm ..... 24a. subsp. *japonica*
  2b. Stem leaves several, very gradually reduced upward on stem to bracts; anther tube at most ca. 1 mm ..... 24b. subsp. *elstonii*

24a. Youngia japonica subsp. **japonica**

黄鹌菜(原亚种) huang an cai (yuan ya zhong)

Prenanthes japonica Linnaeus, Mant. Pl. 1: 107. 1767; *Chondrilla japonica* (Linnaeus) Lamarck; *C. multiflora* (Thunberg) Poiret; *Crepis formosana* Hayata; *C. japonica* (Linnaeus) Bentham; *C. taquetii* (H. Léveillé & Vaniot) H. Léveillé; *Lactuca taquetii* H. Léveillé & Vaniot; *L. taraxacum* H. Léveillé & Vaniot; *Prenanthes fastigiata* Blume; *P. multiflora* Thunberg; *P. striata* Blume; *Youngia fastigiata* (Blume) Candolle; *Y. formosana* (Hayata) H. Hara; *Y. gracilis* Miquel; *Y. japonica* subsp. *formosana* (Hayata) Kitamura; *Y. japonica* var. *formosana* (Hayata) H. L. Li; *Y. multiflora* (Thunberg) Candolle; *Y. napifolia* Candolle; *Y. poosa* Candolle; *Y. runcinata* Candolle.

Herbs usually 10–90 cm tall. Stems solitary or few, leafless and with only bracts or with 1 or 2(or more) leaves in basal ca. 1/3(–1/2). Basal leaves mostly to 15 × 5 cm. Involucre 4–5 mm. Outer phyllaries less than 1 mm. Anther tube ?usually 1.7–2 mm. Achene 1.5–2 mm. Pappus 2.5–3.5 mm. Fl. and fr. Feb–Dec. $2n = 16$*.

Mountain slopes, mountain valleys, forests, forest margins, grasslands, moist areas, stream banks, trailsides, roadsides, disturbed places, as a weed in gardens and fields; below 100–4500 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [present in all easterly and southerly neighboring countries; originating probably from China and introduced pantropically, extending into adjacent subtropical regions].

24b. Youngia japonica subsp. **elstonii** (Hochreutiner) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 98. 1937.

卵裂黄鹌菜 luan lie huang an cai

Crepis japonica var. *elstonii* Hochreutiner, Candollea 5: 340. 1934; *Chondrilla lyrata* (Thunberg) Poiret; *Crepis lyrata* (Thunberg) Bentham ex C. B. Clarke (1876), not (Linnaeus) Froelich (1838); *Ixeris lyrata* (Thunberg) Miquel; *Lactuca pseudosenecio* Vaniot; *Prenanthes lyrata* Thunberg; *Youngia lyrata* (Thunberg) Cassini; *Y. pseudosenecio* (Vaniot) C. Shih.

Herbs usually 0.5–1.5 m tall. Stem mostly solitary, mostly with well-developed leaves at least in lower half. Basal and lower stem leaves to 27 × 7 cm, pinnatipartite or sublyrately pinnatipartite; lateral lobes 3–7-paired, remote, elliptic to triangular, gradually smaller toward leaf base, lowermost segment usually toothlike, apex acute to obtuse; terminal lobe elliptic, apex acute. Middle and upper stems leaves similar to lower ones but gradually smaller and less divided upward on stem, gradually reduced to bracts. Capitula with ca. 20 florets. Involucre cylindric, 4–5.5 mm. Outer phyllaries less than 1 mm. Anther tube usually 0.6–1 mm. Achene 1.7–2 mm. Pappus 3–3.5 mm. Fl. and fr. Apr–Nov.

• Grasslands on mountain slopes, moist areas by water, densely grassy areas by houses, ravines; 300–2500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan.

24c. Youngia japonica subsp. **longiflora** Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 97. 1937.

长花黄鹌菜 chang hua huang an cai

Crepis japonica subsp. *longiflora* (Babcock & Stebbins) Handel-Mazzetti; *Youngia longiflora* (Babcock & Stebbins) C. Shih; *Y. taiwaniana* S. S. Ying.

Herbs usually 30–90 cm tall. Stems solitary or few, leafless or leafy. Basal leaves to 23 × 7 cm, lyrately pinnatilobate, lyrately pinnatipartite, inconspicuously runcinate-pinnatilobate, or runcinate-pinnatipartite; lateral lobes 3–8 pairs, opposite to obliquely opposite, elliptic, triangular, or rhombic, gradually smaller toward leaf base, apex rounded, obtuse, or acute; termi-

nal lobe elliptic to ovate, apex rounded. Stem leaves absent or similar to basal leaves but gradually smaller and less divided upward on stem. Capitula with 15–20 florets. Involucre cylindric, 6–7 mm. Phyllaries in 4 rows, abaxially glabrous; outer phyllaries to 1.5 mm. Anther tube usually 3?–4 mm. Achene usually dark purple brown, 2–2.5 mm. Pappus ca. 3.5 mm. Fl. and fr. Mar–Aug.

• Mountain slopes, field margins, stream banks, densely grassy areas by roads; below 100–3100 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, ?Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Zhejiang.

25. Youngia erythrocarpa (Vaniot) Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 102. 1937.

红果黄鹌菜 hong guo huang an cai

Lactuca erythrocarpa Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 319. 1903.

Herbs 30–100 cm tall, annual. Stem solitary, slender, erect, branched from near base; branches closely and nearly regularly spaced, sparsely pubescent or glabrous. Basal leaves oblanceolate, to 8 × 3 cm, lyrately pinnatisect, glabrous or pubescent with multicellular hairs, base attenuate into a petiole-like portion, margin sinuate-dentate; lateral lobes (1 or)2 or 3 pairs, elliptic to narrowly elliptic, upper lobe largest, apex acute; terminal lobe broadly ovate to broadly triangular, much larger than lateral lobes, apex acute. Stem leaves similar to basal leaves but rather lanceolate, gradually smaller upward on stem and finally reduced and bractlike. Synflorescence paniculiform-corymbiform, with several to many capitula. Capitula with 10–15 florets; peduncle capillaceous. Involucre cylindric, 4–6 mm. Phyllaries abaxially glabrous; outer phyllaries triangular-ovate, longest ca. 1 mm, apex acute; inner phyllaries ca. 8, adaxially appressed pubescent, midvein subapically plane, margin narrowly white scarious, apex acute. Anther tube green. Style branches yellow upon drying. Achene red, broadly fusiform, 2–2.5 mm, compressed, lateral ribs especially in marginal achene conspicuously wide, ribs finely spiculate, apex attenuate into a stout 0.2–0.4 mm beak. Pappus white, 2.5–3 mm, caducous. Fl. and fr. Apr–Aug. $2n = 16$*.

• Densely grassy areas on mountain slopes, wastelands on plains or in ravines; 400–1900 m. Anhui, Chongqing, Fujian, Gansu, Guizhou, Hubei, ?Hunan, Jiangsu, ?Jiangxi, Shaanxi, Sichuan, Zhejiang.

Distinction between *Youngia erythrocarpa* and the following species, *Y. rubida*, appears problematic, and their delimitation should be reassessed.

26. Youngia rubida Babcock & Stebbins, Publ. Carnegie Inst. Washington 484: 100. 1937.

川黔黄鹌菜 chuan qian huang an cai

Herbs 20–50 cm tall, annual. Stem erect, subdivaricately branched from near base, with multicellular hairs below but glabrescent or glabrous above. Basal leaves oblanceolate, 5–10 × 1.5–3.5 cm, lyrately pinnatipartite to pinnatisect, both faces glabrous or ± pubescent with multicellular hairs, base attenuate into a petiole-like portion, margin sinuate-dentate; lateral lobes 2 or 3 pairs, elliptic to narrowly elliptic; terminal lobe triangular, apex acuminate. Lower and middle stem leaves similar to basal leaves; upper stem leaves ± linear, reduced in size, undivided or acutely 2-lobed near base. Synflorescence paniculiform-corymbiform, with several to many capitula. Capitula with 13–15 florets; peduncle capillaceous. Involucre cylindric, 6–7 mm. Phyllaries abaxially glabrous; outer phyllaries ovate, less than 1 mm, apex acute; inner phyllaries ca. 8, adaxially appressed pubescent, midvein subapically plane, margin narrowly white scarious, apex ± acute. Anther tube green. Style branches yellow upon drying. Achene red, broadly fusiform, ca. 2 mm, subcompressed, ribs obscurely spiculate, apex attenuate into a stout 0.2–0.4 mm beak. Pappus white, 3–4 mm, ± caducous. Fl. and fr. Jun–Nov.

• Forests, forest margins, under rocks, earthen walls; ca. 600 m. Guizhou, Hunan, Sichuan.

See note under *Youngia erythrocarpa* above.

27. Youngia szechuanica (E. S. Söderberg) S. Y. Hu, Quart. J. Taiwan Mus. 22: 37. 1969.

少花黄鹌菜 shao hua huang an cai

Crepis szechuanica E. S. Söderberg, Svensk Bot. Tidskr. 28: 362. 1934, based on *C. scaposa* C. C. Chang, Sinensia 3: 201. 1933, not R. E. Fries (1928); *Hieracium runcinatifolium* C. C. Chang, nom. illeg. superfl.; *Youngia scaposa* Babcock & Stebbins, nom. illeg. superfl.

Herbs 15–40 cm tall, perennial, rosulate. Caudex brown lanate, with residues of old leaf bases. Stems solitary or few, slender, erect, branched from base or higher, leafless or only with bracts. Rosette leaves oblanceolate, to 20 × 7 cm, lyrately pinnatilobate, pinnatipartite, or pinnatisect, both faces pubescent with brown multicellular crinkled hairs, base attenuate into a petiole-like portion, margin mucronately sinuate-dentate; lateral lobes 5–8 pairs, opposite or alternate, semiorbicular, elliptic, or triangular, gradually smaller toward leaf base, apex obtuse to rounded; terminal lobe ovate, 5–10 cm, much larger than lateral lobes, shallowly lobed, apex rounded. Synflorescence paniculiform-corymbiform, with numerous capitula. Capitula with ca. 5 florets; peduncle very slender. Involucre cylindric, 6–7 mm. Phyllaries abaxially glabrous; outer phyllaries ovate to lanceolate, longest ca. 1.5 mm, apex ± acute; inner phyllaries 5, adaxially glabrous, apex obtuse. Anther tube and style branches yellow upon drying. Achene dark purplish brown, subfusiform to columnar, 2–3 mm, apex slightly attenuate. Pappus yellowish brown, 3–4 mm. Fl. and fr. Jun–Jul.

• Trailsides on mountain slopes; 900–1700 m. Sichuan.

Crepis szechuanica (1934), *Hieracium runcinatifolium* (1935), and *Youngia scaposa* (1937) are all replacement names for the illegitimate later homonym *C. scaposa* C. C. Chang. The earliest legitimate name for the species is *C. szechuanica*, and the correct name in *Youngia* must therefore be *Y. szechuanica*. The taxonomic placement of the species in *Youngia*, however, needs confirmation.

28. Youngia racemifera (J. D. Hooker) Babcock & Stebbins, Univ. Calif. Publ. Bot. 18: 229. 1943.

总序黄鹌菜 zong xu huang an cai

Crepis racemifera J. D. Hooker, Fl. Brit. India 3: 397. 1881; *C. rapunculoides* Dunn; *Faberia racemifera* (J. D. Hooker) Sennikov; *Hieracioides racemifera* (J. D. Hooker) Kuntze.

Herbs 20–70 cm tall, perennial, with a ?rhizome or ?shoot-bearing roots. Stem solitary, erect, unbranched or with simple branches from ca. middle third, glabrous, usually leafy. Basal and lower stem leaves ovate, triangular-ovate, or lanceolate, 5–15 × 1–5 cm, glabrous, base attenuate or contracted into a 3–9 cm, broadly and long or narrowly and short cuneately winged petiole-like portion, margin ± mucronulately sinuate-dentate, apex acute to acuminate. Middle and upper stem leaves narrowly ovate, lanceolate, or linear-lanceolate, gradually smaller upward on stem, base attenuate into a gradually shorter cuneately winged petiole-like portion, apex acuminate to long acuminate, otherwise similar to basal leaves. Synflorescence of stem and branches secundly racemiform (occasionally of stem narrowly paniculiform), with few to many drooping capitula. Capitula with 10–20 florets; peduncle wiry, usually 0.2–2 cm. Involucre narrowly campanulate, 1–1.3 cm. Phyllaries abaxially usually glabrous; outer phyllaries narrowly triangular to lanceolate, longest 1/4–1/3 as long as inner ones, apex obtuse to acute; inner phyllaries 8–10, midvein of single phyllaries subapically sometimes crested and/or corniculate, apex acute to obtuse and pale brownish ciliate. Anther tube yellow. Style strongly exserted, greenish black upon drying. Achene brown, ± cylindric, 4–5 mm, with 5 main ribs and 2 or 3 secondary ribs in between but otherwise ± smooth, apex truncate. Pappus yellowish to pale brown, 7–9 mm. Fl. and fr. Aug–Sep.

Grasslands on mountain slopes, forest margins, forests, forest openings, thickets; 2800–4200 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

Doubts about the placement of this species in *Youngia* are justified, indeed. We do not agree, however, with its placement in *Faberia* as proposed by Sennikov and I. D. Illarionova (Komarovia 5: 109. 2008). Its systematic position is currently being investigated (J. W. Zhang et al., in prep.).

67. LAPSANASTRUM Pak & K. Bremer, Taxon 44: 19. 1995.

稻槎菜属 dao cha cai shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, annual or short-lived perennial, rosulate. Leaves pinnatipartite or pinnatisect. Capitula usually nodding, in fruit with 6–20 florets. Involucre narrowly cylindric at anthesis, broader in fruit, less than 7 mm, glabrous. Outer phyllaries much shorter than inner ones; inner phyllaries linear-lanceolate to lanceolate, of equal length, becoming broader in fruit. Receptacle naked. Florets yellow. Achene narrowly ellipsoid, subcompressed, with 5 main ribs and each accompanied by 1(or 2) secondary ribs, apex truncate but with 0 or (1 or)2–4 main ribs apically prolonged into 0.2–2.2 mm slender hooked appendages. Pappus absent.

Four species: China, Japan, Korea; four species (two endemic) in China.

A morphological phylogenetic analysis by Pak and K. Bremer (Taxon 44: 13–21. 1995) revealed that the E Asian species of *Lapsana* Linnaeus are rather distant to the remainder of this genus and instead probably related to *Youngia*. Therefore, the four species have been transferred by these authors to a new genus, *Lapsanastrum*. The close relationship to *Youngia* and distance from *Lapsana* have been fully confirmed by a recent molecular phylogenetic analysis of subtribe Crepidinae (J. W. Zhang et al., in prep.).

1a. Inner phyllaries 8; achene without apical hooked projections.
2a. Plants without creeping stems; flowering stems to 50 cm tall, with several capitula ..... 1. *L. humile*
2b. Plants with creeping stems; flowering stems less than 10 cm tall, with 1 or 2 capitula ..... 2. *L. takasei*
1b. Inner phyllaries 5(or 6); achene usually with (1 or)2–4 apical hooked projections or rarely absent.
3a. Achene with (1 or)2 slender hooked 0.2–1 mm projections ..... 3. *L. apogonoides*
3b. Achene with 2–4 slender hooked 1.2–2.2 mm projections ..... 4. *L. uncinatum*

1. Lapsanastrum humile (Thunberg) Pak & K. Bremer, Taxon 44: 19. 1995.

矮小稻槎菜 ai xiao dao cha cai

Prenanthes humilis Thunberg in Murray, Syst. Veg., ed. 14, 715. 1784; *Lapsana humilis* (Thunberg) Makino; *L. musashiensis* Hayata; *L. parviflora* A. Gray; *Youngia humilis* (Thunberg) Candolle.

Herb 10–50 cm tall, annual to ?short-lived perennial, rosulate, with a taproot. Stems few to several, slender, decumbent to ascending, branched in upper part, puberulent or glabrescent, almost leafless. Rosette leaves oblanceolate, 3.5–10[–26] × 1–2[–4] cm, lyrately pinnatipartite to pinnatisect, base attenuate into petiole-like basal portion, margin sinuate-dentate; lateral lobes 2–7 pairs, elliptic to ovate; terminal lobe ovate, irregularly rhombic, or broadly triangular, much larger than lateral ones, apex ± rounded and mucronulate. Stem leaves 1 or 2, similar to rosette leaves. Synflorescence laxly corymbose, with several capitula. Capitula nodding in fruit, with 15–20 florets; peduncle capillaceous, 0.5–4 cm. Involucre cylindric and 3–4 mm at anthesis, ovoid to subhemispheric and 4–5 mm in fruit. Outer phyllaries 3 or 4, triangular-ovate, ca. 1 mm; inner phyllaries 8. Achene brown, 2–3 mm, minutely papillose, without hooked apical projections of main ribs. Fl. and fr. Apr–Jun. $2n = 16$.

Fields, wastelands, streamsides; 500–1000 m. Anhui, Fujian, Jiangsu, Zhejiang [Japan, Korea].

2. Lapsanastrum takasei (Sasaki) Pak & K. Bremer, Taxon 44: 20. 1995.

台湾稻槎菜 tai wan dao cha cai

Lactuca takasei Sasaki, Trans. Nat. Hist. Soc. Formosa 21: 224. 1931; *Lapsana takasei* (Sasaki) Kitamura.

Herbs to 10 cm tall, short-lived perennial, rosulate. Taproot with lateral shoot-bearing roots producing secondary leaf rosettes. Stems few, flagelliform, very slender, creeping to 50 cm above ground, sparsely pilose; nodes 5–10 cm apart, with adventitious roots and a single leaf. Flowering stems from rosettes and leaf axils of creeping stems, to 7 cm, very slender, ascending, simple or more rarely 2-parted, ± leafless. Rosette leaves oblanceolate, 4–9 × 1–2 cm, pinnatisect, rachis winged or not, pilose, base attenuate into a petiole-like portion, margin sinuate-dentate; lateral lobes 4–7 pairs, ovate, triangular, or rhombic, gradually smaller toward petiole-like base, apex rounded to acute and mucronulate; terminal lobe broadly ovate to suborbicular, much larger than lateral ones. Leaves of creeping stems similar to rosette leaves. Capitula 1 or 2 per flowering stem, with ca. 10 florets. Involucres cylindric, ca. 7 mm, in fruit ca. 4 mm wide. Outer phyllaries ca. 5, lanceolate, longest ca. 1 mm; inner phyllaries 8. Achene without hooked apical projections of main ribs. Fl. and fr. Jun–Aug. $2n = 16$*.

• Moist mountain slopes; 1800–2800 m. Taiwan.

3. Lapsanastrum apogonoides (Maximowicz) Pak & K. Bremer, Taxon 44: 19. 1995.

稻槎菜 dao cha cai

Lapsana apogonoides Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 18: 288. 1873.

Herbs 5–25 cm tall, annual to biennial, rosulate, with a taproot. Stems several, slender, ascending, branched from basal half or higher up, pubescent or glabrous, distantly leafy. Rosette leaves oblanceolate, 3–15 × 1–2.5 cm, lyrately pinnatisect, base attenuate into a petiole-like portion, margin subentire to mucronulately sinuate-dentate; lateral lobes 2 or 3(or 4) pairs, ovate, elliptic, or hemispheric, apex mucronulate; terminal lobe ovate, rhombic, or elliptic, much larger than lateral ones, apex rounded and mucronulate. Stem leaves few, similar to basal leaves. Synflorescence laxly corymbiform to laxly paniculiform-corymbiform, with few to several capitula. Capitula nodding in fruit, with 6–10 florets; peduncle 1–5 cm. Involucre narrowly cylindric and 3–4 mm at anthesis, cylindric, campanulate, or obovoid and 4–6 mm in fruit. Phyllaries abaxially glabrous; outer phyllaries 3 or 4, ± ovate, longest 1–1.5 mm, apex acute and often purplish tipped; inner phyllaries 5(or 6). Achene straw-colored to yellowish brown, body 4–5 mm, minutely papillose, usually lateral main ribs apically prolonged into (1 or)2 slender hooked 0.2–1 mm appendages or rarely absent. Fl. and fr. Nov–Jun. $2n = 44$.

Riverbanks, fields, wastelands, roadsides; low elevations. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Shaanxi, Taiwan, Yunnan, Zhejiang [Japan, Korea; introduced to W North America].

In Guangxi and Hunan, the species is used as green fodder for pigs.

4. Lapsanastrum uncinatum (Stebbins) Pak & K. Bremer, Taxon 44: 20. 1995.

具钩稻槎菜 ju gou dao cha cai

Lapsana uncinata Stebbins, Madroño 4: 154. 1938.

Herbs 5–10 cm tall, ?annual, rosulate, glabrous. Stems several, to 15 cm, slender, decumbent, branched in apical half, almost leafless. Rosette leaves oblanceolate, 4–10 × 1–1.5 cm, pinnatisect to lyrately pinnatisect, base attenuate into petiole-like portion, margin sinuate-dentate; lateral lobes 2–4 pairs, triangular to ovate; terminal lobe ovate, much larger than lateral ones, apex ± rounded and mucronulate. Stem leaves 0 or 1, similar to rosette leaves but reduced in size. Synflorescence laxly corymbose, with few to several capitula. Capitula nodding in fruit, with 10–12 florets; peduncle capillaceous, 1.5–5 cm. Involucre cylindric and 5–6 mm at anthesis, cylindric, campanulate, or obovoid and to 6.5 mm in fruit. Outer phyllaries 3 or 4, triangular-ovate, 1–1.5 mm; inner phyllaries 5(or 6). Achene straw-colored to reddish yellow, body ca. 3 mm, minutely papillose, 2–4 main ribs apically prolonged into slender hooked 1.2–2.2 mm appendages. Fl. and fr. Apr.

• Floodplains. S Anhui (Tongling).

Lapsanastrum uncinatum is a remarkable, apparently very rare species and is only known to the authors from the type collection made in 1924 in the floodplains of the Chang Jiang.

68. CREPIDIASTRUM Nakai, Bot. Mag. (Tokyo) 34: 147. 1920.

假还阳参属 jia huan yang shen shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Crepidifolium Sennikov; *Geblera* Kitagawa (1937), not Fischer & C. A. Meyer (1835); *Paraixeris* Nakai.

Herbs, annual, biennial, or perennial, sometimes subshrubs, often rosulate, with a taproot. Stems usually leafy. Leaves undivided or pinnately lobed; stem leaves often clasping. Capitula with 5–20 florets. Involucres narrowly cylindric. Phyllaries with narrow scarious margin; outer phyllaries few, longest ca. 1/4(–1/2) as long as inner ones; inner phyllaries 5 or 8, linear-lanceolate, equal in length. Receptacle naked. Florets yellow. Achene ± fusiform, slightly compressed, with 5 main ribs alternating with 1 or 2 secondary ribs, usually scabrid of antrorse acute papillae especially toward apex, rarely glabrous or muriculate, apex attenuate or with a beak less than 1/5 or to 1/2 of achene length. Pappus white, scabrid, usually ± caducous.

About 15 species: C and E Asia, including N Pacific Bonin (Ogasawara) Islands; nine species (two endemic) in China.

Crepidiastrum, in the circumscription used here, includes *Paraixeris*, following the conclusions by Pak and Kawano (Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 29 61. 1992) of their carpological and cytological investigations, which have been corroborated through recent molecular phylogenetic analyses by J. W. Zhang et al. (in prep.). The analyses by J. W. Zhang et al., moreover, revealed that the *Youngia* segregate *Crepidifolium*

is also nested within the *Crepidiastrum* clade, thus confirming an earlier assumption by Sennikov (Bot. Zhurn. 82(5): 113–116. 1997), which Sennikov later revised in favor of establishing the separate genus *Crepidifolium* (Sennikov & I. D. Illarionova, Komarovia 5: 96. 2008). This genus is therefore also treated here as a congener of *Crepidiastrum*, extending its geographical range to C Asia. Its basic chromosome number is $x = 5$.

1a. Inner phyllaries 5; florets 5 or 6 ..... 5. *C. chelidoniifolium*
1b. Inner phyllaries (7 or)8; florets 8–19.
2a. Stem leaves never clasping.
3a. Plant stoloniferous; leaf blade triangular to orbicular ..... 6. *C. humifusum*
3b. Plant not stoloniferous; leaf blade oblanceolate, elliptic, or lanceolate.
4a. Stems numerous, intricately and divaricately dichotomously branched ..... 9. *C. akagii*
4b. Stems 1 or few, paniculately branched.
5a. Involucre 0.8–1.1 cm, 2.5–3.5 mm wide at anthesis (in middle third); anther tube 3.5–5 mm; achene black to blackish ..... 7. *C. tenuifolium*
5b. Involucre 1–1.4 cm, (3.5–)4–6 mm wide at anthesis (in middle third); anther tube 5–6 mm; achene usually brownish ..... 8. *C. diversifolium*
2b. At least upper stem leaves conspicuously clasping.
6a. Annual or biennial herbs; achene with a beak 1/5–1/3 as long as achene.
7a. Middle and upper stem leaves broadest in basal third; involucre 4.5–6.5 mm; anther tube and style pure yellow upon drying ..... 1. *C. sonchifolium*
7b. Middle and upper stem leaves broadest in middle third; involucre 6–9 mm; anther tube and style greenish to blackish upon drying ..... 4. *C. denticulatum*
6b. Perennial rosulate herbs with a woody caudex or subshrubs; achene without a beak or with a beak at most 1/5 as long as achene.
8a. Leaves undivided or pinnately lobed, margin entire to shallowly dentate; primary stems decumbent; middle and upper stem leaves obovate, ovate, or lanceolate, apex subacute to rounded ..... 2. *C. lanceolatum*
8b. Leaves always undivided, margin entire to denticulate; primary stems ascending-erect; upper stem leaves broadly elliptic to broadly ovate, apex mostly rounded ..... 3. *C. taiwanianum*

1. Crepidiastrum sonchifolium (Maximowicz) Pak & Kawano, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 58. 1992.

尖裂假还阳参 jian lie jia huan yang shen

Herbs 20–100 cm tall, annual or biennial. Root vertical, with many fibrous rootlets. Stem solitary, erect, branched predominantly in upper half, glabrous or rarely puberulent (subsp. *pubescens*). Leaves glabrous, or rarely puberulent (subsp. *pubescens*). Basal leaves and often lower stem leaves oblanceolate, apex rounded. Middle and upper stem leaves sessile, narrowly ovate, lanceolate, or rarely ± elliptic, base very conspicuously auriculately clasping, auricles ± rounded; blade including auricles pinnatifid, pinnatipartite, or subpinnatisect and often laciniately so. Synflorescences terminating main stem and branches, corymbiform or paniculiform, with few to many capitula. Capitula with 12–20 florets; peduncle capillaceous. Involucre 4.5–6.5 mm, narrowly cylindric. Phyllaries abaxially glabrous; outer phyllaries few, ovate, less than 0.5 mm, apex acute; inner phyllaries ca. (7 or)8, plane or more often weakly to strongly crested or corniculate below apex. Achene fusiform, 2–4.2 mm including a slender 0.4–1.8 mm beak. Pappus white, 2–3 mm.

Grasslands on mountain slopes, thickets, floodplains, rocky stream beds, cliffs, roadsides; below 100–1900 m. Anhui, Chongqing, Gansu, ?Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan [Korea, Mongolia, E Russia].

1a. Stems, branches, and leaves glabrous; achene ribs scabrid especially apically, beak 0.4–1 mm and 1/5–1/3 as long as achene ..... 1a. subsp. *sonchifolium*
1b. Stems, branches, and leaves puberulent; achene ribs apically strongly muriculate, beak 1.2–1.8 mm and almost 1/2 as long as achene ..... 1b. subsp. *pubescens*

1a. Crepidiastrum sonchifolium subsp. **sonchifolium**

尖裂假还阳参(原亚种) jian lie jia huan yang shen (yuan ya zhong)

Youngia sonchifolia Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 180. 1859; *Crepidiastrum sonchifolium* var. *elegans* (Franchet) Sennikov; *Ixeridium elegans* (Franchet) C. Shih; *I. sonchifolium* (Maximowicz) C. Shih; *Ixeris denticulata* (Houttuyn) Stebbins subsp. *elegans* (Franchet) Stebbins; *I. denticulata* subsp. *sonchifolia* (Maximowicz) Stebbins; *I. serotina* (Maximowicz) Kitagawa; *I. sonchifolia* (Maximowicz) Hance; *I. sonchifolia* var. *serotina* (Maximowicz) Kitagawa; *Lactuca bungeana* Nakai; *L. denticulata* (Houttuyn) Maximowicz var. *sonchifolia* (Maximowicz) Maximowicz; *L. elegans* Franchet; *L. sonchifolia* (Maximowicz) Debeaux (1876), not Willdenow (1803); *Paraixeris serotina* (Maximowicz) Tzvelev; *P. sonchifolia* (Maximowicz) Tzvelev; *P. sonchifolia* var. *serotina* (Maximowicz) Kitagawa; *Y. serotina* Maximowicz.

Basal leaves and often lower stem leaves oblanceolate, apex rounded. Middle stem leaves sessile, narrowly ovate, lanceolate, or rarely ± elliptic, 2.5–9 × 0.5–3 cm, base very conspicuously auriculately clasping, auricles ± rounded; blade including auricles pinnatifid, pinnatipartite, or subpinnatisect, with short triangular (1–5 mm) to long narrowly triangular or sublinear (to 1.5 cm) acute lateral lobes and a larger acute ter-

minal lobe, margin entire or sharply dentate. Upper stem leaves similar to middle stem leaves but smaller, usually less incised, less dentate, or entire especially in upper part of blade, apex long acuminate. Involucre 4.5–6.5 mm. Inner phyllaries plane or more often weakly to strongly crested or corniculate below apex. Anther tube and style yellow upon drying. Achene reddish brown, 2–3.2 mm including a slender 0.4–1 mm beak. Pappus 2–3 mm. Fl. and fr. Apr–Sep. $2n = 10$*.

Grasslands on mountain slopes, thickets, floodplains, rocky stream beds, cliffs, roadsides; below 100–1900 m. Anhui, Chongqing, Gansu, ?Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan [Korea, Mongolia, E Russia].

Stebbins (J. Bot. 75: 43–51. 1937) distinguished *Ixeris denticulata* subsp. *elegans* from *I. denticulata* subsp. *sonchifolia* by the slightly smaller involucres, distinctly crested or corniculate inner phyllaries, and more finely dentate leaves. In the material studied, this delimitation does not appear to work. Although, for example, the inner phyllaries are strikingly corniculate in the type of *Lactuca elegans*, there is no discontinuity but a rather continuous variation toward plants with only slightly crested or even plane phyllaries. Similar observations regard the other features listed.

1b. Crepidiastrum sonchifolium subsp. **pubescens** (Stebbins) N. Kilian, **comb. nov.**

柔毛假还阳参 rou mao jia huan yang shen

Basionym: *Ixeris denticulata* subsp. *pubescens* Stebbins, J. Bot. 75: 49. 1937.

Stems, branches, and leaves puberulent. Stem leaves lanceolate, 3–6 cm, pinnatipartite; lateral lobes 5–10 pairs, margin entire or dentate to weakly pinnatifid. Involucre 4.5–5.5 mm. Inner phyllaries not or weakly crested or corniculate below apex. Anther tube and style yellow upon drying. Achene 3.5–4.2 mm including a slender 1.2–1.8 mm beak, body apically muriculate. Pappus 2–2.5 mm.

● Hubei.

A little-known taxon, tentatively placed here, it is apparently only known from the holotype at W.

2. Crepidiastrum lanceolatum (Houttuyn) Nakai, Bot. Mag. (Tokyo) 34: 150. 1920.

假还阳参 jia huan yang shen

Prenanthes lanceolata Houttuyn, Nat. Hist. 10: 383. 1779; *Chondrilla lanceolata* (Houttuyn) Poiret; *Crepidiastrum koshunense* (Hayata) Nakai; *C. lanceolatum* f. *batakanense* (Kitamura) Kitamura; *C. lanceolatum* var. *batakanense* (Kitamura) Nemoto; *C. lanceolatum* f. *pinnatilobum* (Maximowicz) Nakai; *C. quercus* (H. Léveillé & Vaniot) Nakai; *Crepis integra* (Thunberg) Miquel; *C. integra* var. *pinnatiloba* Maximowicz; *C. lanceolata* (Houttuyn) Schultz Bipontinus; *C. lanceolata* var. *pinnatiloba* (Maximowicz) Makino; *Hieracioides integra* (Thunberg) Kuntze; *Ixeris koshunensis* (Hayata) Stebbins; *I. lanceolata* (Houttuyn) Stebbins (1937), not C. C. Chang (1932); *I. quercus* (H. Léveillé & Vaniot) Stebbins; *Lactuca koshunensis* Hayata; *L. lanceolata* (Houttuyn) Makino; *L. lanceolata* var. *batakanensis* Kitamura; *L. quercus* H. Léveillé & Vaniot; *P. integra* Thunberg.

Herbs 10–20 cm tall, perennial, rosulate, with a woody caudex or rootstock. Stems several from rosette leaf axils, to 40 cm, decumbent, leafy, each usually producing a secondary leaf rosette at a node in its middle third and with a single or few ± ascending-erect remotely leafy secondary flowering stems. Rosette leaves spatulate to rarely elliptic, 5–15 × 0.5–4.5 cm, usually somewhat fleshy, undivided or more rarely pinnatifid to pinnatisect with ovate to lanceolate lateral lobes, glabrous, base cuneately attenuate, margin entire or shallowly dentate, apex usually rounded. Lower and middle stem leaves similar to rosette leaves but smaller, base semiamplexicaul, apex obtuse to acute. Upper stem leaves obovate to ovate, base auriculately clasping, apex subacute to obtuse. Synflorescence corymbiform, with few to several capitula. Capitula with 8–12 florets; peduncle slender. Involucre narrowly cylindric, 7–9 mm. Phyllaries glabrous; outer phyllaries few, ovate, longest ca. 2 mm, apex ± acute; inner phyllaries 8, apex subacute. Achene brownish, subfusiform, 3–4 mm, scabrid, apically attenuate or with a less than 0.5 mm beak. Pappus white, 3–4 mm. $2n = 10$*.

Rocky situations on hillsides in coastal areas. Taiwan [Japan, S Korea].

3. Crepidiastrum taiwanianum Nakai, Bot. Mag. (Tokyo) 34: 252. 1920.

台湾假还阳参 tai wan jia huan yang shen

Crepidiastrum koshunense (Hayata) Nakai var. *taiwanianum* (Nakai) Yamamoto; *Ixeris taiwaniana* (Nakai) Stebbins; *Lactuca taiwaniana* (Nakai) Makino & Nemoto.

Herbs 20–40 cm tall, perennial, sometimes subshrubs, rosulate, with a woody caudex. Stems several from rosette leaf axils, ascending to erect, branched in apical third or half, leafy; older stems basally woody, developing in middle third a secondary leaf rosette with a single or few ± ascending-erect leafy secondary flowering stems. Rosette leaves spatulate, 4–12 × 1–4 cm, glabrous, base attenuate, margin entire or denticulate, apex rounded. Lower stem leaves similar to rosette leaves but smaller, base semiamplexicaul. Middle and upper stem leaves broadly elliptic to broadly ovate, smaller than lower ones, base auriculately clasping, margin entire or faintly denticulate, apex mostly rounded. Synflorescence corymbiform, with several to many capitula. Capitula with 8–12 florets; peduncle slender. Involucre narrowly cylindric, 6–8 mm. Phyllaries glabrous; outer phyllaries few, ovate, longest ca. 1.5 mm, apex ± acute; inner phyllaries 8, apex subacute. Achene brownish, subfusiform, ca. 4 mm, scabrid, apically attenuate or with a less than 0.5 mm beak. Pappus white, ca. 3 mm. $2n = 10$*.

● Littoral areas; near sea level to 200 m. S Taiwan.

Crepidiastrum taiwanianum is closely related to *C. lanceolatum*. Closer investigation should show whether its status as a separate species is actually justified.

4. Crepidiastrum denticulatum (Houttuyn) Pak & Kawano, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 56. 1992.

黄瓜假还阳参 huang gua jia huan yang shen

Herbs 30–120 cm tall, annual or biennial. Root vertical, with many fibrous rootlets. Stem solitary, erect, branched pre-

dominantly in upper half, glabrous. Leaves glabrous. Basal and lower stem leaves mostly withered in fruit, ± petiolate or sessile, usually oblanceolate, undivided or pinnately divided. Middle stem leaves sessile, base conspicuously auriculately clasping, auricles usually rounded; blade (including auricles) oblanceolate, obovate, pandurate, or ± elliptic, undivided, or pinnatifid or pinnatipartite, margin entire or dentate, apex rounded, acute, or acuminate. Upper stem leaves similar to middle stem leaves but smaller, usually less incised, less dentate, or entire. Synflorescences terminating main stem and branches, corymbiform or paniculiform, with few to many capitula. Capitula with 12–20 florets; peduncle capillaceous. Involucre narrowly cylindric, 6–9 mm. Phyllaries abaxially glabrous; outer phyllaries few, ovate, less than 0.5 mm, apex acute; inner phyllaries ca. (7 or)8, midvein subapically plane, crested, or corniculate. Anther tube and style greenish to blackish upon drying. Achene blackish dark brown, narrowly ellipsoid, 2.5–4.5 mm, with 10–15 apically scabrid ribs, apex attenuate into a beak 1/5–1/3 as long as achene. Pappus white, 3–5.5 mm.

Forests, forest margins, grasslands, dry slopes, among boulders, cliffs, field margins, roadsides; below 100–2000 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea, Mongolia, E Russia, Vietnam].

Based on the treatment by Stebbins (J. Bot. 75: 43–51. 1937) under *Ixeris*, excluding the misplaced *I. denticulata* subsp. *elegans*, *I. denticulata* subsp. *pubescens*, and *I. denticulata* subsp. *sonchifolia* (see subspecies of *Crepidiastrum sonchifolium* above), three subspecies are recognized in *C. denticulatum*. They are not always easily distinguishable and seem linked by transitional populations, but this approach may provide a fairly suitable basis for further, much needed studies.

1a. Involucre 6–7(–8) mm; midvein of inner phyllaries crested below apex; achene with 0.4–1 mm beak ca. 1/4–1/3 as long as achene ..... 4c. subsp. *ramosissimum*

1b. Involucre 7–9 mm; midvein of inner phyllaries plane or crested below apex; achene with 0.2–0.6 mm beak ca. 1/5 as long as achene.

2a. Involucre 7–8 mm; midvein of inner phyllaries plane below apex; achene including beak 2.5–3.5 mm; pappus 3.5–4.5 mm ..... 4a. subsp. *denticulatum*

2b. Involucre 8–9 mm; midvein of inner phyllaries crested below apex; achene including beak 3–4 mm; pappus 4.5–5.5 mm ..... 4b. subsp. *longiflorum*

4a. Crepidiastrum denticulatum subsp. **denticulatum**

黄瓜假还阳参(原亚种) huang gua jia huan yang shen (yuan ya zhong)

Prenanthes denticulata Houttuyn, Nat. Hist. 10: 385. 1779; *Chondrilla denticulata* (Houttuyn) Poiret; *C. hastata* (Thunberg) Poiret; *Crepidiastrum denticulatum* var. *cornutum* Sennikov; *C. denticulatum* f. *pinnatipartitum* (Makino) Sennikov; *Ixeris denticulata* (Houttuyn) Stebbins; *I. denticulata* f. *pinnatipartita* (Makino) Stebbins; *Lactuca denticulata* (Houttuyn) Maximowicz; *L. denticulata* [unranked] *pinnatipartita* Makino; *Paraixeris denticulata* (Houttuyn) Nakai; *P. denticulata* f. *pinnatipartita* (Makino) Nakai; *P. denticulata* var. *pinnatipartita* (Makino) Barkalov; *P. pinnatipartita* (Makino) Tzvelev; *Prenanthes hastata* Thunberg; *Youngia chrysantha* Maximowicz; *Y. denticulata* (Houttuyn) Kitamura; *Y. denticulata* f. *pinnatipartita* (Makino) Kitamura; *Y. hastata* (Thunberg) Candolle.

Basal leaves and lower stem leaves oblanceolate, apex usually rounded. Middle stem leaves sessile, base very conspicuously auriculately clasping, auricles ± rounded; blade (including auricles) oblanceolate, obovate, pandurate, or more rarely ± elliptic, 3–12 × 1–7 cm, undivided, or pinnatifid or pinnatipartite, margin shallowly or more deeply dentate or entire; lateral lobes (if present) 2–4 pairs, opposite to subalternate, triangular-ovate, elliptic, or obovate; terminal lobe triangular-ovate to elliptic, much larger, apex rounded to subacute. Upper stem leaves similar to middle stem leaves but smaller, usually less incised or less dentate or entire. Involucre 7–8 mm. Inner phyllaries usually plane below apex. Achene 2.5–3.5 mm including a 0.2–0.5 mm beak. Pappus 3.5–4.5 mm. Fl. and fr. Aug–Feb. $2n = 10$*.

Forests, forest margins, grasslands, cliffs, field margins; below 100–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shandong, Shanxi, Zhejiang [Japan, Korea, Mongolia, E Russia, Vietnam].

4b. Crepidiastrum denticulatum subsp. **longiflorum** (Stebbins) N. Kilian, **comb. nov.**

长叶假还阳参 chang ye jia huan yang shen

Basionym: *Ixeris denticulata* subsp. *longiflora* Stebbins, J. Bot. 75: 48. 1937.

Leaves similar to subsp. *denticulatum*. Involucre 8–9 mm. Inner phyllaries usually distinctly crested below apex. Achene 3–4 mm including a 0.3–0.6 mm beak. Pappus 4.5–5.5 mm. Fl. and fr. (?Sep–)Jan–Mar.

• Field margins; 400–1000 m. Fujian, Guangdong, Jiangxi.

4c. Crepidiastrum denticulatum subsp. **ramosissimum** (Bentham) N. Kilian, **comb. nov.**

枝状假还阳参 zhi zhuang jia huan yang shen

Basionym: *Brachyramphus ramosissimus* Bentham, London J. Bot. 1: 489. 1842; *Ixeris denticulata* subsp. *ramosissima* (Bentham) Stebbins; *I. ramosissima* (Bentham) A. Gray.

Basal and lower stem leaves spatulate to obovate, to 24 × 7 cm, undivided or pinnatipartite to pinnatisect (often lyrately so), base cuneately attenuate into a winged or sometimes unwinged petiole-like portion and semiamplexicaul to somewhat auriculately clasping, margin sinuate-dentate, apex rounded to acute; lateral lobes (if present) 2–5 pairs. Middle and upper stem leaves mostly spatulate but uppermost ones sometimes lanceolate, smaller, undivided or pinnatipartite, base without petiole-like portion but distinctly auriculately clasping, margin subentire to shallowly sinuate-dentate, apex rounded to

acute. Involucre 6–7(–8) mm. Inner phyllaries usually distinctly crested below apex. Achene 2.8–4.5 mm including a beak 1/4–1/3 as long as achene. Pappus ca. 3 mm. Fl. and fr. Jul–Nov. $2n = 10$*.

• Dry slopes, among boulders, cliffs, roadsides; 600–2000 m. Guangdong, Guangxi, Guizhou, Yunnan.

5. Crepidiastrum chelidoniifolium (Makino) Pak & Kawano, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 56. 1992.

少花假还阳参 shao hua jia huan yang shen

Lactuca chelidoniifolia Makino, Bot. Mag. (Tokyo) 12: 47. 1898 [*"chelidonifolia"*]; *Ixeris chelidoniifolia* (Makino) Stebbins; *L. senecio* H. Léveillé & Vaniot; *Paraixeris chelidonifolia* (Makino) Nakai; *Youngia chelidoniifolia* (Makino) Kitamura.

Herbs 10–25[–50] cm tall, annual, glabrous. Stem solitary, erect, branched from base. Basal leaves withered at anthesis. Lower and middle stem leaves with a slender petiole often basally with well-developed dentate or dissected auricles; leaf blade ± elliptic, 2–6[–12] × 0.5–3[–6] cm, irregularly and interruptedly pinnatisect, rachis wingless; lateral lobes 1–4 pairs, opposite to alternate, ovate, elliptic, falcate, rhombic, or oblanceolate, margin sparsely dentate to incised; terminal lobe similar to lateral ones. Upper stem leaves similar to lower and middle stem leaves. Synflorescence of main stem and branches corymbiform or paniculiform, with few to many capitula. Capitula with ca. 5(or 6) florets. Involucre narrowly cylindric, 5–7 mm. Outer phyllaries few, ovate, longest 0.6–1 mm, apex obtuse to acute; inner phyllaries 5, apex acute to obtuse. Anther tube and style greenish to blackish upon drying. Achene brownish, fusiform, 2.5–3.5 mm, with 10–15 apically long papillose ribs, apex attenuate or with a beak to 0.7 mm. Pappus white, 3.5–4.5 mm. Fl. and fr. Sep–Oct. $2n = 10$.

Mountain slopes, ravines, forests, moist cliffs; 1000–1700 m. Heilongjiang, Jilin [Japan, Korea, E Russia].

"Ixeris saxatilis" (Baranov, Zap. Kharbin. Obshch. Estestvoisp. Etnogr. 12: 34. 1954, and repeated identically in Feddes Repert. Spec. Nov. Regni Veg. 63: 289. 1961), based on a collection from Heilongjiang, is here considered as conspecific with *Crepidiastrum chelidoniifolium*, following Sennikov (Bot. Zhurn. 82(5): 114. 1997). Sennikov also noted (loc. cit.) that the name *"I. saxatilis"* was not validly published because the alternative name *"Lactuca saxatilis"* was proposed simultaneously (*Vienna Code*, Art. 34.2). Three later binomials referring to, and based on, Baranov's original description, where two gatherings were cited, were also not validly published, because their authors failed to indicate a single gathering as the type (Art. 37.1 and 37.2): *"Ixeris saxatilis"* (Soják, Novit. Bot. Delect. Seminum Horti Bot. Univ. Carol. Prag. 1962: 50. 1962), *"Paraixeris saxatilis"* (Tzvelev, Fl. URSS 29: 400. 1964), and *"Crepidiastrum saxatile"* (Pak & Kawano, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 57. 1992).

6. Crepidiastrum humifusum (Dunn) Sennikov, Bot. Zhurn. 82(5): 115. 1997.

心叶假还阳参 xin ye jia huan yang shen

Lactuca humifusa Dunn, J. Linn. Soc., Bot. 35: 512. 1903; *Crepis stolonifera* H. Léveillé; *Ixeris humifusa* (Dunn) Stebbins; *I. stebbinsiana* Handel-Mazzetti; *Paraixeris humifusa* (Dunn) C. Shih.

Herbs 15–40 cm tall, perennial, with long creeping runners sometimes covering ground. Basal leaves present at anthesis, with an unwinged sparsely hairy petiole to 13 cm; leaf blade obovoid, elliptic, broadly ovoid, or semiorbicular, 5–8 × 4–9 cm, abaxially sparsely hairy, lyrately pinnatisect or pinnatipartite, with 1 or 2(or more?) pairs of lateral lobes and a much larger terminal lobe or margin coarsely sinuate-dentate, base cordate to truncate, apex acute. Middle and upper stem leaves and leaves on runners with unwinged petiole usually as long as blade or longer; leaf blade broadly ovate, subtriangular, or semiorbicular, margin coarsely sinuate-dentate, otherwise similar to basal leaves. Uppermost stem leaves petiolate; leaf blade lanceolate to polygonal, not divided, base truncate to broadly cuneate. Synflorescence laxly corymbiform with 2–7 capitula. Capitula with 10–14 florets; peduncle capillaceous, 1–5 cm. Involucre cylindric, 8.5–11 mm. Phyllaries abaxially glabrous; outer phyllaries few, ovate to narrowly ovate, longest 1.5–2 mm, apex acute to obtuse; inner phyllaries 8, apex obtuse. Anther tube and style dark. Achene brown, ellipsoid, ca. 3.5 mm, subcompressed, with ca. 10 ribs, apex attenuate into a thick ca. 0.5 mm beak. Pappus white, ca. 4 mm. Fl. and fr. Aug–Sep.

• Cliffs in shaded and damp valleys; 900–2500 m. E Chongqing (Wushan), W Hubei (Badong, Shennongjia), ?Sichuan, NE Yunnan.

Crepidiastrum humifusum is apparently rare, of scattered distribution, and still little known. Its placement in *Crepidiastrum* should be regarded as tentative and needs confirmation by more detailed investigations.

7. Crepidiastrum tenuifolium (Willdenow) Sennikov, Bot. Zhurn. 82(5): 115. 1997.

细叶假还阳参 xi ye jia huan yang shen

Crepis tenuifolia Willdenow, Sp. Pl. 3: 1606. 1803; *Barkhausia tenuifolia* (Willdenow) Candolle; *Berinia tenuifolia* (Willdenow) Schultz Bipontinus; *Chondrilla baicalensis* (Ledebour) Schultz Bipontinus; *Crepis altaica* (Babcock & Stebbins) Roldugin; *C. baicalensis* Ledebour; *C. pulcherrima* Fischer ex Link; *Geblera tenuifolia* (Willdenow) Kitagawa; *Hieracioides tenuifolia* (Willdenow) Kuntze; *Lagoseris tenuifolia* (Willdenow) Reichenbach; *Youngia altaica* (Babcock & Stebbins) Czerepanov; *Y. tenuifolia* (Willdenow) Babcock & Stebbins; *Y. tenuifolia* subsp. *altaica* Babcock & Stebbins.

Herbs 10–70 cm tall, perennial, rosulate. Taproot strong, woody. Caudex woody, branching with age, with residues of old leaf bases. Stems solitary or few, erect, usually branching in upper half, leafy; branches ascending-erect. Rosette leaves numerous; petiole 3–9 cm, adaxially long brown tomentose, base ± expanded; leaf blade narrowly elliptic, 7–17 × 2–5 cm, pinnatisect to pinnatipartite; lateral lobes 6–12 pairs, opposite to alternate, very variable, narrowly elliptic, lanceolate, or linear, undivided or sparsely divided with linear segments, apex acute; terminal lobe similar to lateral ones. Stem leaves similar to rosette leaves but gradually smaller and less or not divided upward on stem. Synflorescence corymbiform or paniculiform-corymbiform, with some capitula. Capitula with 10–15 florets. Involucre narrowly cylindric, 8–11 mm. Phyllaries dark green,

abaxially sparsely curled pilose or rarely glabrous, frequently crested or corniculate below apex, apex acute; outer phyllaries few, narrowly ovate, longest 1/3–1/2 as long as inner ones, apex acute; inner phyllaries 8. Achene black to blackish, fusiform, 4–6 mm, with 10–12 ribs, shortly and rather inconspicuously scabrid, apex attenuate to weakly beaked. Pappus white, 4–6 mm. Fl. and fr. Jul–Sep. $2n = 10$.

Mountain slopes, meadows, floodplains, by water, gravelly areas; 1500–4000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang, Xizang [Mongolia, E Russia].

The related species, previously treated as *Youngia serawschanica* (B. Fedtschenko) Babcock & Stebbins (incl. *Y. distincta* (Popov & Vvedensky) Babcock & Stebbins), distributed in Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan, and distinguished by a pale brownish pappus and inner phyllaries often with long pale bristles on the midvein, was also included for Xinjiang by C. H. An (Fl. Xinjiang. 5: 451. 1999), but this record is presumably erroneous (Sennikov & I. D. Illarionova, Komarovia 5: 96. 2008, under *Crepidifolium*).

8. Crepidiastrum diversifolium (Ledebour ex Sprengel) J. W. Zhang & N. Kilian, **comb. nov.**

细裂假还阳参 xi lie jia huan yang shen

Basionym: *Prenanthes diversifolia* Ledebour ex Sprengel, Syst. Veg. 3: 657. 1826; *Crepis tenuifolia* Willdenow var. *altaica* Bongard & C. A. Meyer; *Youngia diversifolia* (Ledebour ex Sprengel) Ledebour; *Y. tenuifolia* (Willdenow) Babcock & Stebbins subsp. *diversifolia* (Ledebour ex Sprengel) Babcock & Stebbins.

Herbs 18–40 cm tall, perennial, rosulate. Taproot strong, woody. Caudex woody, branching with age, with residues of old leaf bases. Stems solitary or few, erect, branching from base or middle, leafy. Rosette leaves petiolate; petiole 2–6 cm, long brown tomentose, base expanded; leaf blade narrowly elliptic, 6–9 × 2–4 cm, pinnatipartite to pinnatisect; lateral lobes 6–9 pairs, lanceolate to linear, margin entire or with few teeth; terminal lobe similar to lateral ones. Stem leaves similar to rosette leaves but gradually smaller and less or not divided upward on stem. Synflorescence corymbiform or paniculiform-corymbiform, with some capitula. Capitula with 10–16 florets. Involucre broadly cylindric, 1–1.4 cm. Phyllaries abaxially dark green, sparsely curled pilose, frequently crested or corniculate below apex; outer phyllaries few, ovate-lanceolate, longest 1/4–1/3 as long as inner ones, apex acute; inner phyllaries 8. Achene brown to blackish, fusiform, 5–7.5 mm, with 10–14 ribs, shortly scabrid, apex attenuate to weakly beaked. Pappus white, 6–7 mm. Fl. and fr. Jul–Sep. $2n = 15, 20$.

Mountain slopes, rock slopes, gravelly areas on floodplains; 1800–4700 m. Gansu, Xinjiang, Xizang [N India, Kashmir, Kazakhstan, Mongolia, Nepal, E Russia].

Crepidiastrum diversifolium is a triploid or tetraploid taxon closely related to and perhaps not sharply delimited from *C. tenuifolium*, being distinguished mainly by larger involucres and florets. It was considered conspecific by Sennikov and I. D. Illarionova (Komarovia 5: 93. 2008, under *Crepidifolium*); closer investigations are necessary.

9. Crepidiastrum akagii (Kitagawa) J. W. Zhang & N. Kilian, **comb. nov.**

叉枝假还阳参 cha zhi jia huan yang shen

Basionym: *Geblera akagii* Kitagawa, J. Jap. Bot. 13: 430. 1937; *Crepidifolium akagii* (Kitagawa) Sennikov; *C. tenuicaule* (Babcock & Stebbins) Tzvelev; *Crepis tenuifolia* Willdenow subsp. *tenuicaulis* (Babcock & Stebbins) Handel-Mazzetti; *Youngia akagii* (Kitagawa) Kitagawa; ?*Y. nansiensis* Y. Z. Zhao & L. Ma; *Y. ordosica* Y. Z. Zhao & L. Ma; *Y. tenuicaulis* (Babcock & Stebbins) Czerepanov; *Y. tenuifolia* (Willdenow) Babcock & Stebbins subsp. *tenuicaulis* Babcock & Stebbins.

Shrublets 10–25 cm tall, cushion-forming, rosulate. Taproot woody. Caudex woody, branching with age, densely covered with residues of old leaf bases. Stems many, slender, rigid, hardened, erect, repeatedly, dichotomously, intricately, and divaricately branched almost from base, glabrous. Rosette leaves oblanceolate to narrowly elliptic, 2–8 × 0.5–3 cm, glabrous, pinnatifid to pinnatisect, basally attenuate; lateral lobes 5 or 6 pairs, broadly triangular toothlike to narrowly linear, unequal in length, margin entire, apex acute. Stem leaves few, much smaller, otherwise similar to basal leaves or linear to linear-subulate, reduced in size, undivided, and often bractlike. Synflorescence of each stem divaricately corymbiform, with some capitula. Capitula with 10–12 florets. Involucre narrowly cylindric, 8–9 mm. Phyllaries dark green, abaxially glabrous to slightly puberulent, frequently crested or corniculate below apex; outer phyllaries few, narrowly ovate to lanceolate, longest ca. 2 mm, apex acute; inner phyllaries 8, apex ± obtuse. Achene black to blackish, fusiform, 3.5–5.5 mm, with 10 ribs, shortly scabrid, apex attenuate. Pappus white, 4–6 mm, caducous. Fl. and fr. Jul–Sep. $2n = 42$.

Grasslands on mountain slopes, gravelly areas; 1400–4900 m. Gansu, Hebei, Nei Mongol, Xinjiang [Mongolia, E Russia].

Crepidiastrum akagii is superficially similar to and sometimes confused with *Askellia flexuosa*; for their distinction see there (p. 327). *Crepidiastrum akagii* is closely related to *C. tenuifolium* and *C. diversifolium* and, as was already assumed by Babcock and Stebbins (Publ. Carnegie Inst. Washington 484: 52. 1937), a "polyploid apomict." No material has been seen of *Youngia nansiensis*, which was provided by its authors with a very poor description and said to be glabrous but otherwise similar to *C. akagii* (Y. Z. Zhao & L. Ma, Bull. Bot. Res., Harbin 24: 133. 2004); it is provisionally sunk in the synonymy of the latter. The largely neglected *Y. alashanica* H. C. Fu (in Ma, Fl. Intramongol., ed. 2, 4: 849. 1993), said to have affinities to *C. akagii* as well, in contrast, is certainly completely unrelated and actually represents with high probability *Launaea procumbens* (see there, p. 239).

69. HETERACIA Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 29. 1835.

异喙菊属 yi hui ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, annual. Stem leaves sagittately clasping. Capitula solitary or few, terminal on or in axils of branches, with numerous florets. Involucre hemispheric in fruit. Phyllaries in 2 rows; outer phyllaries 2–5; inner phyllaries lanceolate. Receptacle naked. Flo-

rets yellow. Achene dimorphic; outer achenes with short stout beak; inner achenes with a long slender beak. Pappus absent in outer achenes and mostly present in inner achenes, white, of scabrid bristles.

One species: C and SW Asia, SE Europe.

1. Heteracia szovitsii Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 1: 30. 1835.

异喙菊 yi hui ju

Heteracia epapposa (Regel & Schmalhausen) Popov; *H. szovitsii* var. *epapposa* Regel & Schmalhausen.

Herbs 5–30(–40) cm tall, annual. Taproot slender. Stem erect to ascending, sparsely furcately branched from base, glabrous. Basal leaves narrowly elliptic, obovate, or narrowly spatulate, 3–8 × 0.5–1.5 cm, undivided or shallowly pinnatifid to pinnatisect, glabrous, base attenuate, margin entire or sinuate-dentate, apex rounded to acute; lateral lobes (if present) triangular to narrowly elliptic, unequal. Stem leaves narrowly ovate to lanceolate, 3–7 × 0.5–1.5 cm, base sagittately clasping, otherwise similar to basal leaves. Capitula solitary or few, terminal or in axils of branches, sessile or on a distally somewhat thickened peduncle to usually ca. 4 cm at fruiting, with 20–50 florets. Involucre stout cylindric and 4–6 × 4–5 mm at anthesis, flat hemispheric and 5–10 mm in diam. in fruit. Outer phyllaries 2–5, triangular, 1–2 mm, subequal; inner phyllaries lanceolate, ca. 8, subequal. Achene with body 3–4 mm, of 2 kinds; outer achenes grayish brown, broadly obconical, compressed, with 5 ± rugose ribs, lateral ribs strongly winglike and enlarged, with a stout to slender 0.8–1.8 mm beak; inner achenes slenderly obconical, with 5 unequal, apically acute verruciform or scaly ribs, with a filiform beak to 8–10 mm strongly exceeding involucre. Pappus absent in outer achenes, mostly present or more rarely absent in inner achenes, white, 3–5 mm. Fl. and fr. Apr–Jun. $2n = 8$.

Deserts or semideserts; 800–1000 m. Xinjiang [Kazakhstan, Kyrgyzstan, Russia (E European part), Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

70. GARHADIOLUS Jaubert & Spach, Ill. Pl. Orient. 3: 119. 1850.

小疮菊属 xiao chuang ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, annual. Leaves mostly rosulate, undivided to pinnatisect. Capitula few to many, cymose on stout branches. Involucre campanulate. Phyllaries in 2 rows; outer phyllaries inconspicuous; inner phyllaries linear-lanceolate, hardened, thickened in fruit. Receptacle naked. Florets yellow. Achene columnar, ± incurved, minutely hairy; outer achenes apically attenuate and partly enclosed by inner hardened phyllaries; inner achenes attenuate into a long slender beak. Pappus white, of scabrid bristles to 1.5 mm.

Four species: C and SW Asia; one species in China.

1. Garhadiolus papposus Boissier & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 135. 1860.

小疮菊 xiao chuang ju

Rhagadiolus papposus (Boissier & Buhse) Kuntze.

Herbs 5–20(–40) cm tall, annual. Taproot slender. Stem erect, branched from base or basally, white pubescent and sometimes also with subulate stiff bristles. Basal leaves oblanceolate, narrowly elliptic-oblanceolate, or elliptic, 2–15 × 0.5–3 cm, lyrately pinnatifid to pinnatisect, base attenuate, margin ± dentate; lateral lobes 2–5-paired, lowermost ones small and toothlike, upper ones large and triangular to elliptic; terminal lobe triangular to elliptic, apex obtuse, acute, or rounded. Stem leaves few, similar to basal leaves or narrowly elliptic and divided or not. Capitula usually a few densely aggregated at nodes of branches, with 6–10 florets. Involucre stoutly cylindric and 4–5 × 3–4 mm at anthesis, 6–9 mm in fruit. Outer phyllaries few, inconspicuous; inner phyllaries linear-lanceolate, abaxially with rigid subulate bristles or rarely glabrous, hardened, carinate and incurved in fruit, partly enclosing outer achenes. Achene columnar, curved, with appressed hairs; outer achenes 4–5 mm, apically attenuate; inner achenes 7–10 mm, strongly exceeding involucre, apically attenuate into a long slender beak. Pappus of white, smooth to scabrid bristles of 0.2–1.5 mm, shorter in outer achenes, longer in inner achenes. Fl. and fr. Apr–Jun.

Plains, low mountain regions; above 600 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

71. TARAXACUM F. H. Wiggers, Prim. Fl. Holsat. 56. 1780, nom. cons., not Zinn (1757).

蒲公英属 pu gong ying shu

Ge Xuejun (葛学军); Jan Kirschner, Jan Štěpánek

Herbs, rosulate, perennial, with a taproot, root head sometimes with a tunic (covered with dry brown remnants of petioles from previous years). Stems 1 to sometimes several, hollow, leafless (scape), unbranched, rarely with 1–3 branches. Plant indumentum consisting of arachnoid hairs; leaf and scape hairs sometimes on low protuberances or ridges; hairs on floret tube often straight and simple. Leaves entire or variously lobed, runcinate to pinnatisect. Capitulum pointing upward or downward after anthesis. Involucre with two distinct series of phyllaries. Some of phyllaries often corniculate or horned at apex; outer phyllaries variable in length and

shape (imbricate) or almost uniform (not imbricate), usually substantially shorter than inner ones, appressed to reflexed, glabrous to ciliate or with arachnoid surfaces, unbordered to variously pale to whitish bordered. Receptacle naked, glabrous or sparsely arachnoid. Florets yellow, white, whitish yellow, pale or deep pink, orange, brownish orange, or reddish brown; ligules flat, involute, or tubular, adaxial epidermal cell cuticle ± domed and transversely striate. Achene whitish, straw-brown, ochraceous, reddish, reddish brown, deep brown, or ± black, usually composed of a body, which includes a narrowed but equally colored cone, and apically with a beak but cone sometimes indistinct or not developed; body spinulose and/or squamulose in upper part (below cone), often tuberculate below or completely or almost smooth, or spinulose and tuberculate throughout, abruptly or gradually narrowing into cone (when cone developed); beak usually longer than achene body including cone or short, sometimes not developed at all, thin or thick. Pappus with numerous scabrid bristles, white, yellowish, or light reddish brown. Plants with agamospermous reproduction or sexual, self-incompatible or rarely self-compatible. Chromosome base number $x = 8$ (diploids to dodecaploids). Diploids always sexual, tetraploids usually agamospermous [three tetraploid sexual species known in *Taraxacum* sect. *Piesis*], other polyploids agamospermous.

More than 2,500 species: mainly in the Arctic and temperate zones of the N Hemisphere with main diversity in mountains of Eurasia, a few species in temperate regions of the S Hemisphere; 116 species (81 endemic, three introduced) in China.

The genus *Taraxacum* represents a taxonomic complexity in the whole of its range and in China in particular. Basic features of dandelions relevant for the taxonomy at the species level are: 1) There is a low level of structural morphological differentiation. 2) There is a coexistence of agamospermy and sexuality. 3) There is complex hybridity. 4) There is extensive polyploidy. 5) There is a large number of taxa. Thus, any taxonomic study of this genus should follow a few principles: 1) A great attention should be paid to the reproduction in population structures because different modes of reproduction usually mean very different variation ranges, and species in *Taraxacum* differ substantially in this respect. 2) The taxonomic study must be started at the lowest level of recognizable units in order to avoid a loss of information, and later lumping should be a result of a knowledge of the population structure of all subordinate units. 3) The category of section is equally important as that of species in *Taraxacum*. Because of very different reproduction systems, the species have incommensurable variation ranges, and, for a non-specialist in particular, the most useful traditional rank covering both sexual and agamospermous taxa is that of section. Moreover, in an imperfectly explored region, there might be sections in which the species remain unknown or undescribed because of the insufficient material, although the very occurrence of the given section in the territory studied is unquestionable. The latter case requires using sections as one of the basic categories in taxonomic hierarchy.

Notes on descriptions: Achenes are measured to include the cone, a narrow part of the achene connecting achene body with the beak. Middle leaves are those well developed during full anthesis; outer leaves are the first spring leaves and are usually less deeply lobed or not divided. Inner leaves develop at the end of anthesis and are usually more deeply divided than the others. In the descriptions, middle leaves are taxonomically the most important. Outer phyllaries are described as imbricate when the outermost ones of them are broader and shorter than the successive more inner ones (often the outermost ones are ovate to ovate-lanceolate and the others lanceolate to narrowly lanceolate; the distal parts of the latter are clearly visible above the outermost ones). In species with imbricate outer phyllaries, the bracket measurements usually refer to the innermost outer phyllaries (the longest and the narrowest ones).

In several Chinese *Taraxacum* sections achene color substantially changes before maturity. Particularly in *T.* sect. *Tibetana* and *T.* sect. *Emodensia*, two color series can be recognized: in one series achenes are pale reddish ochraceous or ochraceous when immature and become darker red to reach deep reddish castaneous brown or deep red when mature, and the other series starts with pale grayish or straw-colored achenes, becoming gray and reaching almost black at full maturity.

Variation is also observed in the development of a horn on the outer phyllaries. The first capitula to blossom often have flat or callose outer and/or inner phyllaries while later capitula have a distinct horn near the apex of the phyllaries. This characteristic mainly concerns *Taraxacum* sect. *Borealia*, *T.* sect. *Emodensia*, and *T.* sect. *Mongolica*.

The references to Higher Pl. China in the following treatment of *Taraxacum* refers to the treatment of *Taraxacum* by X. J. Ge (11: 766–786. 2005).

1a. Achene smooth or with very sparse spinules or tubercles above, spinules minute.
2a. Achene cone subcylindric and clearly developed ..... 15. *T.* sect. *Glabra* (p. 316)
2b. Achene cone not developed at all or broadly conic and forming a gradual transition from achene body to beak.
3a. Outer phyllaries sparsely to densely arachnoid on abaxial and/or adaxial surfaces; outer phyllary margin densely to sparsely arachnoid; achene usually 5–6.5 mm; beak not fragile, usually almost as thick as achene body; pappus easily breaking off ..... 4. *T.* sect. *Oligantha* (p. 280)
3b. Outer phyllaries glabrous on both surfaces; outer phyllary margin glabrous or subglabrous; achene usually 4–5 mm; beak fragile, thick or slightly thickened but narrower than achene body; pappus not easily breaking off ..... 13. *T.* sect. *Atrata* (p. 314)
1b. Achene sparsely to densely spinulose and/or squamulose above, spinules evident and not minute.
4a. Most of outer phyllaries patent, arcuate-patent, recurved, or reflexed.
5a. Achene red, reddish brown, or deep brown.
6a. Achene longer than 4.2 mm; plants medium-sized to subrobust; tunic not evident ..... 19. *T.* sect. *Erythrocarpa* (p. 321)
6b. Achene 3.2–4.2 mm; plants small; tunic evident ..... 22. *T.* sect. *Erythrosperma* (p. 323)
5b. Achene light grayish straw-colored brown, light olivaceous brown, yellowish, or pale ochraceous.

7a. Near apex of outer phyllaries flat, callose, or minutely corniculate (check later flowering capitula).
8a. Outer phyllaries 3–5 mm wide and leaves subprostrate to erect-patent and not subleathery ... 10. *T.* sect. *Qaisera* (p. 303)
8b. Outer phyllaries usually 1.5–3 mm wide, or if broader then leaves erect and subleathery.
9a. Leaves erect, subleathery; achene (4–)5–6.1 mm; cone subcylindric, 1–2.2 mm ..... 9. *T.* sect. *Turrita* (p. 301)
9b. Leaves erect-patent to subprostrate, not subleathery; achene 3–4.5 mm; cone conic to subcylindric, 0.2–0.9 mm ..... 23. *T.* sect. *Taraxacum* (p. 324)
7b. Near apex of outer phyllaries (check later flowering capitula) or sometimes only inner phyllaries with a conspicuous horn.
10a. Ligules yellowish orange, later light brownish orange; outer phyllaries 25–40 ..... 1. *T.* sect. *Biennia* (p. 273)
10b. Ligules deep yellow; outer phyllaries to 25.
11a. Outer phyllaries 15–25, 6–13 mm; leaves subleathery; achene 4–6.1 mm ..... 9. *T.* sect. *Turrita* (p. 301)
11b. Outer phyllaries less than 15, to 6 mm; leaves not subleathery; achene 3–4 mm .... 12. *T.* sect. *Macrocornuta* (p. 313)

4b. Outer phyllaries appressed, loosely appressed, or erect, a minority of them may be erect-patent.
12a. Outer phyllaries or sometimes only inner ones or both with conspicuous horns.
13a. Achene body 1.1–2 mm wide when mature.
14a. Outer phyllaries not distinctly veined; achene spinulose and/or tuberculate in upper 1/4–1/2 but otherwise ± smooth ..... 7. *T.* sect. *Emodensia* (p. 291)
14b. Outer phyllaries with distinct venation; achene usually squamulose or spinulose and tuberculate throughout ..... 8. *T.* sect. *Mongolica* (p. 296)
13b. Achene body 0.7–1.1 mm wide when mature.
15a. Achene cone broadly conic to subconic; achene body abruptly to subabruptly narrowing into cone; scapes usually growing from lateral side to leaf rosette ..... 16. *T.* sect. *Borealia* (p. 317)
15b. Achene cone cylindric to subcylindric; achene body gradually to subgradually narrowing into cone; scapes growing from center of leaf rosette.
16a. Outer phyllaries 13–24; leaves deeply dissected or pinnatisect, lateral lobes linear, linear-triangular, or rarely to narrowly triangular ..... 3. *T.* sect. *Stenoloba* (p. 278)
16b. Outer phyllaries 8–14; leaves shallowly pinnatilobed to pinnatifid, lateral lobes broadly triangular, deltoid, or broadly deltoid-triangular ..... 11. *T.* sect. *Ceratoidea* (p. 312)
12b. Outer phyllaries flat, callose, or minutely corniculate.
17a. Outer phyllaries 3.5–8 mm wide.
18a. Outer phyllaries 6–17 mm.
19a. Outer phyllaries corniculate near apex; achene cone usually 0.8–1.4 mm; scapes densely arachnoid ..... 5. *T.* sect. *Calanthodia* (p. 281)
19b. Outer phyllaries flat near apex; achene cone usually 0.4–0.8 mm; scapes sparsely arachnoid to subglabrous or densely arachnoid ..... 10. *T.* sect. *Qaisera* (p. 303)
18b. Outer phyllaries 3–6 mm.
20a. Achene cone conic, 0.5–0.6 mm; achene body ± gradually narrowing into cone ..... 14. *T.* sect. *Arctica* (p. 316)
20b. Achene cone ± cylindric, 0.6–0.8 mm; achene body subabruptly narrowing into cone .... 21. *T.* sect. *Dissecta* (p. 323)
17b. Outer phyllaries 1–3.5 mm wide.
21a. Outer phyllaries light glaucous-green to light green, dark color confined to a narrow middle strip, flat near apex ..... 17. *T.* sect. *Parvula* (p. 318)
21b. Outer phyllaries blackish, blackish green, dark green, or deep green, if light green then corniculate.
22a. Achene light grayish straw-colored brown or light grayish brown.
23a. Achene cone ± conic or subcylindric, 0.4–0.5 mm wide; beak thickened or thin.
24a. Achene body spinules (particularly upper ones) coarse, usually curved upward ..... 2. *T.* sect. *Leucantha* (p. 273)
24b. Achene body spinules long or short and thinly or shortly subconic, straight, erect-patent to suberect ..... 6. *T.* sect. *Tibetana* (p. 285)
23b. Achene cone ± cylindric, 0.2–0.3 mm wide; beak thin.
25a. Pappus white to yellowish white; flowering spring to early summer; dry subsaline or steppe to substeppe habitats ..... 3. *T.* sect. *Stenoloba* (p. 278)
25b. Pappus light pinkish brown; flowering late summer and autumn; wet saline habitats .... 18. *T.* sect. *Piesis* (p. 320)
22b. Achene reddish, red, dark olivaceous brown, deep brown to blackish brown, or blackish.
26a. Achene cone cylindric, thin; achene 3.2–3.8 mm ..... 21. *T.* sect. *Dissecta* (p. 323)
26b. Achene cone conic or subconic, if ± cylindric then thick; achene 3.7–5.5 mm.
27a. Achene beak longer than body usually by 1.5 mm or more ..... 6. *T.* sect. *Tibetana* (p. 285)

27b. Achene beak shorter than or equaling body.
28a. Achene blackish brown; stigmas blackish; leaf lateral lobes few ..... 14. *T.* sect. *Arctica* (p. 316)
28b. Achene reddish brown; stigmas pale grayish green; leaf lateral lobes numerous ..... 20. *T.* sect. *Suavia* (p. 322)

1. Taraxacum sect. **Biennia** R. Doll, Feddes Repert. 93: 543. 1982.

垂头蒲公英组 chui tou pu gong ying zu

Hairs on scapes and on some leaves often on low protuberances. Capitulum nodding after anthesis. Outer phyllaries very numerous, linear-lanceolate, irregularly recurved, apical part attenuate, apex with a horn; inner phyllaries ± equaling outer ones. Florets brownish orange. Stigmas dark blackish violet when dry. Achene pale brown, medium-sized; body ± broad, apically subgradually narrowing into a 0.5–0.8 mm subconic cone; beak 1–1.5 cm. Pappus dirty white to brownish white. Sexual.

• One species: China.

The section was described on the basis of the report of a biennial life cycle in cultivated material. The bienniality of *Taraxacum nutans* is excluded on the basis of the study of plants collected in the wild. They often have a root head with a tunic (see the generic description). Field observations show almost complete absence of sterile leaf rosettes in natural populations (almost all plants flowering), another feature supporting the most common *Taraxacum* pattern.

1. Taraxacum nutans Dahlstedt, Svensk Bot. Tidskr. 26: 264. 1932.

垂头蒲公英 chui tou pu gong ying

Herbs to 45 cm tall, robust, perennial but often mistakenly reported to be biennial. Leaves basally indistinctly narrowed into a winged green or purplish petiole; leaf blade pale grayish green, oblanceolate to narrowly oblanceolate, 20–30 × 3–5 cm, arachnoid to densely arachnoid, margin usually dentate or rarely with patent acute lobules. Scapes pale brownish green, sparsely arachnoid near base but very densely arachnoid below capitulum, hairs pale brownish. Capitulum 5–6 cm wide. Involucre to 1.3 cm wide, base ± rounded. Outer phyllaries to 40, linear-lanceolate, 1.5–1.8 × 0.2–0.3 cm, irregularly recurved, apically attenuate, middle part paler green, venation prominent, border purplish or membranous, margin dentate and apically ciliate, apex with a large acute horn; inner phyllaries 1.5–1.7 cm, narrow. Ligules yellowish orange, later light brownish orange; outer ligules flat, striped purplish; inner ligules involute. Stigmas deep brownish grayish green, dark blackish violet when dry. Anthers polliniferous; pollen grains regular in size. Achene pale brown, 3.5–5 × 1–1.5 mm; body apically densely spinulose-squamulose and subabruptly narrowing into a 0.5–0.8 mm subconic cone; beak 1.2–1.5 cm. Pappus 6–7 mm. Fl. late summer. Sexual. $2n = 16$*

• Mountain grassland slopes and forests, along paths; 1100–3200 m. W Hebei, S Ningxia, Shaanxi, Shanxi.

2. Taraxacum sect. **Leucantha** Soest, Wentia 10: 6. 1963.

白花蒲公英组 bai hua pu gong ying zu

Leaves and scapes sparsely arachnoid to subglabrous. Capitulum erect after anthesis. Outer phyllaries (9 or)10–16(–19), greenish to dark green, imbricate or sometimes not so, ovate to lanceolate, usually tightly appressed, border paler or reddish and usually broad or less often narrow or absent, usually not corniculate near apex. Florets white, whitish yellow, pale yellowish (more deeply yellow in center of capitulum), or yellow. Achene pale grayish or brownish straw-colored, subdensely coarsely spinulose with subacute stout spinules often slightly curved upward, apically subgradually to subabruptly narrowing into a usually subcylindric 0.7–1 × 0.4–0.5 mm cone; beak 5–7 mm, sometimes thick but usually thin. Pappus white or brownish discolored, 5–7 mm.

About 23 species: Afghanistan, China, India, Mongolia, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan; 13 species (four endemic) in China.

Part of the sectional diversity center is in SW China.

In Hebei, Nei Mongol, Shaanxi, and Shanxi sexual representatives of *Taraxacum* sect. *Leucantha* were detected. They are very variable in leaf shape and by their outer phyllary characters belong to the group of *T. sinicum* and *T. dealbatum*. Further research is needed.

Taraxacum leucanthum (Ledebour) Ledebour (Fl. Ross. 2: 815. 1846) has been reported as a member of the Chinese flora (FRPS 80(2): 14. 1999; Higher Pl. China 11: 769. 2005). The name usually covers most of the diversity of the whole section in the literature. We failed to find any specimen belonging to this species in the material studied. However, *T. leucanthum* might be found in NW Xinjiang. High mountain plants from Gansu, Qinghai, and Xizang reported in the literature under this name belong to other taxa (in part, probably to *T. candidatum*), but a revision is inevitable.

1a. Pollen absent.
2a. Outer phyllaries evenly black to blackish green, border not developed ..... 2. *T. albiflos*
2b. Outer phyllaries green to dark green in middle, paler borders developed.
3a. Scapes glabrous; achene cone 1–1.1 mm, beak 5–6 mm ..... 4. *T. niveum*
3b. Scapes arachnoid; achene cone 0.7–1 mm, beak 4–5 mm ..... 6. *T. candidatum*
1b. Pollen present.

4a. Pollen grains regular in size (plants sexual) ..... see comment above
4b. Pollen grains irregular in size.
5a. Stigmas yellow or ± yellow.
6a. Achene beak 2–3 mm, thick ..... 8. *T. armeriifolium*
6b. Achene beak 4–5 mm, thin.
7a. Achene 3.5–3.9 mm; pappus 4–5 mm ..... 11. *T. pseudoleucanthum*
7b. Achene 5.2–5.7 mm; pappus ca. 7 mm ..... 12. *T. iliense*
5b. Stigmas discolored (grayish, greenish, dark, yellowish green).
8a. Inner florets involute to subtubular, cream to pale yellowish white ..... 14. *T. cereum*
8b. Inner florets canaliculate, all yellow or at least only outer ones white.
9a. All florets yellow.
10a. Involucre base rounded, 7–10 mm wide; outer phyllaries ovate to broadly ovate ..... 9. *T. ikonnikovii*
10b. Involucre base ± subobconic, 6–8 mm wide; outer phyllaries ovate-lanceolate to lanceolate.
11a. Leaf lateral lobes linear to linear-triangular, not lingulate; achene 3.5–4.4 mm, cone 0.7–1 mm ..... 7. *T. sinicum*
11b. Leaf lateral lobes lingulate; achene 4.5–4.8 mm, cone 1.2–1.5 mm ..... 13. *T. patiens*
9b. At least outer florets ± white inside.
12a. Outer phyllaries with dark blackish green middle part, border white and 0.9–1.3 mm wide ..... 3. *T. album*
12b. Outer phyllaries with green to dark green middle part, border whitish and 0.5–1 mm wide.
13a. Pappus ± yellowish white ..... 5. *T. dealbatum*
13b. Pappus conspicuously brownish pinkish white ..... 10. *T. luridum*

2. Taraxacum albiflos Kirschner & Štěpánek, **sp. nov.**

白花蒲公英 bai hua pu gong ying

Type: China. Xinjiang: "Turkestania sinensis: in montibus K'un-lun [昆仑山], Keng-shewar, in paludosis ad Aktjok," 27 Jun 1932, *N. Ambolt, S. Hedin Expedition 5849b* (holotype, S; isotype, S).

Plantae agamospermae foliis linearibus integris vel denticulatis, scapis superne dense araneosis, phyllariis involucralibus exterioribus 11 ad 14, adpressis, aterrimis, ovatis vel ovato-lanceolatis, parte mediana obscure nigrescenti-viridi, marginibus pallidis non evolutis, ligulis exterioribus albis, extus stria atro-rosea notatis, interioribus pallide lutescentibus, antheris polline carentibus, stigmatibus extus nigricantibus.

Herbs to 10 cm tall, slender, perennial. Leaves mid-green but pale green at base, linear, 5–9 × 0.3–0.4 cm, almost glabrous, margin entire, remotely denticulate, or rarely remotely shallowly sublobulate, apex obtuse. Scapes brownish green, to 8 cm, ± equaling leaves, sparsely arachnoid at base but densely arachnoid below capitulum. Capitulum 1.5–3 cm wide. Involucre 5–7 mm wide, base rounded. Outer phyllaries 11–14, black but median part often blackish green, subimbricate, ovate to ovate-lanceolate, 3.5–5.5 × 1.6–2.5 mm, appressed, without a paler border, margin not ciliate, apex acute, pale pinkish, and often with small black horn or ± flat; inner phyllaries blackish, narrowly linear, 0.9–1.2 cm, apex corniculate. Outer ligules white or very pale yellowish white but outside striped blackish pink, flat; inner ligules pale yellowish with blackish apical teeth. Anthers without pollen. Stigmas abaxially blackish, adaxially gray, black pubescent. Achene unknown. Agamosperm.

• Wet subsaline meadows; ca. 3800 m. S Xinjiang.

Taraxacum albiflos is distinct in having a blackish involucre, whitish ligules, linear leaves, and anthers without pollen. In *T.* sect. *Leucantha*, *T. albiflos* can be compared with *T. candidatum*. The latter has green, pale-bordered outer phyllaries and a very sparsely arachnoid scape. Outside of *T.* sect. *Leucantha*, *T. albiflos* is similar to *T. staticifolium* of *T.* sect. *Tibetana*. *Taraxacum staticifolium* has flat (not corniculate), narrower, and not tightly appressed outer phyllaries with a ciliate margin and also ± yellow ligules.

3. Taraxacum album Kirschner & Štěpánek, Preslia 78: 54. 2006.

白蒲公英 bai pu gong ying

Herbs 10–14 cm tall. Petiole usually purple, narrowly winged in outer and middle leaves, ± unwinged in inner ones; leaf blade bright green and often with a purplish midvein, ± linear, 7–10 × 0.7–1.2 cm, subglabrous, margin almost entire, dentate, or irregularly lobed; lateral lobes (if present) 3 or 4 pairs, triangular, 3–4 × 3–4 mm, ± patent, blades of inner leaves often deeply dissected into linear to linear-triangular lobes; interlobes short, 3–4 mm wide, margin entire or with minute acute teeth near distal base of lobes; terminal lobe not distinct in middle leaves, to 2 cm in inner leaves, margin usually entire. Scapes brownish green, ± equaling leaves, densely arachnoid below capitulum. Capitulum 2–3 cm wide. Involucre 1–1.2 cm wide, base rounded to slightly truncate. Outer phyllaries 10–13, middle part dark blackish green and 0.6–1.5 mm wide, not imbricate, ovate, outermost ones 6–7.5 × 2.5–3.5 mm and ca. 1/2 as long as inner ones, ± appressed, with a very distinct whitish membranous 0.9–1.3 mm border, margin glabrous to sparsely ciliate at apex, apex distinctly corniculate; inner phyllaries 1.2–1.4 cm, corniculate below apex. Ligules outside pure white; outer ligules flat to cucullate, outside striped purplish gray; inner ligules white to slightly pinkish white, with grayish teeth. Stigmas grayish to blackish green. Anthers sparsely polliniferous; pollen grains irregular in size. Achene pale grayish, 3.9–4.2 mm; body apically spinulose and subabruptly narrowing into a cylindric to subcylindric 0.8–1 mm cone, spinules long and coarse; beak 4–5 mm, thin. Pappus pale yellowish, 6.5–7.5 mm. Fl. summer. Agamosperm.

Wet saline marshes, wet pastures, along rivers; 2000–3000 m. W Xinjiang [Kyrgyzstan].

Taraxacum album is a rather marginal species in this section, with some resemblance to species of *T.* sect. *Suavia*.

4. Taraxacum niveum Kirschner & Štěpánek, Preslia 78: 35. 2006.

雪白蒲公英 xue bai pu gong ying

Herbs 6–13 cm tall. Petiole usually pinkish, long, narrow, unwinged, base sparsely arachnoid; leaf blade dull green, linear, 6–8(–11) × 0.4–0.8(–1) cm, ± glabrous, margin usually shortly remotely lobed or sometimes subentire; lateral lobes 3 or 4 pairs, linear, to 4 mm, patent to bent upward, margin entire; interlobes usually 5–8(–10) × 1(–2) mm, margin entire; terminal lobe linear to linear-lingulate, (4–)6–10(–20) mm, margin entire. Scapes greenish, equaling or slightly overtopping leaves, glabrous or rarely with a few arachnoid hairs. Capitulum 1.5–2 cm wide. Involucre 6–7 mm wide, base ± rounded. Outer phyllaries 12–14, deep green but often suffused pinkish apically, imbricate, outermost ones ovate and 3–4.2 × 2.2–2.5 mm, middle ones ovate-lanceolate, 5–5.5 × 2–2.3 mm, and 1/3–1/2 as long as inner ones, appressed, with a ± distinct membranous to ± whitish (0.2–)0.3–0.4 mm wide border, margin entire or denticulate and usually sparsely ciliate near apex, apex flat; inner phyllaries 9–10 mm, apex flat. Ligules inside pure white; outer ligules almost flat, outside striped grayish pink; inner ligules with white apical teeth. Stigmas green. Anthers without pollen. Achene light grayish straw-colored, 3.8–4.1 × 0.9–1 mm; body subdensely coarsely spinulose above, ± gradually narrowing into a relatively thick cylindric 1–1.1 mm cone; beak 5–6 mm, thin. Pappus yellowish white, 4.5–5 mm. Fl. spring to early summer. Agamosperm. $2n = 32$.

Wet saline meadows, along rivers; ca. 1200 m. NW Xinjiang [Russia (Altai)].

5. Taraxacum dealbatum Handel-Mazzetti, Monogr. Taraxacum, 30. 1907.

粉绿蒲公英 fen lü pu gong ying

Herbs 10–20 cm tall. Petiole purple, narrow, unwinged; leaf blade mid-green to slightly bluish green, linear-oblanceolate, 7–13 × (0.7–)0.9–1.3(–2) cm, usually ± arachnoid, later often subglabrous, margin in outer leaves shallowly lobulate to sinuate-dentate but in middle leaves deeply lobed to dissected; lateral lobes 4–7 pairs, ± linear, 1–1.5(–2.2) mm wide, ± remote, ± patent, often bent upward, margin entire; interlobes usually 1.2–1.5(–2.5) mm wide, margin entire; terminal lobe usually ± linear, elongated, narrow, apex ± acute. Scapes greenish, ± overtopping leaves, arachnoid. Capitulum 2–2.5 cm wide. Involucre 6–7 mm wide, base ± subobconic. Outer phyllaries 12–18, deep green to dark green but with reddish apex, imbricate, usually lanceolate to ovate-lanceolate, outermost ones 4–5.2(–6) × (1.3–)1.6–2.5 mm and ca. 1/2 as long as inner ones, appressed, with ± distinct whitish 0.3–0.5 mm wide border, margin glabrous, apex often acuminate from ± ovate base, with a callosity near apex; inner phyllaries 1.1–1.4 cm, apex ± flat to callose. Ligules inside ± white; outer ligules ± flat, outside striped pink to grayish pink; inner ligules probably yellowish, ± flat, with pale reddish or reddish gray apical teeth. Stigmas pale green with darker pubescence. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 3.3–3.8 × ca. 0.9 mm; body subsparsely spinulose above, subabruptly narrowing into a subcylindric 0.8–1.1 × 0.3–0.4 mm cone, spinules coarse and distinct; beak 5–6 mm, ± thin. Pappus yellowish white, 5.5–6 mm. Fl. spring to early summer. Agamosperm.

Subsaline steppe depressions, pastures along rivers; 600–1000 m. Nei Mongol [Russia (Siberia)].

Taraxacum dealbatum was reported from Xinjiang (Higher Pl. China 11: 769. 2005), but this report is almost surely erroneous.

6. Taraxacum candidatum Kirschner & Štěpánek, Preslia 78: 36. 2006.

纯白蒲公英 chun bai pu gong ying

Herbs to 10 cm tall, delicate. Petiole purplish to greenish, narrow to narrowly winged, ± sparsely arachnoid; leaf blade ± mid-green, linear, 3–7 × (0.2–)0.3–0.5(–0.7) cm, sparsely arachnoid, margin often entire but sometimes dentate to shallowly lobed; lateral teeth or lobules mostly 4–7 pairs, narrowly triangular, mostly 1–1.5 mm, patent; interlobes broad, margin entire; terminal lobe not distinctly developed. Scapes brownish green, subequaling leaves, ± sparsely arachnoid. Capitulum 1.5–2 cm wide. Involucre 5–7 mm wide, base ± rounded. Outer phyllaries (10–)14–17, deep to light green, often with a narrow blackish middle strip, and darker apically, ± imbricate, outermost ones ovate and 4–5 × 2–2.7 mm, middle ones ovate-lanceolate, ca. 5 × 2 mm, and 1/3–1/2 as long as inner ones, appressed, with a membranous 0.1–0.2 mm wide border, margin almost glabrous, apex flat to callose; inner phyllaries 8–9 mm, apex flat. Ligules inside pure white; outer ligules almost flat, outside striped pinkish or faintly gray pinkish; inner ligules white, with white or pinkish apical teeth. Stigmas grayish green to almost black. Anthers without pollen. Achene light grayish, (3.7–)4–4.5 × ca. 0.9 mm; body almost smooth below, subsparsely spinulose above, gradually narrowing into a subcylindric 0.7–1(–1.1) mm cone, spinules thin and erect-patent; beak 3.2–5.5 mm, thin. Pappus yellowish white, 5–6.5 mm. Fl. spring to summer. Agamosperm.

Temporarily wet subsaline to saline alpine grasslands, wet saline meadows in mountains; 2000–3000 m. S Xinjiang, W Xizang [Afghanistan, India, Tajikistan].

In areas adjacent to China *Taraxacum candidatum* reaches an elevation of ca. 5300 m.

7. Taraxacum sinicum Kitagawa, Bot. Mag. (Tokyo) 47: 826. 1933.

华蒲公英 hua pu gong ying

Taraxacum sinense Dahlstedt, Acta Horti Gothob. 2: 168. 1926, not Poiret (1816); *T. borealisinense* Kitamura, nom. illeg. superfl.

Herbs 8–15(–25) cm tall. Petiole brownish purple, narrow; leaf blade ± mid-green, linear-oblanceolate, 7–10(–15) × 0.6–1 cm, subglabrous to sparsely arachnoid, margin usually pinnatilobed, pinnatisect, or very deeply dissected or rarely undivided; lateral lobes 5–7(–9) pairs, linear to linear-triangular, ± recurved; interlobes narrow, usually 5–7 mm, margin entire; terminal lobe narrow, elongated, base sagittate, apex ± acute. Scapes brownish green, ± overtopping leaves, arachnoid and

densely so below capitulum. Capitulum 1.5–2.5 cm wide. Involucre 6–7(–8) mm wide, ± subobconic at base. Outer phyllaries 16–18, yellowish green with red apex to dark green and often suffused reddish, imbricate, outermost ones ovate-lanceolate and 4.5–6.5 × 1.8–2.7 mm, middle ones ± lanceolate, 7–8 × 1.5–2 mm, and 1/3–1/2 as long as inner ones, appressed, with a ± conspicuous membranous to whitish 0.2–0.4 mm wide border, margin glabrous, apex ± flat to slightly callose; inner phyllaries 10–13 × ca. 1 mm, apex flat. Ligules deep yellow; outer ligules ± flat, outside striped dark gray; inner ligules with yellow to grayish apical teeth. Stigmas greenish gray. Anthers polliniferous; pollen grains irregular in size. Achene light grayish, 3.5–4.4 × 0.9–1 mm; body subsparsely to ± densely spinulose above, ± gradually narrowing into a thick subcylindric 0.7–1 mm cone, spinules coarse with uppermost ones curved upward; beak 5–6.5 mm, base ± thick. Pappus yellowish white, 6.5–7 mm. Fl. spring to summer. Agamosperm. $2n = 24$.

Subsaline pastures, temporarily wet grasslands, substeppe depressions; 600–2000 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi [Kyrgyzstan, Mongolia, Russia (Altai)].

Reports of *Taraxacum sinicum* (as *T. borealisinense*) from Henan, Hubei, Hunan, Sichuan, and Yunnan (FRPS 80(2): 18. 1999; Higher Pl. China 11: 770. 2005) are incorrect.

8. Taraxacum armeriifolium Soest, Feddes Repert. 70: 61. 1965.

全叶蒲公英 quan ye pu gong ying

Taraxacum oblanceifolium D. Z. Ma.

Herbs 4–10(–15) cm tall. Petiole purplish to greenish, narrow; leaf blade ± light green to slightly grayish green, linear to linear-oblanceolate, 4–8(–11) × 0.5–0.9 cm, ± glabrous, margin usually deeply lobed to dissected but sometimes entire; lateral lobes 3–7 pairs, linear, linear-triangular, or narrowly triangular, ± recurved; interlobes short, margin entire; terminal lobe elongated, narrow, apex ± acute. Scapes brownish green, ± equaling leaves, ± sparsely arachnoid and densely so below capitulum. Capitulum 1.5–2.5 cm wide. Involucre 5.5–7.5 mm wide, base subconic. Outer phyllaries 12–15, light green with darker tips, ± imbricate, outermost ones ovate and 3.5–5.5 × 1.7–3 mm, middle ones ovate-lanceolate, ca. 6.5 × 2.5 mm, and ca. 1/2 as long as inner ones, appressed, with a membranous to whitish 0.5–1 mm wide border, margin glabrous, apex ± flat; inner phyllaries 0.9–1.2 cm, apex callose to flat. Ligules yellow; outer ligules canaliculate to involute, sometimes ± flat, outside striped pinkish gray to grayish purple; inner ligules often subtubular or cucullate, with dirty yellow apical teeth. Stigmas yellow to pale grayish yellow. Anthers polliniferous; pollen grains irregular in size. Achene light grayish, 4–4.7 × 1–1.1 mm; body ± sparsely spinulose above, gradually narrowing into a ± subconic (0.8–)1–1.3 × 0.5–0.6 mm cone, spinules short with some coarse; beak 2–3 × 0.2–0.3 mm. Pappus whitish, 5–6 mm. Fl. spring to summer. Agamosperm. $2n = 24$.

Saline areas, temporarily wet to wet pastures and grasslands, substeppe areas; 1500–2800 m. Hebei, Ningxia, Xinjiang, Xizang [Afghanistan, India, Mongolia, Tajikistan].

In areas adjacent to China *Taraxacum armeriifolium* reaches an elevation of ca. 4800 m.

9. Taraxacum ikonnikovii Schischkin, Fl. URSS 29: 736. 1964.

大头蒲公英 da tou pu gong ying

Herbs 10–15(–25) cm tall. Petiole usually purplish or greenish, unwinged; leaf blade mid-green, ± linear to linear-oblanceolate, (4–)6–9(–15) × 0.6–1(–1.5) cm, ± subglabrous, margin usually pinnatisect or rarely ± entire; lateral lobes 4–6 pairs, linear-triangular to narrowly triangular, 3–8 × 3–4 mm, recurved, margin entire; interlobes short, 3–4 mm wide, margin entire; terminal lobe elongated, linear-triangular, base sagittate, margin entire, apex acute. Scapes greenish, sparsely arachnoid mainly below capitulum. Capitulum 2–2.5 cm wide. Involucre 7–10 mm wide, base rounded. Outer phyllaries 13–17, deep green to dark green, conspicuously imbricate, ovate to broadly ovate, outermost ones 4–5(–7.5) × (2–)2.5–3.5 mm and 1/4–1/2 as long as inner ones, appressed, with a distinct whitish membranous 0.4–0.8 mm border, margin glabrous to sparsely ciliate at apex, apex ± corniculate; inner phyllaries 1–1.3 cm, ± corniculate below apex. Ligules inside yellow to pale yellow; outer ligules flat, outside striped gray. Stigmas pale green. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, 3.9–4.5 mm; body apically subsparsely spinulose, gradually narrowing into a ± cylindric 0.9–1.2 mm cone, spinules thin, erect-patent; beak 5–7(–8) mm, thin. Pappus slightly yellowish white, 5–6 mm. Fl. summer. Agamosperm.

Wet subsaline meadows, pastures along rivers; 3600–4000 m. SW Xinjiang [Tajikistan].

10. Taraxacum luridum G. E. Haglund, Bot. Not. 1938: 307. 1938.

红角蒲公英 hong jiao pu gong ying

Herbs 5–10 cm tall. Petiole usually greenish, seldom pinkish, ± narrowly winged; leaf blade mid-green to slightly bluish green, ± linear, 5–7(–8) × 0.6–0.9(–1.1) cm, ± subglabrous or glabrous, margin usually sinuate-dentate to pinnatilobed but often entire to subentire; lateral lobes 4–8 pairs, linear to linear-triangular, to 6 × 0.5–1.3 mm, usually patent, sometimes recurved or curved upward, margin ± entire; interlobes 5–10 mm, entire; terminal lobe often elongated, to 1.5 cm, sometimes not distinct, entire. Scapes greenish brown, subequaling leaves, sparsely arachnoid, later glabrescent. Capitulum 2–2.5 cm wide. Involucre 6–8 mm wide, base rounded. Outer phyllaries 8 or 9(–13), ± not imbricate, broadly ovate to ovate-lanceolate, outermost ones 4–5 × 2.7–3 mm and 2/5–1/2 as long as inner ones, appressed to loosely so, middle ones dark green and 0.8–1.5 mm wide, with a gradual transition into a pale whitish green or membranous 0.5–0.8(–1) mm border, margin glabrous to sparsely ciliate at apex, apex callose to corniculate; inner phyllaries 1–1.1 cm, ± corniculate below apex. Ligules flat; outer ligules outside striped greenish gray to pinkish gray, inside white; inner ligules pale yellowish at base but otherwise white. Stigmas pale grayish yellowish green. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, (3.5–)3.8–4.2(–4.5) mm; body apically sub-

sparsely spinulose, subgradually narrowing into a ± cylindric medium-thick (0.7–)0.9–1.2 mm cone, spinules coarse; beak 3–4.2 mm, ± thin. Pappus brownish pinkish white, 5–6 mm. Fl. summer. Agamosperm. $2n = 24$.

Subsaline meadows, along streams; 2800–5000 m. SW Xinjiang, S Xizang [India, Kyrgyzstan, Tajikistan].

11. Taraxacum pseudoleucanthum Soest, Proc. Kon. Ned. Akad. Wetensch., C, 69: 365. 1966.

假白花蒲公英 jia bai hua pu gong ying

Herbs 5–10 cm tall. Petiole pinkish or greenish, 2–4 mm wide, very narrowly winged; leaf blade ± mid-green, linear to linear-oblanceolate, 5–8 × 0.6–0.9 cm, subglabrous, margin usually remotely dentate to lobulate but often subentire; lateral lobules or teeth 3–6 pairs, triangular to broadly triangular, 0.5–1(–2.5) mm, ± recurved; interlobes broad, undivided part of blade usually broader than divided one, margin entire; terminal lobe usually not discernible, apex subacute. Scapes brownish green, ± equaling leaves, arachnoid. Capitulum 1.5–2 cm wide. Involucre 5–6 mm wide, base ± rounded to subconic. Outer phyllaries 12–15, green to light green, slightly imbricate, ovate-lanceolate, outermost ones 3–3.5 × (1.2–)3–3.5 mm and 2/5–1/2 as long as inner ones, appressed, with a ± distinct membranous 0.2–0.3 mm wide border, margin subglabrous to sparsely ciliate, apex ± flat to callose; inner phyllaries 8–9(–10) mm, apex flat to corniculate. Ligules probably inside white or pale yellowish; outer ligules flat, outside striped grayish pink or grayish. Stigmas yellow to dirty yellow. Anthers polliniferous; pollen grains irregular in size. Achene grayish, 3.5–3.9 × 0.8–0.9 mm; body ± subsparsely spinulose above, gradually narrowing into a subcylindric 0.5–0.6(–0.8) mm cone, spinules thin, erect-patent, and acute; beak 4–5 mm, thin. Pappus yellowish white, 4–5 mm. Fl. summer. Agamosperm.

Pastures along rivers, mountain slopes; 3500–3800 m. S Xinjiang [India, Kyrgyzstan, Tajikistan].

12. Taraxacum iliense Kirschner & Štěpánek, **sp. nov.**

伊犁蒲公英 yi li pu gong ying

Type: China. Xinjiang: "Ad ripam fluminis Ili He [伊犁河], haud procul ab oppido Yining [伊宁]," 30 Sep 2004, *P. Sekerka, P. Hanzelka & I. Bulánková 04/32*, cultivated as JŠ 7955 (holotype, PRA; isotypes, A, MO, PE).

Plantae agamospermae foliis pinnatisectis lobis lateralibus remotis, recurvatis, angustis, vulgo integris, phyllariis involucralibus exterioribus adpressis, imbricatis, late ovatis usque anguste lanceolatis, viridibus, marginibus albo-membranaceis, ligulis saturate luteis, stigmatibus sordide luteis, antheris polliniferis, acheniis eximie longis, subalatis, sparse spinulosis, sensim in pyramidem longam abeuntibus.

Herbs 10–17 cm tall. Petiole grayish purple, unwinged; leaf blade grayish mid-green with a grayish purple midvein, ± linear, 12–16 × (1.2–)1.5–1.8 cm, ± subglabrous, pinnatisect; lateral lobes 5 or 6 on each side, usually alternate, narrowly triangular or from a broader base abruptly narrowed into linear-oblong distal part, 5–8 × 3–4 mm, usually recurved, proximal margin entire, distal margin entire or with a single tooth, apex acute; interlobes 8–14 × 2–3(–4) mm, margin entire or with a single tooth; terminal lobe narrowly triangular, 1.5–2 × 0.8–1.4 cm, margin entire but distally concave, apex acuminate. Scapes greenish brown to purplish, ± equaling leaves, arachnoid. Capitulum 3–3.5 cm wide. Involucre 6–8 mm wide, base flat-rounded. Outer phyllaries with deep green middle part and a gradual transitioning into whitish membranous to 1 mm border but later in season with only a 0.2–0.4 mm wide border; outer phyllaries in early spring plants 11–14, suffused reddish in distal ca. 1/3, ± imbricate, broadly ovate to ovate-lanceolate, outermost ones 4–5 mm and to 1/2 as long as inner ones, appressed, apex callose to corniculate; outer phyllaries in early summer flowering plants 18–21, conspicuously imbricate, ovate-lanceolate to narrowly lanceolate, outermost ones 5–6 × 2.5–3 mm and 2/5–1/2 as long as inner ones, apex usually reddish callose; inner phyllaries ca. 1.2 cm, flat to ± corniculate below apex. Ligules deep yellow, ± flat; outer ligules outside striped purplish grayish brown; inner ligules canaliculate, with purplish apical teeth; ligule tube pubescent. Stigmas dirty yellow. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 5.2–5.7 × ca. 1 mm; body with prominent lateral ridges, ± sparsely spinulose mainly on ridges in upper ca. 2/3 and elsewhere in upper ca. 1/3, very gradually narrowing into a thick ± subconic 1.3–1.5 mm cone, spinules long, thin, and erect and with some also on cone; beak 4.5–5 mm, ± thin. Pappus ± white, ca. 7 mm. Fl. spring and summer. Agamosperm.

● Alluvial pastures, shrubby meadows; ca. 600 m. W Xinjiang.

13. Taraxacum patiens Kirschner & Štěpánek, **sp. nov.**

冷静蒲公英 leng jing pu gong ying

Type: China. Xizang: "In urbe Lhasa [拉萨市]," 31 Jul 1992, *L. Businská & R. Businský 13*, cultivated as JŠ 5110 (holotype, PRA; isotypes, A, MO, PE).

Paratypes: China. Sichuan: "Dêgê [德格], S of the town," 6 Jun 1992, *L. Businská & R. Businský 4*, cultivated as JŠ 5122 (PE, PRA). Xizang: "In urbe Lhasa [拉萨市]," 31 Jul 1992, *L. Businská & R. Businský 13*, cultivated as JŠ 5111 (PE, PRA); "Valley of Lhasa He [拉萨河] river, the village of Kacchäl (ca. 40 km E of the city of Lhasa [拉萨市])," ca. 3650–3850 m, 20 Jun 2002, *M. Štefánek 57b*, cultivated as JŠ 7837 and JŠ 7839 (PRA); "The town of Shigatse [日喀则], valley between Shigatse and the monastery of Shalu Gön [夏鲁寺] S of the town," ca. 3650–3850 m, 8 Jun 2002, *M. Štefánek 41*, cultivated as JŠ 7818, JŠ 7819, JŠ 7820 (PRA).

Plantae agamospermae foliis pinnatisectis lobis lateralibus patentibus lingulatis Taraxaci sherriffii Soest *similes, phyllariis involucralibus exterioribus adpressis imbricatis vel subimbricatis* T. sinici Kitagawa *proximae, stigmatibus sordide luteis vel luteo-viridibus, antheris polliniferis, acheniis pallide griseo-stramineis sparse spinulosis, in pyramidem subcylindricam crassam sensim abeuntibus, rostro brevi, pappo sordide albido 6–7 mm longo.*

Herbs (10–)14–30 cm tall. Petiole purple, narrow; leaf blade ± light grayish mid-green, linear-oblanceolate to linear, 6–15 × 1.3–2.1 cm, sparsely arachnoid, pinnatisect; lateral lobes 6 or 7 pairs, from a broad base abruptly narrowing into a lingu-

late-linear distal part, 5–10 × 2–3 mm, patent to slightly subrecurved, proximal margin ± straight and entire or with one tooth, distal margin concave to sigmoid and entire or with one tooth; interlobes to 12 × 2 mm, margin ± entire; terminal lobe 3-partite, basal segments patent, terminal segment lingulate-elongated, 7–14 × 2.5–4 mm, and apex ± acute. Scapes brownish green, ± overtopping leaves, arachnoid. Capitulum ca. 2 cm wide. Involucre 6–7 mm wide, base subobconic. Outer phyllaries in early flowering plants 9–15, dark olivaceous green with reddish brown apex, ± not imbricate, ovate to lanceolate, 3.5–6.5 × 2–3.5 mm, appressed, with a ± conspicuous whitish green to 0.5 mm wide border, apex ± flat to callose; outer phyllaries in late flowering plants 17–22, imbricate, lanceolate to linear-lanceolate, 4.5–6 × 1.8–2.6 mm, with light green middle part and a whitish green or membranous ca. 0.5(–0.8) mm wide border; inner phyllaries ca. 1 cm, apex ± flat. Ligules yellow; outer ligules ± flat, outside striped pinkish pale gray; inner ligules with yellow to dirty yellow apical teeth; ligule tube pubescent. Stigmas dirty yellow to yellowish green. Anthers polliniferous; pollen grains irregular in size. Achene light ochraceous grayish to light gray, 4.5–4.8 × 0.9–1 mm; body sparsely spinulose above, ± gradually narrowing into a thick subcylindric 1.2–1.5 × ca. 0.4 mm cone, spinules thin and erect-patent; beak 3.5–4.5 mm. Pappus yellowish white, 6–7 mm. Fl. spring to summer. Agamosperm.

• Subsaline pastures, flooded meadows, grasslands; 3400–3900 m. W Sichuan, S Xizang.

14. Taraxacum cereum Kirschner & Štěpánek, **sp. nov.**

蜡黄蒲公英 la huang pu gong ying

Type: China. Xinjiang: "Montes Tian Shan [天山], pars montium Borohoro Shan [婆罗科努山]: lacus Sayram Hu," 29 Sep 2004, *P. Sekerka, P. Hanzelka & I. Bulánková 04/26*, cultivated as JŠ 7964 (holotype, PRA; isotypes, A, MO, PE).

Plantae agamospermae foliis subintegris usque profunde pinnatisectis araneosis, lobis lateralibus ± linearibus, capitulis subopertis pallide luteolis usque cereis, phyllariis involucralibus exterioribus ± ovatis, deinde ± lanceolatis late pallide marginatis, flosculis exterioribus canaliculatis, interioribus subtubulosis tubo pubescente, stigmatibus obscure luteo-viridibus, acheniis robustis, grosse subsparse spinulosis, spinulis saepe sursum curvatis, corpore in pyramidem subcylindricam crassam ca. 1 mm longam subabrupte transiente.

Herbs 16–22 cm tall. Petiole purplish, narrow, brownish arachnoid at base; leaf blade ± light green, linear to narrowly oblanceolate, 8–14 × (0.2–)0.8–2.7 cm, arachnoid, in early flowering plants margin subentire or denticulate but in later plants pinnatisect; lateral lobes in late flowering plants 5–8 pairs, ± linear to linear-triangular, 7–13 × 1–3 mm, ± patent, margin entire, apex acute; interlobes 5–12 × ca. 2 mm, margin entire; terminal lobe lingulate-elongated, narrow, 3-partite, basal segments patent, terminal segment 2.5–4 × 0.3–0.5 cm and apex ± acute. Scapes brownish purple, ± equaling leaves, ± densely arachnoid and densely so below capitulum. Capitulum not fully opening, ca. 2 cm wide. Involucre 7–9 mm wide, base subtruncate. Outer phyllaries 12–16 and ovate-lanceolate to broadly ovate in early plants, 15–25 and ± lanceolate in later flowering plants, deep green with darker apical part, ± imbricate, outermost ones 5–7 × 2.5–3.5 mm and ca. 1/2 as long as inner ones, appressed to loosely appressed, with membranous to whitish green border to 1.1 mm wide, margin glabrous and minutely sparsely denticulate, apex ± callose; inner phyllaries ca. 1 cm, apex callose or subcorniculate. Ligules pale cream yellow or pale yellowish white, deeper so at base; outer ligules canaliculate, ± erect, outside striped gray purplish; inner ligules subtubular, with reddish or cream apical teeth; ligule tube densely pubescent. Stigmas yellowish green, almost not exserted in outer florets, not exserted in inner florets, blackish pubescent outside. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, robust, 4.2–4.4 × ca. 1.2 mm; body subsparsely spinulose above, subabruptly narrowing into a subcylindric ca. 1 × 0.4 mm cone, spinules coarse, curved upward, larger on ridges, and usually 1 or 2 on cone; beak 6–7 mm. Pappus dirty white, ca. 7 mm. Fl. spring to summer. Agamosperm.

• Mountain calcareous pastures; 2100–2200 m. W Xinjiang.

3. Taraxacum sect. **Stenoloba** Kirschner & Štěpánek, Folia Geobot. 39: 261. 2004.

深裂蒲公英组 shen lie pu gong ying zu

Leaves usually pinnatisect to deeply dissected. Outer phyllaries usually numerous, ovate-lanceolate to linear-lanceolate, most often loosely appressed to recurved at apex or ± patent, narrowly pale bordered, outer and/or inner ones usually corniculate to horned. Florets yellow. Achene narrow, almost smooth below, ± densely spinulose in upper ca. 1/4; body usually gradually to subgradually narrowing into a ± thin cylindric or rarely subcylindric usually 0.9–1.2 × 0.2–0.3 mm cone, spinules minute; beak 7–9 mm, thin.

About seven species: China, Kazakhstan, Mongolia, Russia; four species (two endemic) in China.

Members of this section usually occur in dry substeppe to steppe habitats with a center of distribution in Mongolia and Russia (S Siberia).

The name *Taraxacum* sect. *Sinensia* Soest (Wentia 10: 9. 1963) was often used for *T.* sect. *Stenoloba* (e.g., Soest in K. H. Rechinger, Fl. Iranica 122: 238. 1977; FRPS 80(2): 16. 1999). The former name is a taxonomic synonym of *T.* sect. *Leucantha* (Kirschner & Štěpánek, Taxon 46: 96. 1977).

The name *Taraxacum heterolepis* Nakai & Koidzumi ex Kitagawa (Bot. Mag. (Tokyo) 47: 829. 1933) is based on a holotype specimen that lacks important characters and cannot be safely classified, not even to the section. It is accepted in FRPS (80(2): 80. 1999) as the correct name for *T. multisectum* (see below) but differs from the latter in the shape and posture of outer phyllaries and in important achene features.

Type material of the name *Taraxacum falcilobum* Kitagawa (Rep. Inst. Sci. Res. Manchoukuo 2: 312. 1938), also referred to this group in FRPS

(80(2): 19. 1999), was not traced, and the protologue does not give relevant information as to its taxonomic position. The name is therefore listed among names awaiting further study.

Representatives of this section often appear under the name *Taraxacum asiaticum*, the lectotype of which (Kirschner & Štěpánek, Preslia 83: 498. 2011) proved to belong to *T. scariosum* (see below), a taxon often called *T. stenolobum*. *Taraxacum asiaticum* was reported to occur in a number of Chinese provinces (FRPS 80(2): 19. 1999), but a revision of the material is required.

1a. Stigmas yellow ..... 16. *T. scariosum*
1b. Stigmas discolored (grayish green, greenish).
2a. Outer phyllaries 20–24, 1–1.5 mm wide ..... 15. *T. sinomongolicum*
2b. Outer phyllaries 13–17, 2–4 mm wide.
3a. Achene body with short dense spinules, beak 7–9 mm ..... 17. *T. abax*
3b. Achene body with long subdense spinules, beak 10–11 mm ..... 18. *T. multisectum*

15. Taraxacum sinomongolicum Kitagawa, Neo-Lin. Fl. Manshur. 687. 1979.

凸尖蒲公英 tu jian pu gong ying

Taraxacum cuspidatum Dahlstedt, Acta Horti Gothob. 2: 171. 1926, not Marklund (1911).

Herbs 12–15(–30) cm tall. Petiole usually purplish at base or greenish, unwinged; leaf blade mid-green, ± linear to linear oblanceolate, (8–)10–12(–16) × 0.8–1.5(–2) cm, ± subglabrous, ± pinnatisect; lateral lobes (3 or)4–6 pairs, linear-triangular to narrowly triangular, 3–8 × 3–4 mm, recurved to ± patent, margin usually entire; interlobes 2–3(–4) mm wide, margin entire; terminal lobe narrowly triangular, sometimes elongated, base sagittate, margin entire, apex acute. Scapes greenish, sparsely arachnoid but more densely arachnoid below capitulum. Capitulum ca. 2 cm wide. Involucre 7–8 mm wide, base ± rounded. Outer phyllaries 20–24, deep green to pale green, ± imbricate, lanceolate to narrowly lanceolate but outermost ones sometimes linear, outermost ones 4–5.5(–7.5) × 1–1.5 mm and 2/5–1/2 as long as inner ones, appressed to loosely so, with a evident whitish membranous 0.2–0.3 mm border, margin glabrous to sparsely ciliate, apex flat; inner phyllaries 1–1.2 cm, apex ± corniculate. Ligules ± yellow; outer ligules flat, outside striped grayish green. Stigmas light greenish. Anthers polliniferous; pollen grains irregular in size. Achene pale grayish, 3.9–4.2 × 0.8–1 mm; body apically ± densely spinulose, gradually narrowing into a ± cylindric 0.9–1 mm cone, spinules short and erect-patent; beak ca. 6 mm, thin. Pappus slightly yellowish white, ca. 6 mm. Fl. summer. Agamosperm.

• Dry grasslands; 1400–2000 m. Hebei, Nei Mongol.

16. Taraxacum scariosum (Tausch) Kirschner & Štěpánek, Preslia 83: 498. 2011.

深裂蒲公英 shen lie pu gong ying

Leontodon scariosus Tausch, Flora 12(Ergänz. 1): 34. 1829; *Taraxacum asiaticum* Dahlstedt; *T. asiaticum* var. *lonchophyllum* Kitagawa; *T. commixtiforme* Soest; *T. stenolobum* Stscheglejew.

Herbs 12–20(–25) cm tall. Petiole usually faintly purplish to purple at base, unwinged; leaf blade mid-green to light green, narrowly oblanceolate, 12–15 × 1.3–2.5 cm, arachnoid, margin deeply dissected; lateral lobes 6–10 pairs, linear, ± patent, sometimes slightly bent upward or downward, often ± wider at base where divided into sharp linear lobules or teeth; interlobes 5–12 × 1.5–2 mm, margin with numerous usually patent linear acute lobules and/or teeth; terminal lobe 3-partite, apical segment linear and apex acute; late summer leaves with broader linear lobes to 8 mm wide. Scapes greenish brown, arachnoid but more densely arachnoid below capitulum. Capitulum 2–3 cm wide. Involucre 0.9–1.1 cm wide, base rounded. Outer phyllaries 14–18, yellowish green to green and usually slightly suffused pinkish, ± imbricate, lanceolate to broadly lanceolate but inner ones more narrowly so, outermost ones 5–7(–8.5) × (1.8–)2.5–2.8 mm and 2/5–3/5 as long as inner ones, appressed, later ± erect, with whitish 0.2–0.3 mm border more distinct in apical part and often pinkish, margin arachnoid ciliate, apex initially ± flat to minutely corniculate but corniculate in later flowering capitula; inner phyllaries 1.2–1.4 cm, apex ± corniculate. Ligules yellow; outer ligules flat, outside striped gray to grayish pink; inner ligules with reddish apical teeth. Stigmas pure yellow to pale grayish yellow. Anthers polliniferous; pollen grains irregular in size. Achene pale grayish straw-colored, 4.2–4.7 × ca. 0.8 mm; body apically subsparsely to ± densely spinulose, ± gradually narrowing into a subcylindric 0.8–1 mm cone; beak 8–9 mm, thin. Pappus white, 6–7 mm. Fl. spring and summer. Agamosperm. $2n = 24$.

Dry steppe and substeppe habitats, roadsides, dry pastures; 900–3000 m. Hebei, Heilongjiang, Nei Mongol, Shanxi, ?Xinjiang, Xizang [Kazakhstan, Mongolia, Russia (Altai)].

The report of *Taraxacum scariosum* (as *T. asiaticum*) from Xinjiang (FRPS 80(2): 19. 1999) is probable but needs to be confirmed, as do those from Gansu, Hubei, Jilin, Liaoning, Qinghai, Shaanxi, and Sichuan.

The name, most often covering this species in the Russian and Chinese literature, *Taraxacum stenolobum*, was usually used in a very broad concept. The same applies to another frequently used name, *T. asiaticum*, for which the original material is very heterogeneous and the lectotype represents *T. scariosum*. We use the oldest epithet in a narrow sense of a single very widespread agamospermous species, within this section distinct in having yellow stigmas, very narrow achenes, narrow appressed outer phyllaries, and short corniculation.

17. Taraxacum abax Kirschner & Štěpánek, Preslia 83: 504. 2011.

平板蒲公英 ping ban pu gong ying

Herbs 10–20 cm tall. Petiole usually purple at base, unwinged; leaf blade dull green to mid-green, narrowly oblanceolate, 7–10 × 1.5–2.8 cm, arachnoid, margin deeply dissected; lateral lobes 6–9 pairs, linear to linear-lingulate, 8–14 × 1–2(–2.5) mm, ± patent, sometimes slightly bent upward or downward, margin ± entire; interlobes 6–10 × 1–2 mm, margin

with a few linear patent acute lobules or teeth; terminal lobe 3-partite, apical segment linear to linear-lingulate, 10–15 × 1.5(–3) mm, and apex acute; late summer leaves with broader lobes. Scapes greenish brown, ± equaling leaves, arachnoid but later sparsely so. Capitulum 2–3 cm wide. Involucre 1–1.2 cm wide, base ± rounded. Outer phyllaries 13–17, deep green to ± dark green, usually slightly glaucous and often suffused reddish in upper part, subimbricate, ± lanceolate, outermost ones 7–9(–10) × (2.2–)2.6–3.1 mm and ca. 3/5 as long as inner ones, loosely appressed to ± erect, some slightly recurved at apex, with whitish membranous ca. 0.3 mm border, margin ± glabrous, apex with distinct horn or corniculate; inner phyllaries 1.2–1.5 cm, narrow, apex distinctly corniculate. Ligules deep yellow; outer ligules flat, outside striped grayish greenish pink; inner ligules with reddish apical teeth. Stigmas grayish green, densely dark pubescent. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, 3.9–4.3 × 0.8–0.9 mm; body apically ± densely shortly spinulose, subgradually to subabruptly narrowing into a thin cylindric 0.9–1.2 mm cone, spinules thin; beak 7–9 mm, thin. Pappus yellowish white, 6.5–7 mm. Fl. spring and summer. Agamosperm. $2n$ = 24.

Dry substeppe grasslands, pastures, roadsides; 700–2000 m. Hebei, Xinjiang [Russia (Siberia)].

18. Taraxacum multisectum Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 2: 310. 1938.

异苞蒲公英 yi bao pu gong ying

Herbs 11–20 cm tall. Petiole pale green or purplish, sparsely arachnoid at very base but otherwise glabrous, unwinged; leaf blade mid-green, narrowly oblong, 7–16 × 1.2–2.4 cm, sparsely arachnoid, pinnatipartite; lateral lobes 3–5 pairs, ± linear, 8–16 × 1.2–2.3 mm, ± patent, margin ± entire, apex acute; interlobes 3–12 × 1–2 mm, margin filiform-dentate or lobulate; terminal lobe 3-partite, margin of segments entire, apex acute. Scapes brownish green, ± overtopping leaves, arachnoid. Capitulum 3–3.5 cm wide. Involucre 0.9–1.1 cm wide, base rounded. Outer phyllaries 10–14, dark green, margin and apical part often purple, with a gradual transition into paler border and a sharply delimited whitish ca. 0.3 mm wide border, not imbricate, usually broadly lanceolate to narrowly ovate, outermost ones (6–)7–9 × (2–)2.5–4 mm and ca. 1/2 as long as inner ones, appressed, later to erect-patent, margin ± glabrous or sparsely ciliate, apex ± callose, rarely flat; inner phyllaries 1.4–1.6 cm, apex ± flat to corniculate. Ligules yellow; outer ligules ± flat, outside striped gray. Stigmas grayish green. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 4.6–5 × 0.8–0.9 mm; body subsparsely spinulose above, gradually narrowing into a ± cylindric 0.9–1 mm cone, spinules long with longest ones to 0.5 mm, thin, erect-patent, acute, and some also on cone base; beak 1–1.1 cm, thin. Pappus ± white, ca. 7 mm. Fl. spring. Agamosperm.

• Steppe grasslands, pastures; below 100–300 m. Jilin, Liaoning, ?Nei Mongol.

The occurrence of *Taraxacum multisectum* in Nei Mongol is probably correct, but this record needs to be confirmed.

Taraxacum multisectum is similar to *T. abax* but substantially differs in having conspicuously long spinules on the achenes, longer beak, not horned, and seldom corniculate outer phyllaries.

4. Taraxacum sect. **Oligantha** Soest, Wentia 10: 8. 1963.

短喙蒲公英组 duan hui pu gong ying zu

Plants small, base usually densely hairy. Leaves usually arachnoid; petiole ± unwinged; leaf blade deeply lobed; lobes usually patent. Involucre narrow, usually to 6 mm wide. Phyllaries abaxially sparsely to densely arachnoid or less often surface glabrous, margin often long ciliate; outer phyllaries 6–10(–12), imbricate or subimbricate, broadly lanceolate to ovate, usually less than 5–6(–7) mm, appressed, margin with paler central part, apically corniculate or with a horn at apex, horn usually blackish and erect. Receptacle glabrous or with a few arachnoid hairs. Florets few (usually less than 30 but sometimes less than 15), yellow. Achene grayish straw-colored brown to grayish brown, 5–6.5 mm; body almost smooth or very sparsely spinulose above, very gradually and indistinctly narrowing into beak, cone not visible or thick and broadly conic, spinules few and remote; beak 0.2–4 mm, thick. Pappus yellowish white to pale brownish, 4.5–6 mm, often fragile.

About 15–18 species: centered in C Asia; two species in China.

In addition to the species listed below, *Taraxacum pseudominutilobum* Kovalevskaja was reported to occur in China (FRPS 80(2): 12. 1999). However, this name is based on the material from the Chatkal Range, W Tian Shan, and Angren Plateau, both in Uzbekistan, and the material studied shows that it is probably confined to these regions. No similar plants from China were seen.

1a. Leaf blade undivided; ligules pale yellow; achene beak 1–2 mm ..... 19. *T. syrtorum*
1b. Leaf blade pinnatilobed; ligules mid-yellow; achene beak 0.2–1 mm ..... 20. *T. minutilobum*

19. Taraxacum syrtorum Dshanaëva, Fl. Kirgizii, Dopoln. 1: 115. 1967.

高山耐旱蒲公英 gao shan nai han pu gong ying

Herbs to 10 cm tall; plant base with remnants of old petioles. Petiole ± glabrous, unwinged; leaf blade ± light green, ± linear, 3–8 × 0.1–0.3(–0.5) cm, glabrous, not divided, margin entire or rarely minutely remotely dentate, apex subacute. Scapes greenish, ± equaling leaves, arachnoid and densely so below capitulum. Capitulum to 2 cm wide. Involucre 8–9 mm wide, base ± subobconic. Outer phyllaries 8–10(–12), light green often suffused pinkish in upper part, subimbricate, ± lanceolate to narrowly triangular, outermost ones 5–7(–8) × 2–3 mm and ca. 1/2 as long as inner ones, appressed, abaxial surface slightly arachnoid, with a narrow whitish membranous border, margin densely arachnoid, near apex pale to blackish

corniculate; inner phyllaries (8–)10–12 × 1.1–1.5 mm, apex corniculate. Ligules pale yellow (becoming pinkish); outer ligules flat, outside striped faintly grayish. Achene gray straw-colored brown, ca. 6 × 1 mm; body apically totally smooth, with cone not discernible; beak 1–2 mm, very thick. Pappus brownish white, 5–6 mm. Fl. summer.

High alpine and subsaline slopes; ca. 4000 m. W Xinjiang (Wuqia) [Kyrgyzstan].

20. Taraxacum minutilobum Popov ex Kovalevskaja, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. S.S.R. 17: 6. 1962.

毛叶蒲公英 mao ye pu gong ying

Herbs to 8 cm tall, slender, delicate, tunic usually developed. Petiole pale green, densely arachnoid, unwinged but dilated at very base; leaf blade grayish green, linear to oblanceolate, 3–6 × 0.4–1.2 cm, densely arachnoid to lanate, sometimes glabrescent, pinnatipartite to pinnatisect; lateral lobes 3–5 pairs, narrowly oblong, 1.5–6 × 1–1.5 mm, patent, some subrecurved or pointing upward, margin entire; interlobes usually 2–4 × ca. 1 mm, margin entire but sometimes with a few minute teeth; terminal lobe 3-partite, margin entire, basal segments ± recurved, terminal segment to 16 × 1.5 mm and apex subacute to acute. Scapes ± green, shorter than leaves, arachnoid. Capitulum to 1.5 cm wide. Involucre narrow, 3–4 mm wide, base obconic. Outer phyllaries 8–13, grayish olivaceous green, subimbricate, lanceolate to narrowly lanceolate but outermost ones to ovate-lanceolate or triangular, outermost ones 4–6 × 2–3 mm and 1/3–1/2 as long as inner ones, ± appressed to loosely appressed, abaxially densely arachnoid, with a whitish membranous 0.2–0.5 mm wide border, apex with a distinct blackish horn to 1 mm; inner phyllaries usually 8 or 9, 8–10 × 1.5–2(–2.5) mm, abaxially arachnoid but later glabrescent, border pink, apex corniculate. Ligules yellow; outer ligules flat to canaliculate, outside striped dark; inner ligules with reddish or yellow apical teeth. Stigmas deep yellow. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, ± cylindric, 5.5–6.1 × ca. 1 mm, totally smooth or with almost indistinct sparse minute tubercles, cone not discernible; beak whitish, 0.5–1 mm. Pappus dirty yellowish white to white, 5–6 mm, easily breaking off. Fl. summer. Agamosperm.

Stony slopes in high mountains; 3500–4500 m. S Xizang [Afghanistan, India (Ladakh), Pakistan, Tajikistan, Uzbekistan].

The problem surrounding the name *Taraxacum brevirostre* Handel-Mazzetti (Monogr. Taraxacum, 46. 1907) requires further study. In the literature, this name usually covers what is here called *T. minutilobum*, in accordance with the majority of original syntypes. The lectotype of this name comes from the Pamirs (Pamir region, 3900–4600 m, *Alcock 17727*, lectotype BM, no. det. 8426, *fide* Soest in K. H. Rechiner, Fl. Iranica 122: 234. 1977), and the type is intermediate between *T.* sect. *Oligantha* and *T.* sect. *Atrata*. The taxon represented by the lectotype is known only from the type collection and has not been found in China, although reported from Gansu, Qinghai, and Xizang (FRPS 80(2): 14. 1999).

5. Taraxacum sect. **Calanthodia** (Dahlstedt) R. Doll, Gatt. Taraxacum, 59. 1974.

大头蒲公英组 da tou pu gong ying zu

Taraxacum [unranked] *Calanthodia* Dahlstedt, Acta Horti Gothob. 2: 144. 1926.

Plants robust. Petiole often winged; leaf blade shallowly to deeply lobed. Capitulum 3–6 cm wide. Involucre usually more than 1.5 cm wide. Outer phyllaries usually more than 10 × 4 mm, imbricate or not so, broadly ovate to lanceolate, appressed or rarely to patent, border usually distinct and pale, apex usually corniculate. Ligules yellow. Stigmas dark. Achene dark brown to straw-colored brown, large, usually 4.5–5.5 × 1.1–2 mm, ± densely spinulose above, subabruptly to abruptly narrowing into usually thick subconic to subcylindric 0.8–1.4 mm cone; beak usually 8–10 mm. Pappus white.

● Eight species: China.

The highest diversity of this section is in Sichuan. Sexuality is relatively common in this section.

1a. Outer phyllaries erect-patent to patent ..... 25. *T. grypodon*
1b. Outer phyllaries appressed to erect.
2a. Achene 0.9–1 mm thick.
3a. Stigmas yellow to greenish yellow, rarely in populations plants with blackish green stigmas; outer phyllaries 9–14, usually narrowly lanceolate to ovate-lanceolate ..... 23. *T. peccator*
3b. Stigmas black; outer phyllaries 13–17, usually ovate to ovate-lanceolate ..... 24. *T. forrestii*
2b. Achene 1.1–2 mm thick.
4a. Achene cone 1.2–1.4 mm.
5a. Leaves undivided to shallowly lobed, lateral lobes 3–5, interlobes well developed and entire ..... 22. *T. platypecidum*
5b. Leaves deeply pinnatisect, lateral lobes 5 or 6, interlobes with a large acute tooth or lobule ..... 24. *T. forrestii*
4b. Achene cone 0.4–1.1 mm.
6a. Outer phyllaries without a paler border or border green, very narrow, and indistinct.
7a. Outer phyllaries 17–25, lanceolate to narrowly lanceolate; achene 1.2–1.4 mm thick ..... 26. *T. lanigerum*
7b. Outer phyllaries 11–19, broadly ovate to ovate-lanceolate; achene 1.5–2 mm thick ..... 27. *T. lugubre*
6b. Outer phyllaries with a distinct paler (whitish to greenish white) border.
8a. Outer phyllaries narrowly lanceolate to linear-lanceolate, 1.2–1.5 cm; stigmas blackish purple but probably brownish gray when fresh ..... 28. *T. pseudonutans*

8b. Outer phyllaries broadly ovate to ovate-lanceolate, 0.6–1.3 cm; stigmas black, blackish green, or deep green.
9a. Outer phyllaries 2–4.5 mm wide; plants not robust, usually less than 10 cm tall ..... 24. *T. forrestii*
9b. Outer phyllaries 4–8 mm wide; plants robust, 10–35 cm tall.
10a. Pappus 8–11 mm ..... 21. *T. calanthodium*
10b. Pappus 6–7.5 mm ..... 27. *T. lugubre*

21. Taraxacum calanthodium Dahlstedt, Acta Horti Gothob. 2: 150. 1926.

丽花蒲公英 li hua pu gong ying

Taraxacum canitiosum Dahlstedt; *T. connectens* Dahlstedt.

Herbs 20–35 cm tall, robust. Petiole purplish, narrow; leaf blade pale green, oblanceolate to broadly oblanceolate, 9–15 × 3–4.5 cm, sparsely to densely arachnoid, margin shallowly lobed and remotely dentate to deeply lobed; lateral lobes 3–6, triangular to linear-triangular, patent, often with recurved distal part or recurved; interlobes short, lobulate; terminal lobe broad, apex subobtuse to acute and sometimes with a distinct terminal lobule. Scapes brownish green, overtopping leaves, apically yellowish arachnoid. Capitulum 5–6 cm wide. Involucre 1.5–2 cm wide, base broadly rounded. Outer phyllaries (12–)15–24, pale green at base, suffused reddish, and getting darker then blackish toward apex, ± imbricate or not so, ovate to ovate-lanceolate, outermost ones 9–13 × 4–8 mm and ca. 4/5 as long as inner ones, appressed, border white and 0.4–1.5 mm, margin sparsely ciliate, apex blunt and corniculate; inner phyllaries 1.6–1.8 cm but to 2.3 cm in fruit. Ligules yellow; outer ligules outside faintly striped purplish; inner ligules with pinkish apical teeth; floret tube sparsely puberulent. Stigmas blackish green to green. Anthers polliniferous; pollen grains slightly irregular in size, almost regular. Achene dark grayish brown, 4.5–5.1 × 1.1–1.7 mm; body ridged, densely spinulose above, spinulose on ridges throughout, ± abruptly narrowing into a 0.8–1 mm subconic or subcylindric cone; beak 8–11 mm. Pappus yellowish, 8–11 mm. Fl. summer. Sexual.

• Alpine and subalpine grassland slopes and meadows; 3000–4000 m. S Gansu, Qinghai, NW Sichuan, ?Xizang.

Taraxacum calanthodium may occur in E Xizang, but material was not seen by the present authors. Reports from Shaanxi (FRPS 80(2): 38. 1999; Higher Pl. China 11: 776. 2005) are incorrect.

The three names, *Taraxacum calanthodium*, *T. canitiosum*, and *T. connectens*, all described by Dahlstedt from Sichuan, belong to a taxon characterized by great variation. Only in cultivation was sexuality proven for all the morphotypes (in spite of inconspicuous size variation of pollen grains). *Taraxacum grypodon* may also belong to this taxon but it is kept separate as it has patent outer phyllaries. Ploidy level of the whole complex remains unknown (both diploids and sexual tetraploids are possible).

22. Taraxacum platypecidum Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 515. 1922.

白缘蒲公英 bai yuan pu gong ying

Taraxacum licentii Soest.

Herbs 12–40 cm tall, robust. Petiole narrow; leaf blade deep green, narrowly oblanceolate, (6–)10–18 × 2–4 cm, arachnoid, margin subentire, dentate, shallowly lobed, or rarely to deeply pinnatisect; lateral lobes 3–5, broadly triangular, recurved; interlobes (when developed) with margin entire. Scapes brownish green, overtopping leaves, white arachnoid but whitish to brownish tomentose below capitulum. Capitulum 4–5 cm wide. Involucre 1–1.3 cm wide, base ± rounded. Outer phyllaries 14–19, subimbricate, ovate-lanceolate to ovate, 8–15 × (2.5–)3–4.5(–6) mm, appressed to loosely so, not distinctly veined, median part blackish green, with a whitish green to whitish 1–2 mm wide border, margin conspicuously densely whitish ciliate and blackish callose below apex (sometimes surface arachnoid in upper ca. 1/3); inner phyllaries 1.5–1.7 cm. Ligules yellow; outer ligules outside striped faintly purplish gray. Stigmas blackish to dark green. Anthers without pollen or polliniferous; pollen grains irregular in size. Achene grayish brown to light brown, (4.5–)5.5 × 1.5–2 mm; body spinulose-squamulose in upper ca. 1/3, tuberculate below, ± abruptly narrowing into a thick subcylindric 1.2–1.4 mm cone; beak ca. 9.5 mm. Pappus yellowish dirty white, 7–9 mm. Fl. summer. Agamosperm.

• Subalpine meadow slopes; 1900–3000 m. Gansu, Hebei, Shanxi.

The report of *Taraxacum platypecidum* for a number of additional provinces and for Korea and Japan (FRPS 80(2): 43 1999; Higher Pl. China 11: 778. 2005) is probably incorrect. However, although not yet seen by the authors among the specimens studied, the species should be looked for in the mountainous provinces adjacent to Hebei and Shanxi.

23. Taraxacum peccator Kirschner & Štěpánek, **sp. nov.**

五台山蒲公英 wu tai shan pu gong ying

Taraxacum platypecidum Diels var. *angustibracteatum* Y. Ling.

Type: China. Hebei: "Kungtaoling, Hsiaowutaishan [小五台山], alpine meadow," 2500 m, 11 Jul 1934, *C. W. Wang 61630* (holotype, PE, no. det. 18637).

Paratypes: China. Hebei: "Hsiaowutaishan [小五台山], T'ang-ch'ih-sze," 1600 m, 19 Jul 1931, *T. P. Wang 925*, type of *Taraxacum platypecidum* var. *angustibracteatum* (PE, no. det. 18648); "Hsiaowutaishan [小五台山]," 3000 m, 6 Aug 1934, *C. W. Wang 62098* (PE, no. det. 18649); 5 Jul 1931, *T. P. Wang 532* (PE, no. det. 18639); *Wu & Yang 36916* (PE, no. det. 18643); *Wu & Yang 36909* (PE, no. det. 18640); *Wu & Yang 37634* (PE, no. det. 18638); *Anonymous 5087* (PE, no. det. 18630, 18631); *Anonymous 5088* (PE, no. det. 18632); *Anonymous 5325* (PE, no. det. 18634, 18633); *Anonymous 1752* (PE, no. det. 18636).

Plantae sexuales, habitu toto floribusque ad Taraxacum platypecidum Diels *valde accedentes, sed ab eo differunt foliis argutius divisis lobis lateralibus approximatis, phyllariis involucralibus exterioribus tantum (9 vel)10 ad 13(vel 14), ovato-lanceolatis vel lineari-lanceolatis, minoribus (plerumque 6.5–8.5 mm longis et 2–3 mm latis), granis pollinis aequimagnis,*

acheniis griseo-stramineis 4.5–4.9 mm longis pyramide subconica solum 0.6–0.8 mm longa.

Herbs (4–)12–20(–30) cm tall. Petiole green to purplish, often 3–6 cm, narrow, sparsely arachnoid; leaf blade mid-green, of variable shape, oblanceolate to narrowly oblanceolate, (2–)5–10(–15) × 1.5–3.5 cm, arachnoid and usually densely so, margin almost undivided and sinuate-dentate or more often deeply pinnatisect; lateral lobes (3–)5–9(–11) pairs, narrowly triangular to narrowly deltoid, ± approximate, ± patent, sometimes subrecurved, margin entire or rarely ± dentate and on distal side usually sigmoid; interlobes short, narrow; terminal lobe triangular to 3-partite, terminal segment narrowly triangular and apex acute to subobtuse. Scapes brownish green or purplish, overtopping leaves, arachnoid but lanate below capitulum. Capitulum (1–)1.5–2.5(–3.5) cm wide. Involucre 0.8–1.2 cm wide, base broadly obconic to obconic-rounded. Outer phyllaries (9 or)10–13(or 14), ± imbricate, ovate-lanceolate, narrowly lanceolate, or rarely ovate, outermost ones (5–)6.5–8.5(–10.5) × (1.3–)2–3(–3.5) mm and 3/5–4/5 as long as inner ones, ± appressed, sometimes arachnoid on abaxial surface near apex, middle part black and usually 0.7–1.1 mm wide, with a sharp transition into a broad white to whitish pink border, margin densely ciliate, apex ± flat or blackish callose. Ligules yellow, not striped or outside very faintly striped grayish; inner ligules with yellow or pinkish apical teeth; floret tube ± glabrous. Stigmas variable in color, usually yellow, dirty yellow, or greenish yellow but sometimes blackish green (within population). Anthers polliniferous; pollen grains regular in size. Achene (not fully ripe) grayish straw-colored brown, (4–)4.5–4.9 × 0.9–1 mm; body spinulose in upper ca. 1/3, subgradually narrowing into a subconic 0.6–0.8 mm cone, spinules minute and thin. Pappus white, 5–6 mm. Fl. summer. Sexual.

• Subalpine meadows; 1400–3000 m. Hebei (Xiaowutai Shan).

Taraxacum peccator is a sexual relative of agamospermous plants of the *T. platypecidum* group, probably confined to Hebei (Xiaowutai Shan). It deviates from *T. platypecidum* in the type of reproduction, deeply dissected leaves with dense approximate segments, lower number of outer phyllaries, smaller outer phyllaries, and very different achenes.

24. Taraxacum forrestii Soest, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 265. 1961.

网苞蒲公英 wang bao pu gong ying

Herbs to 10 cm tall. Petiole short, narrow; leaf blade mid-green, broadly oblanceolate, 5–6 × 1.2–2.5 cm, arachnoid, pinnatisect; lateral lobes 5 or 6 approximate pairs, narrowly triangular, ± patent, distal margin and/or interlobes with a large acute tooth or lobule, apex acute to acuminate; terminal lobe often 3-partite with segment apices acute. Scapes ± equaling leaves, arachnoid and densely so below capitulum. Capitulum 3.5–4 cm wide. Involucre 1.4–1.8 cm wide, base broadly rounded. Outer phyllaries 13–17, ± imbricate, ovate to ovate-lanceolate but innermost ones narrowly lanceolate, outermost ones 6–8(–11) × (2–)3.5–4.5 mm and ca. 1/2 as long as inner ones, appressed, median part blackish green to black, usually ± distinctly veined, border distinct, white or apically suffused pinkish, and ca. 1 mm wide, margin subglabrous to ciliate and blackish purple corniculate below apex; inner phyllaries 1.6–1.8 cm. Ligules yellow; outer ligules outside dark striped. Stigmas black. Anthers polliniferous; pollen grains irregular in size. Achene unknown. Pappus white. Fl. summer. Agamosperm.

• Alpine stony grasslands; 4200–4800 m. SE Xizang, NW Yunnan.

25. Taraxacum grypodon Dahlstedt, Acta Horti Gothob. 2: 157. 1926.

反苞蒲公英 fan bao pu gong ying

Herbs 20–30 cm tall, robust. Petiole ± pale green to purplish, narrow; leaf blade pale green, oblanceolate to narrowly oblanceolate, 12–15 × 2–2.5 cm, sparsely arachnoid, undivided or lobed; lateral lobes broadly triangular, remote, recurved-hamate; interlobes long, margin subentire or with 1–3 triangular teeth; terminal lobe elongated, apex subobtuse. Scapes brownish green, overtopping leaves, apically yellowish arachnoid. Capitulum 5–5.5 cm wide. Involucre 1.6–1.8 cm wide, base broadly rounded Outer phyllaries 20–24, ovate-lanceolate, outermost ones 13–16 × 4.5–5.5 mm and 3/5–4/5 as long as inner ones, unequal, ± patent to erect-patent, middle part greenish at base and apically blackish green, distinctly veined, border white, membranous, and ca. 0.2 mm wide but apically pink and ca. 0.5 mm wide, margin sparsely ciliate, apex blackish green, blunt, and corniculate below tip; inner phyllaries to 2 cm. Ligules yellow; outer ligules outside striped grayish; inner ligules with blackish apical teeth; floret tube sparsely puberulent. Stigmas blackish green. Anthers polliniferous; pollen grains slightly irregular in size. Achene brown, 4.5–4.8 × ca. 1.2 mm; body densely spinulose and squamulose above, ± smooth to tuberculate below, ± abruptly narrowing into a subcylindric ca. 1 mm cone; beak 8–9 mm. Pappus yellowish white, ca. 9 mm. Fl. summer. Probably sexual.

• Subalpine meadows; 3100–3300 m. Qinghai, N Sichuan.

Taraxacum grypodon was also reported from E Xizang (FRPS 80(2): 42. 1999; Higher Pl. China 11: 777. 2005), but a revision of the material is required.

As there are no ripe achenes in the authentic material of *Taraxacum grypodon*, their description is compiled on the basis of *Anonymous 8486* (PE, no. det. 22956), from Qinghai.

26. Taraxacum lanigerum Soest, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 269. 1961.

多毛蒲公英 duo mao pu gong ying

Herbs (10–)15–20 cm tall, robust. Petiole pale green to grayish purple, unwinged; leaf blade mid-green to slightly brownish green and sometimes with small dark spots, oblanceolate to ± elliptic, (5–)8–15 × 1.5–4 cm, sparsely to densely arachnoid, pinnatipartite to pinnatisect but sometimes undivided, midvein proximally brownish purple, margin dentate, teeth recurved; lateral lobes 4 or 5(–8) pairs, triangular to narrowly falcate, recurved, margin entire or on distal side with a single tooth, apex subacute with tip often elongated into a very narrow

variously pointing terminal part; interlobes short and broad, margin ± entire, dentate, or lobulate; terminal lobe triangular to narrowly triangular, margin entire or sparsely denticulate and sometimes distally with a distinct incision, apex acute to subacute, basal segments recurved to subpatent. Scapes brownish green, subequaling leaves, apically densely whitish brown arachnoid but sometimes glabrescent. Capitulum 3.5–5 cm wide. Involucre 0.7–1.2 cm wide, base broadly rounded. Outer phyllaries 17–25, blackish green to olivaceous green, ± not imbricate, lanceolate to narrowly lanceolate, outermost ones 7–13 × 3–5 mm and 2/3–4/5 as long as inner ones, loosely appressed to erect, unbordered to very narrowly paler bordered, margin sparsely to densely ciliate or subglabrous, distally often suffused brownish purple; inner phyllaries 1.3–1.7 cm. Ligules yellow; outer ligules flat, outside striped gray to grayish purple; floret tube puberulent. Stigmas blackish green. Anthers polliniferous; pollen grains regular in size. Achene variable, initially straw-colored brown, later brown, grayish brown, or almost black, 3.5–5 × 1.2–1.4 mm; body densely spinulose and squamulose above, ± smooth to tuberculate below, ± abruptly narrowing into a conic 0.4–1.1 mm cone; beak 6–10 mm. Pappus brownish dirty white, 6–7 mm. Fl. summer. Sexual.

• Subalpine to alpine meadows and grasslands; 3500–4200 m. Sichuan.

Taraxacum lanigerum was also reported from Xizang (FRPS 80(2): 40. 1999; Higher Pl. China 11: 777. 2005), but the material under this name in herbarium collections belongs to other taxa.

Taraxacum lanigerum is a variable sexual species. Some plants may be interpreted as a product of hybridization or introgression with *T. lugubre*.

27. Taraxacum lugubre Dahlstedt, Acta Horti Gothob. 2: 148. 1926.

川甘蒲公英 chuan gan pu gong ying

Herbs 10–18 cm tall, medium-sized. Petiole pale green to purple, unwinged; leaf blade vivid green with midvein pale green or proximally pinkish, narrowly oblanceolate to ± narrowly elliptic, 10–14 × 1.5–3 cm, sparsely arachnoid to ± glabrous, pinnatipartite to pinnatisect but sometimes undivided, margin remotely dentate; lateral lobes 3–5(or 6) pairs, triangular to narrowly triangular, patent to subrecurved, margin ± entire, apex subobtuse to obtuse; interlobes to 1 cm wide, margin ± entire or with a single tooth; terminal lobe triangular to helmet-shaped, margin entire, apex subacute. Scapes pale brownish green, subequaling leaves, sparsely arachnoid but sometimes apically densely arachnoid. Capitulum 3.5–4 cm wide. Involucre 1.2–1.5 cm wide, base broadly rounded to truncate. Outer phyllaries (11–)13–19, ± imbricate, ovate-lanceolate to broadly ovate, outermost ones 6–11 × 4–7 mm and 1/2–3/4 as long as inner ones, loosely appressed, venation not distinct, abaxially glabrous or sparsely arachnoid, middle part blackish green to dark green but blackish or black when dry, with a greenish white 0.1–0.3(–2.4) mm wide border or rarely unbordered, margin sparsely to densely ciliate, apex ± callose; inner phyllaries blackish green, 1.4–1.6 cm, abaxially sometimes arachnoid. Ligules yellow; outer ligules flat, 1.8–3.6 mm wide, outside striped grayish or dark gray; floret tube puberulent. Stigmas blackish. Anthers polliniferous; pollen grains regular in size. Achene variable, straw-colored brown, dark brown, grayish brown, or almost black, 3.6–5.6 × 1.5–2 mm; body spinulose above, uppermost part squamulose, abruptly narrowing into a conic 0.4–0.7(–0.9) mm cone; beak 6.5–9 mm. Pappus brownish to yellowish white, 6–7.5 mm. Fl. summer. Sexual.

• Alpine meadows and grasslands, open-ground slopes; 4000–4600 m. Sichuan.

Taraxacum lugubre was also reported from Gansu, Qinghai, and Xizang (FRPS 80(2): 40. 1999; Higher Pl. China 11: 777. 2005), but a revision of the material is required.

28. Taraxacum pseudonutans Kirschner & Štěpánek, **sp. nov.**

假垂穗蒲公英 jia chui sui pu gong ying

Type: China. Ningxia: "Haiyuan County [海原县], Jiangyang Qu," 7 Sep 1956, *Yellow River Expedition 5240* (holotype, PE, no. det. 24853).

Paratypes: China. Gansu: "Near Mawu [马坞], Minhsien [岷县], on weedy summit," 2600 m, 27 Jun 1938, *T. P. Wang, 4613* (PE, no. det. 24832). Ningxia: "Haiyuan County [海原县], Nanhua Mt. [南花山]," 10 Jul 1956, *Yellow River Expedition 5307* (PE, no. det. 24854); "Jingyuan County [泾源县]," 18 Jul 1956, *Yellow River Expedition 5419* (PE, no. det. 24852); "Lung-ti-kuo, in marg. viae" [probably Longde Xian 隆德县], ca. 2600 m, 5 Jul 1930, *D. Hummel, S. Hedin Expedition 3933c* (S, no. det. 23066 et no. det. 23030).

Plantae agamospermae, in comparatione Taraxaci nutantis Dahlstedt (*e* Taraxaco sect. Biennibus R. Doll) *foliis argutius regulariusve divisis, calanthidio minore ca. 4.5 cm diametro, phyllariis involucralibus exterioribus numero restricto fere 15 ad 21, brevioribus latioribusque, 1.2–1.5 cm longis et 3–4.5 mm latis, granis pollinis diametro imparibus.*

Herbs 20–40 cm tall, usually robust. Petiole ± purplish, 5–13 cm, winged; leaf blade probably light green, narrowly oblanceolate to linear-lanceolate, 10–30 × 2.5–3.5 cm, sparsely arachnoid with long hairs, undivided but margin regularly dentate or pinnatilobed; lateral lobes 3 or 4 pairs, lobulelike and broadly to narrowly triangular, to 1 cm, remote, patent, margin entire; interlobes long, broad, margin irregularly sparsely dentate; terminal lobe narrowly triangular, large, apex subacute, basal segments narrowly triangular and patent. Scapes brownish green, overtopping leaves, very densely arachnoid (almost tomentose), with thickened pale brownish hair base near capitulum. Capitulum ca. 4.5 cm wide. Involucre 1–1.2 cm wide, base flat-rounded. Outer phyllaries (13–)15–21, not imbricate, narrowly lanceolate to linear-lanceolate, 12–15 × 3–4.5 mm, ± erect, middle part dark olivaceous green and probably slightly pruinose, with gradual transition into pale green 0.3–1 mm wide border, margin remotely denticulate and long ciliate, apex blackish green corniculate; inner phyllaries 1.7–1.8 cm. Ligules light brownish orange, becoming brownish violet when dry; outer ligules outside striped dark gray; floret tube puberulent. Stigmas blackish purple, originally probably light brownish gray. Anthers polliniferous (sometimes sparsely);

pollen grains irregular in size. Achene (only not fully ripe ones available) light brown, 4.7–5 × 1.2–1.6 mm; body ± densely spinulose and squamulose above, spinules short, obtuse, and ± tuberculate to smooth below, ± subgradually narrowing into a conic 0.7–1 mm cone; beak probably long. Pappus dirty white. Fl. summer. Agamosperm.

• Mountain grasslands, pastures, along paths; 2300–2800 m. S Gansu, Ningxia.

6. Taraxacum sect. **Tibetana** Soest, Wentia 10: 41. 1963.

西藏蒲公英组 xi zang pu gong ying zu

Plants usually small, delicate. Petiole ± unwinged; leaf blade usually with recurved lateral segments, their distal margin often sigmoid. Outer phyllaries (5–)9–13(–22), black or black green, not imbricate or ± imbricate, ovate-lanceolate, lanceolate, or sometimes linear-lanceolate, appressed, unbordered or less often with a pale border, apex flat or callose. Stigmas usually black or blackish green, rarely yellow. Achene usually 4–5.5 × (1–)1.2–1.4 mm; body most often densely shortly spinulose or squamulose above, sometimes with longer erect spinules, gradually to subabruptly narrowing into a conic to thickly subcylindric 0.6–1.7 mm cone; beak 5–10 mm. Pappus white or yellowish, 5–8 mm. Sexual or agamospermous.

About 25 species: highest diversity in S Xizang, N Yunnan, and W Sichuan; 17 species (15 endemic) in China.

In China this section contains sexual species with wider variation ranges (i.e., *Taraxacum apargiiforme* and *T. eriopodum*) and an array of agamospermous species, which are usually known from only rather scanty material.

1a. Pollen absent.
2a. Stigmas yellow ..... 32. *T. atrocarpum*
2b. Stigmas blackish to dark grayish green.
3a. Outer phyllaries unbordered ..... 31. *T. suberiopodum*
3b. Outer phyllaries with a distinct whitish or whitish green 0.2–0.7 mm wide border.
4a. Outer phyllaries 19–22, border 0.5–0.7 mm wide ..... 42. *T. delicatum*
4b. Outer phyllaries 10 or 11, border ca. 0.2 mm wide ..... 43. *T. centrasiaticum*
1b. Pollen present.
5a. Pollen grains regular in size.
6a. Outer phyllaries 15–18; involucre base broadly rounded; achene cone 1–1.5 mm ..... 29. *T. eriopodum*
6b. Outer phyllaries 11–13; involucre base obconic; achene cone 0.6–0.7 mm ..... 37. *T. apargiiforme*
5b. Pollen grains irregular in size.
7a. Stigmas yellow ..... 33. *T. mutatum*
7b. Stigmas blackish to dark grayish green.
8a. Outer phyllaries with a distinct whitish border.
9a. Leaf lateral lobes in 5–9 pairs; outer phyllaries not imbricate ..... 35. *T. subcoronatum*
9b. Leaf lateral lobes in 2–4 pairs; outer phyllaries ± imbricate.
10a. Outer phyllary border 0.3–0.4 mm wide; leaf lateral lobes not remote ..... 40. *T. chionophilum*
10b. Outer phyllary border ca. 0.2 mm wide; leaf lateral lobes remote ..... 43. *T. centrasiaticum*
8b. Outer phyllaries unbordered or with an indistinct paler border to 0.1 mm wide.
11a. Outer phyllaries usually 7–9 mm ..... 30. *T. tibetanum*
11b. Outer phyllaries usually 4–7 mm.
12a. Outer phyllaries densely ciliate.
13a. Achene dark grayish olivaceous, light straw-colored brown when unripe; cone conic ..... 39. *T. apargia*
13b. Achene reddish brown to dark reddish brown, ochraceous reddish when unripe; cone cylindric to subcylindric.
14a. Achene 3.9–4.2 mm ..... 44. *T. austrotibetanum*
14b. Achene 4.3–5.1 mm ..... 45. *T. suavissimum*
12b. Outer phyllaries ± glabrous or very sparsely ciliate.
15a. Leaves undivided but margin sometimes remotely minutely denticulate ..... 41. *T. staticifolium*
15b. Leaves pinnatilobed, pinnatisect, or at least lobulate.
16a. Outer phyllaries 5–9; involucre 5–7 mm wide; leaf terminal lobe elongated ..... 38. *T. mastigophyllum*
16b. Outer phyllaries 10–14; involucre 8–10 mm wide; leaf terminal lobe not elongated.
17a. Ligules deep yellow; outer phyllaries 2–3 mm wide ..... 34. *T. przevalskii*
17b. Ligules pale yellow; outer phyllaries 1.5–2.2 mm wide ..... 36. *T. roseoflavescens*

29. Taraxacum eriopodum (D. Don) Candolle, Prodr. 7: 147. 1838.

毛柄蒲公英 mao bing pu gong ying

Leontodon eriopodus D. Don, Mem. Wern. Nat. Hist. Soc. 3: 413. 1821 [*"eriopodum"*].

Herbs 6–13(–20) cm tall, usually small, base whitish to brownish arachnoid. Petiole green, unwinged; leaf blade mid-green to bright green, oblanceolate to broadly oblanceolate, 8–10(–12) × 1.5–2.5 cm, whitish brown arachnoid on outer leaves but ± subglabrous on middle ones, usually lobed or rarely undivided; lateral lobes (when present) 3 or 4 short to moderately long pairs, to 1 × 1 cm, ± patent to recurved, distal margin minutely dentate, apex obtuse; interlobes broad, margin ± entire; terminal lobe rounded-obtuse, 1.5–3 cm, usually broader than lateral lobes, margin entire. Scapes brownish green, ± overtopping leaves, brownish arachnoid. Capitulum 2.5–3.5 cm wide. Involucre 1.1–1.4 cm wide, base broadly rounded. Outer phyllaries 15–18, blackish green and suffused red (black when dry), subimbricate, ± lanceolate, outermost ones (5.5–)6.5–7.5 × 2–2.5(–3) mm and ca. 1/2 as long as inner ones, appressed to erect, without a paler border, flat to minutely corniculate below apex; inner phyllaries 1.2–1.4 cm, flat to corniculate near apex. Ligules yellow, flat; outer ligules outside striped greenish gray; inner ligules with gray or pink apical teeth. Stigmas dark (black when dry). Anthers polliniferous; pollen grains regular in size. Achene deep red or pale straw-colored brown, 4.5–5 × 1.1–1.3 mm; body ± densely spinulose above, ± gradually narrowing into a conic (1–)1.2–1.4(–1.5) mm cone with thick base, spinules conic, short, and acute; beak ca. 6 mm, not thin. Pappus yellowish, 6–6.5 mm. Fl. late summer or autumn. Sexual.

Mountain pastures, along paths, grassy slopes; 2000–4500 m. Xizang, NW Yunnan [Bhutan, India, Nepal].

For the explanation of the authorship and nomenclature, see Kirschner and Štěpánek (Edinburgh J. Bot. 53: 217–219. 1996). Reports of *Taraxacum eriopodum* from Qinghai and Sichuan (FRPS 80(2): 55. 1999; Higher Pl. China 11: 782. 2005) require additional study.

30. Taraxacum tibetanum Handel-Mazzetti, Monogr. Taraxacum, 67. 1907.

藏蒲公英 zang pu gong ying

Herbs 5–15(–20) cm tall. Petiole ± green or purplish, base sparsely arachnoid; leaf blade mid-green to deep green, narrowly oblong-lanceolate in outline, 4–10(–13) × 0.8–1.2(–1.6) cm, glabrous, pinnatilobed to pinnatisect; lateral lobes 2–4 pairs, broadly triangular with base convex on distal side, approximate, ± recurved, distal margin entire, dentate, or sparsely lobulate, apex narrowed into a ± subpatent to strongly recurved lobulelike segment; interlobes short, broad; terminal lobe ± narrowly triangular-sagittate, margin entire or sparsely denticulate, apex subobtuse. Scapes brownish green, ± overtopping leaves, subglabrous and only sparsely arachnoid below capitulum. Capitulum ca. 4 cm wide. Involucre 1.1–1.4 cm wide, base broadly rounded. Outer phyllaries 10–13, ± black, subimbricate, oblong-ovate (often widest above middle), outermost ones (4–)7–9 × 2.7–3.1 mm and 1/2–3/4 as long as inner ones, venation not distinct, unbordered, ± glabrous to sparsely ciliate, ± flat to minutely corniculate below apex; inner phyllaries blackish green, 13–16 × 2–2.5 mm, apex ± flat or callose. Ligules yellow, outside striped dark gray; inner ligules with blackish apical teeth. Stigmas ± black. Anthers polliniferous; pollen grains irregular in size. Achene dark grayish brown, 4.1–4.4 × 1.1–1.4 mm; body distally subsparsely spinulose, ± smooth below, ± subabruptly narrowing into a 0.6–0.9 mm cone broadly conic at base and subconic distally, spinules small, suberect, and acute; beak ca. 6 mm. Pappus yellowish white, 7–8 mm. Fl. summer. Agamosperm.

Alpine grasslands and pastures; 3800–5000 m. Sichuan, Xizang [India (Sikkim)].

Records of *Taraxacum tibetanum* from Qinghai and Yunnan (FRPS 80(2): 55. 1999; Higher Pl. China 11: 782. 2005) should be re-examined. The species was reported from W China and Bhutan (Soest, Wentia 10: 51. 1963), but material is outside the limits of *T. tibetanum*. The description is compiled on the basis of the lectotype (*J. D. Hooker s.n.*; K, no. det. 8781; a flowering capitulum of the lectotype specimen is depicted in Handel-Mazzetti, Monogr. Taraxacum, pl. II. 1907), the K and BM syntypes fully corresponding to the lectotype, and *H. Smith 10711:1* (PRA, UPS). The description of fruit is based on the latter specimen; achene description in the protologue was prepared using another original syntype (*J.-A. Soulié 574*, K) not conspecific with the lectotype and is disregarded here.

31. Taraxacum suberiopodum Soest, Acta Bot. Neerl. 19: 28. 1970.

滇北蒲公英 dian bei pu gong ying

Herbs 12–20 cm tall. Petiole pinkish, narrow to narrowly winged; leaf blade narrowly oblanceolate, 10–18 × 1.5–3.5 cm, ± glabrous, undivided and remotely lobulate to pinnatilobed; lateral lobes usually in 3 or 4 pairs, remote, to 1.2 cm, from a broad flat triangular base abruptly narrowed into lingulate lobule, recurved, often reduced to patent lobules; interlobes long, to 1.5 cm wide, margin entire or distal margin with 1 or 2 teeth; terminal lobe ± elongated triangular, 3–5 cm. Scapes brownish green, ± equaling leaves, subglabrous at base but densely whitish brown arachnoid below capitulum. Capitulum 2.5–3 cm wide. Involucre broadly rounded, 1–1.2 cm wide. Outer phyllaries 11–15, brownish green, ± not imbricate, ovate-lanceolate, outermost ones 5.5–6 × 2.5–3 mm and 1/3–1/2 as long as inner ones, loosely appressed, venation not distinct, unbordered, margin sparsely ciliate, flat below apex; inner phyllaries to 1.4 cm. Ligules yellow; outer ligules flat and outside striped grayish purple; inner ligules with long blackish purple teeth. Stigmas ± black. Anthers without pollen (so far as it can be observed in late blossom). Achene straw-colored brown, 5–5.5 mm; body apically densely spinulose, subabruptly narrowing into a subconic 1–1.3 mm cone, spinules short; beak ca. 1 cm. Pappus dirty white, ca. 7 mm. Fl. summer. Agamosperm.

• Mountain calcareous shrubby slopes; 3100–3400 m. NW Yunnan.

Taraxacum suberiopodum is known from the type material only.

32. Taraxacum atrocarpum Kirschner & Štěpánek, **sp. nov.**

黑果蒲公英 hei guo pu gong ying

Type: China. Yunnan: "South end of Zhongdian [中甸]

Plateau, ca. 45 km S of Zhongdian," 3200 m, Jun 1995, *A. J. Richards s.n.*, cultivated as JK 4039 (holotype, PRA; isotypes, PRA).

Paratype: China. Yunnan: *ibidem*, *A. J. Richards s.n.*, cultivated as JK 4040 (PRA).

Plantae agamospermae phyllariis involucralibus imbricatis numerosis, anguste ovatis usque anguste lanceolatis, arcte adpressis, pallide marginatis ciliatis ecorniculatis, ligulis luteis, stigmatibus luteis, antheris polline carentibus, acheniis nigricantibus crassis, corpore superne dense squamuloso, in pyramidem crassam 1.2–1.4 mm longam subabrupte transiente.

Herbs 10–18 cm tall. Petiole greenish or pink, narrow, sparsely arachnoid; leaf blade mid-green, narrowly oblong-oblanceolate, 5–11 × 1–2 cm, sparsely arachnoid, pinnatisect; lateral lobes 3–5 pairs, narrowly triangular, ± patent to subrecurved, proximal margin concave and entire, distal margin sigmoid or straight and often with 1–3 teeth, apex subacute; interlobes narrow, margin entire or denticulate; terminal lobe narrowly triangular, elongated. Scapes ± overtopping leaves, sparsely arachnoid. Capitulum 3–3.5 cm wide. Involucre 1–1.1 cm wide, base rounded. Outer phyllaries 15–19, blackish green, imbricate, narrowly ovate to narrowly lanceolate, often from an ovate basal part abruptly narrowing into a narrow apical part, outermost ones 4.5–7.5(–8.5) × 2.2–3 mm and ca. 2/5 as long as inner ones, appressed, dark middle part with a ± gradual transition into greenish white 0.3–0.7 mm wide border, margin ciliate, ± flat below apex; inner phyllaries 1.3–1.5 cm, apex flat. Ligules yellow; outer ligules ± flat, outside striped gray purplish; inner ligules with purplish apical teeth. Stigmas yellow. Anthers without pollen. Achene dark gray to blackish but straw-colored when unripe, 4.1–4.4 × 1.2–1.3 mm; body apically with ± dense squamules, subabruptly narrowing into a ± cylindric 1.2–1.4 × ca. 0.4 mm cone; beak 6–7 mm. Pappus yellowish white, 5–6 mm. Fl. summer. Agamosperm.

• Alpine meadows; ca. 3200 m. NW Yunnan.

Taraxacum atrocarpum is characterized by yellow stigmas, male sterility, and thick blackish achenes. The other known species without pollen in the section are *T. suberiopodum* and *T. delicatum*. The former has large (5–5.5 mm) achenes, beak ca. 1 cm, and black stigmas. The latter has more numerous outer phyllaries and black stigmas. *Taraxacum centrasiaticum*, in which the presence of pollen remains unknown, has only 10 or 11 outer phyllaries with glabrous margin, stigmas blackish green, and achenes with a short (0.7–0.8 mm) cone.

33. Taraxacum mutatum Kirschner & Štěpánek, **sp. nov.**

变化蒲公英 bian hua pu gong ying

Type: China. Yunnan: "Northern part of Zhongdian [中甸] Plateau, Napa Hai [纳帕海], road out of the plateau," 3400–3750 m, Jun 1995, *A. J. Richards s.n.*, cultivated as JK 4066 (holotype, PRA; isotypes, PRA).

Paratypes: China. Yunnan: *ibidem*, *A. J. Richards s.n.*, cultivated as JK 4065 (PRA); "South end of Zhongdian [中甸] Plateau, ca. 45 km S of Zhongdian," 3200 m, Jun 1995, *A. J. Richards s.n.*, cultivated as JK 4049 (PRA).

Plantae agamospermae foliis pinnatilobis vel pinnatisectis, lobis lateralibus late linearibus rectis patentibus, phyllariis involucralibus exterioribus paucis, lanceolatis usque linearilanceolatis, pallide viridibus usque atro-viridibus, pruinosis, stigmatibus luteis, acheniis subatris, magnis, sensim in pyramidem longam subcylindricam abeuntibus.

Herbs 12–20 cm tall. Petiole ± greenish, narrow, sparsely arachnoid; leaf blade light green to mid-green, linear-oblanceolate, 6–16 × 0.8–2 cm, sparsely arachnoid, pinnatilobed to pinnatisect; lateral lobes 3–6 pairs, ± linear-triangular to broadly linear, patent, margin entire or with a single tooth or lobule near base on distal side; interlobes 2–4 mm wide, with 1 or 2 teeth or lobules; terminal lobe narrowly triangular-lingulate, margin often with 1–3 patent teeth or segments, basal segments linear. Scapes greenish, overtopping leaves, sparsely arachnoid but sometimes subglabrous even below capitulum. Capitulum 2.5–3.5 cm wide. Involucre ± pruinose, 0.9–1.1 cm wide, base rounded. Outer phyllaries 9–11(–13), light green to blackish green and grayish pruinose, slightly imbricate, lanceolate to linear-lanceolate, outermost ones 4.5–6.5(–8) × (1.6–)1.9–2.3 mm and ca. 1/2 as long as inner ones, ± appressed to loosely so, with an evident whitish 0.2–0.3 mm wide border, margin ciliate, apex flat; inner phyllaries 1.2–1.5 cm, apex flat. Ligules yellow; outer ligules ± flat, outside striped grayish pink; inner ligules with reddish apical teeth. Stigmas yellow, sometimes with a few darker hairs. Anthers polliniferous; pollen grains irregular in size. Achene dark gray to blackish but straw-colored when unripe, 4.9–5.3 × 1–1.1 mm; body spinulose-squamulose in upper 1/2–2/3, ± gradually narrowing into a subcylindric 1.4–1.7 × ca. 0.3 mm cone; beak ca. 7 mm. Pappus yellowish white, 5–6 mm. Fl. summer. Agamosperm.

• Alpine meadows, grazed alpine grasslands; 3400–3800 m. NW Yunnan.

Taraxacum mutatum is characterized by outer phyllaries pruinose, not numerous, of narrow shape, and ciliate; stigmas yellow; leaves with straight and patent lateral lobes; and achenes large, squamulose, almost black, and with body gradually narrowing into an unusually long cone. Similar agamospermous polliniferous species of *T.* sect. *Tibetana* to be compared with *T. mutatum* are *T. tibetanum* (stigmas black, cone conic and to 0.9 mm), *T. przevalskii* (stigmas blackish, cone 0.4–0.6 mm), *T. subcoronatum* (achene body abruptly narrowing into cone), *T. apargia* (stigmas black, smaller achenes with cone to 0.9 mm), *T. centrasiaticum* (stigmas blackish green, small achenes, cone ca. 0.9 mm), and *T. suavissimum* (achenes dark reddish brown).

34. Taraxacum przevalskii Tzvelev, Novosti Sist. Vyssh. Rast. 24: 218. 1987.

藏北蒲公英 zang bei pu gong ying

Herbs 5–15 cm tall, subglabrous at base. Petiole purplish at base, narrow; leaf blade mid-green, narrowly oblanceolate, 4–10 × 0.8–1.5 cm, glabrous, shallowly to deeply lobed; lateral lobes 3 or 4 pairs, ± narrowly triangular, recurved, margin entire and on distal side often concave, apex elongated and subacute; terminal lobe triangular, often elongated with subpatent basal segments. Scapes brownish green, ± equaling leaves, glabrous. Capitulum 2–3 cm wide. Involucre blackish, 8–10 mm wide, base ± rounded. Outer phyllaries 10–12, blackish and slightly pruinose, subimbricate, ovate-lanceolate, outermost ones 4–6 × 2–3 mm and 1/5–1/3 as long as inner ones,

appressed, paler border absent, margin glabrous, apex ± flat; inner phyllaries blackish green, 1–1.3 cm. Ligules yellow; outer ligules flat, outside striped pale grayish. Stigmas blackish. Anthers polliniferous; pollen grains irregular in size. Achene (when unripe) brownish, 4–5 mm; body apically distinctly spinulose, subgradually narrowing into a 0.4–0.6 mm cone. Pappus white, ca. 6 mm. Fl. summer. Agamosperm.

• Alpine slopes; ca. 5000 m. Xizang.

Taraxacum przevalskii is known from the type specimens only.

35. Taraxacum subcoronatum Tzvelev, Novosti Sist. Vyssh. Rast. 24: 218. 1987.

亚冠蒲公英 ya guan pu gong ying

Herbs 8–20 cm tall, brownish hairy at base. Petiole purple, narrow; leaf blade mid-green, narrowly oblanceolate, 4–7 × 0.8–1 cm, sparsely arachnoid, shallowly to deeply lobed; lateral lobes 5–9 pairs, ± triangular-deltoid, ± patent to recurved, margin entire, apex acute; terminal lobe triangular, often elongated. Scapes ± overtopping leaves, base purple, apically brownish white arachnoid. Capitulum 2–3 cm wide. Involucre blackish green, 8–10 mm wide, base ± rounded. Outer phyllaries 11–16, blackish green, not imbricate, narrowly triangular to narrowly lanceolate, usually widest in middle, outermost ones 6–8 × 1.8–2.5 mm and ca. 1/2 as long as inner ones, appressed, with a whitish 0.1–0.2 mm wide border, margin almost not ciliate, apex whitish and ± flat; inner phyllaries blackish green, 1.3–1.5 cm. Ligules pale yellow; outer ligules flat, outside striped grayish pink. Stigmas blackish. Anthers polliniferous; pollen grains irregular in size. Achene (when unripe) pale brownish, 4–5 mm; body apically spinulose, abruptly narrowing into a cone. Pappus white, ca. 6 mm. Fl. summer. Agamosperm.

• Alpine slopes along rivers; ca. 4500 m. Qinghai or N Xizang.

Taraxacum subcoronatum is known from the type specimen only, and it is uncertain if this collection is from N Xizang or Qinghai, although FRPS (80(2): 74. 1999) gives the locality as N Xizang.

36. Taraxacum roseoflavescens Tzvelev, Novosti Sist. Vyssh. Rast. 24: 217. 1987.

二色蒲公英 er se pu gong ying

Herbs 5–12 cm tall, slender. Petiole pink or pale green, narrow; leaf blade mid-green, linear-oblanceolate, usually 5–7 × 0.6–0.9 cm, subglabrous, margin subentire to shallowly lobed; lateral segments in 3 or 4 pairs, recurved, distal margin sinuate and downward pointing; terminal lobe often elongated. Scapes pale brownish green, slightly overtopping or equaling leaves, subglabrous or arachnoid below capitulum. Capitulum 2–3 cm wide. Involucre blackish, 8–10 mm wide, base rounded. Outer phyllaries 10–14, blackish green, ± not imbricate, lanceolate to narrowly lanceolate, outermost ones 5–6 × 1.5–2.2 mm and 2/5–1/2 as long as inner ones, appressed, ± glabrous, paler border absent, apex flat or corniculate; inner phyllaries blackish green, 1.2–1.4 cm. Ligules pale yellow; outer ligules flat, outside striped (grayish) pink; inner ligules with blackish red 0.5–1 mm teeth. Stigmas dark greenish. Anthers polliniferous; pollen grains irregular in size. Achene (only unripe available) spinulose apically. Pappus white, ca. 6 mm. Fl. summer. Agamosperm.

• Moist places, near streams; ca. 4300 m. Qinghai.

Taraxacum roseoflavescens is known from the type specimens only.

37. Taraxacum apargiiforme Dahlstedt, Acta Horti Gothob. 2: 178. 1926.

天全蒲公英 tian quan pu gong ying

Type: China. Sichuan: "Sze-ch'uan bor.-occid.: Tsipula, fjälläng i passet," ca. 4000 m, 5 Aug 1922, *H. Smith, Pl. Sin. 4173* (**lectotype, designated here**, UPS; isolectotype, S).

Taraxacum apargiiforme f. *integrifolium* Dahlstedt.

Herbs to 15 cm tall, slender. Petiole pale green or purplish, narrow; leaf blade narrowly oblanceolate, ± glabrous, margin undivided and remotely dentate or pinnatisect; lateral lobes in 4 or 5 pairs, approximate, ± recurved, distal margin sigmoid, apex with an elongated tip; interlobes short, margin entire; terminal lobe ± triangular, with a lingulate tip. Scapes brownish green, overtopping leaves, glabrous. Capitulum ca. 3 cm wide. Involucre obconic, 5–7 mm wide. Outer phyllaries 11–13, blackish green, ± not imbricate, ovate to lanceolate, outermost ones 4.2–6.5 × 1.3–2 mm and 1/3–1/2 as long as inner ones, loosely appressed, venation not visible, unbordered, margin whitish ciliate, flat below apex; inner phyllaries 1–1.1 cm. Ligules (?pale) yellow; outer ligules flat and striped pinkish outside; inner ligules with blackish purple teeth. Stigmas black. Anthers polliniferous; pollen grains regular in size. Achene (mature unknown) probably straw-colored brown, ca. 4 mm, apically sparsely spinulose and subabruptly narrowing into a conic 0.6–0.7 mm cone; beak at least 5 mm. Pappus white, ca. 5 mm. Fl. summer. Sexual.

• Alpine meadows; ca. 4000 m. Sichuan.

Reports of *Taraxacum apargiiforme* from Xizang (FRPS 80(2): 60. 1999; Higher Pl. China 11: 783. 2005) are uncertain.

The original material of *Taraxacum apargiiforme* listed by Dahlstedt in the protologue is not homogeneous, and we exclude *H. Smith 4196*. The figure of the achene in Dahlstedt (loc. cit.: pl. III: 21) is excluded as *H. Smith 4196* does not belong to this species and is agamospermous, and the figure is based on a damaged immature achene. Dahlstedt also mistakenly listed *H. Smith 4171*, not at all present in the original material (he himself gave the correct number, *H. Smith 4173*, in the caption to fig. 14, c, d).

38. Taraxacum mastigophyllum Kirschner & Štěpánek, **sp. nov.**

剑叶蒲公英 jian ye pu gong ying

Type: China. Sichuan: "Sikang [西康], Kangting [康定] (Tachienlu) distr., Tapaoshan, east range," 4100 m, 24 Aug 1934, *H. Smith 11547* (holotype, UPS).

Paratypes: China. Sichuan: *H. Smith 11243* (UPS); *H. Smith 10711:3* (UPS).

Plantae graciles, foliis angustis lobo terminali elongato, scapis glabris, involucris aterrimis paucisquamosis glaberrimis, ligulis apice conspicue dentatis, stigmatibus atris, an-

theris polliniferis polline irregulari, acheniis obscure griseo-brunneis, magnis, grosse spinulosis.

Herbs 7–14 cm tall. Petiole long, narrow; leaf blade mid-green, linear-oblanceolate, 6–9(–12) × 0.5–0.9(–1.1) cm, ± glabrous, margin remotely lobulate or shallowly lobed; lateral segments in 1 or 2(or 3) pairs, subpatent to recurved; terminal lobe elongated, apex subobtuse. Scapes pale brownish green, slightly overtopping leaves, glabrous. Capitulum 3–3.5 cm wide. Involucre blackish, 5–7 mm wide, base narrowly rounded to slightly obconic. Outer phyllaries 5–9, black but often with a reddish apex, subimbricate, ovate-lanceolate to narrowly lanceolate, outermost ones 4.2–6 × 1.8–2.6 mm and 1/3–2/5 as long as inner ones, ± appressed, glabrous, paler border absent, apex flat; inner phyllaries blackish, 1.1–1.4 cm. Ligules (?pale) yellow; outer ligules flat, outside striped grayish pink; inner ligules with (probably) dark blackish 0.5–1 mm teeth. Stigmas blackish. Anthers polliniferous; pollen grains irregular in size. Achene dark brownish gray but reddish ochraceous when unripe, 5.2–5.3 × 1.1–1.2 mm; body subsparsely spinulose and sometimes also apically squamulose, apically subabruptly narrowing into a conic 0.7–0.8 mm cone, spinules subsparse, to 0.7 mm, thin, erect, and acute; beak (when unripe) more than 4 mm. Pappus white, 5.5–6.5 mm. Fl. late summer. Agamosperm.

• Alpine meadows; 4100–4500 m. W Sichuan.

Among members of this section, *Taraxacum mastigophyllum* is distinct in having glabrous scapes and leaves, outer phyllaries very few and glabrous (not ciliate), leaves narrow with an elongated terminal lobe (the leaf shape resembles a common one in *T.* sect. *Emodensia*), and achenes with unusually long sparse spinules above.

39. Taraxacum apargia Kirschner & Štěpánek, **sp. nov.**

四川蒲公英 si chuan pu gong ying

Type: China. Sichuan: "Sikang [西康], Kangting [康定] (Tachienlu) distr., Yülingkong, Gomba-La, in prato herboso futicoso," 3700 m, 22 Jul 1934, *H. Smith 11950* (holotype, UPS; isotype, PRA).

Paratypes: China. Sichuan: *H. Smith 12508* (CAS, PRA, UPS); *H. Smith 11561* (UPS).

Plantae phyllariis involucralibus numerosis, subimbricatis, atro-viridibus, marginibus ciliatis, apicibus ecorniculatis, involucro basi rotundato, ligulis apice distincte denticulatis, stigmatibus aterrimis, polline irregulari, acheniis saturate griseo-olivaceis, pyramide conica brevi insignes.

Herbs 12–21 cm tall. Petiole purplish, narrow; leaf blade mid-green, narrowly oblanceolate, 9–12 × 1.3–2(–2.5) cm, abaxially glabrous or sparsely hairy on midvein, margin subentire to deeply lobed; lateral lobes 3–6 pairs, narrowly triangular, ± patent to recurved, margin entire or on distal side with 1 tooth, apex acute; terminal lobe triangular-sagittate. Scapes ± overtopping leaves, apically sparsely arachnoid. Capitulum 3–4.5 cm wide. Involucre blackish, 8–10 mm wide, base rounded. Outer phyllaries 11–15(–17), blackish green, subimbricate, narrowly lanceolate, outermost ones 4.3–7.5 × 1.3–1.8 mm and 1/3–1/5 as long as inner ones, appressed to recurved at apex, border paler and less than 0.1 mm wide, margin ciliate to densely ciliate; inner phyllaries blackish, 1.1–1.4 cm. Ligules (?pale) yellow; outer ligules flat, outside striped greenish pink; inner ligules with dark blackish 0.5–0.7 mm teeth. Stigmas black. Anthers polliniferous; pollen grains irregular in size. Achene dark grayish olivaceous but straw-colored when unripe, 4.2–4.5 × 1–1.2 mm; body apically with distinct erect spinules and squamules, subgradually narrowing into a conic 0.7–0.9 mm cone; beak 6–6.5 mm. Pappus slightly yellowish white, 5–6 mm. Fl. summer. Agamosperm.

• Alpine meadows; 3700–4200 m. W Sichuan.

Taraxacum apargia is similar to *T. apargiiforme* but differs in having involucre rounded at base, outer phyllaries usually with a very narrow paler border, achenes ± densely covered with distinct spinules and squamules above, pollen irregular, and agamospermous reproduction.

40. Taraxacum chionophilum Dahlstedt, Acta Horti Gothob. 2: 177. 1926.

川西蒲公英 chuan xi pu gong ying

Herbs 7–9 cm tall, delicate. Petiole greenish or pinkish, narrow; leaf blade deep green, oblanceolate, 2.5–5 × 1–1.5 cm, subglabrous, margin shallowly pinnatilobed; lateral lobes 3 or 4 pairs, narrowly triangular, ca. 5 mm, approximate, patent, distal margin entire or with 1 minute tooth; interlobes short, margin sometimes with 1 tooth or lobule; terminal lobe ± broadly triangular. Scapes slightly overtopping leaves, densely arachnoid below capitulum. Capitulum 2–3 cm wide. Involucre ± blackish green, 5–7 mm wide, base narrowly rounded. Outer phyllaries 9–13, ± black, linear-lanceolate to narrowly lanceolate, outermost ones 4.8–5.8(–8) × 1.3–1.8 mm, unequal, and ca. 1/3(–2/3) as long as inner ones, appressed to apically recurved, with a whitish indistinct border becoming pinkish and 0.3–0.4 mm wide near apex, margin densely long ciliate, apex flat and not corniculate; inner phyllaries blackish green, 1.1–1.3 cm. Ligules (?pale) yellow; outer ligules flat, outside faintly striped greenish pink; inner ligules with yellowish apical teeth. Stigmas black. Anthers polliniferous; pollen grains irregular in size. Achene unknown. Agamosperm.

• Subnival places; ca. 4600 m. NW Sichuan.

The scarcity of material (absence of achenes and broad white border to outer phyllaries) make the position of *Taraxacum chionophilum* in *T.* sect. *Tibetana* rather uncertain.

41. Taraxacum staticifolium Soest, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 272. 1961.

柳叶蒲公英 liu ye pu gong ying

Herbs ca. 12 cm tall, slender. Petiole pale green to pinkish, narrow; leaf blade mid-green, linear-oblanceolate, 4–6 × 0.5–0.6 cm, ± glabrous, margin ± entire but sometimes remotely minutely denticulate, apex subobtuse. Scapes pale green, overtopping leaves, arachnoid below capitulum. Capitulum ca. 2.5 cm wide. Involucre blackish green, ca. 7 mm wide, base ± rounded. Outer phyllaries 9 or 10, ± black, ± not imbricate, lanceolate to narrowly lanceolate, outermost ones 4–6 × ca. 1.2 mm and 1/3–1/2 as long as inner ones, ± loosely appressed, paler border absent, margin sparsely ciliate, apex flat; inner phyllaries blackish, ca. 1 cm. Ligules yellow; outer ligules flat, outside striped dark gray-purple. Stigmas dark green to blackish.

Anthers polliniferous; pollen grains irregular in size. Achene unknown. Fl. summer. Agamosperm.

• Wet alpine sites; ca. 4200 m. S Xizang (Gyangzê).

Taraxacum staticifolium is known from a single type plant, which was mistakenly reported to have pollen absent.

42. Taraxacum delicatum Kirschner & Štěpánek, **sp. nov.**

柔弱蒲公英 rou ruo pu gong ying

Type: China. Gansu: "Kung-tze-tagga in valle Zaluk," ca. 3000 m, 20 Jul 1930, *D. Hummel, Exped. S. Hedin 4191* (holotype, S; isotype, S).

Paratypes: China. Qinghai: "Tongde Xian [同德县]. Longmuer Xiuma, between Jungong (Gyumgo) and Hebei on the N side of the Huang He," 3650 m, 22 Jul 1993, *Ho Ting-nung, B. Bartholomew & M. Gilbert 174* (CAS, PE, duplicate at HNWP not seen).

Plantae agamospermae delicatae, subtunicatae, foliis profunde pinnatisectis vel pinnatipartitis, lobis lateralibus angustis, patentibus, sigmoideis, subintegris, petiolis purpureis angustis, scapis dense araneosis, phyllariis involucralibus exterioribus numerosis, lanceolatis vel lineari-lanceolatis, laxe adpressis, planis, conspicue albido-marginatis, ligulis luteis, stigmatibus aterrimis, antheris polline carentibus, acheniis superne dense spinulosis, in pyramidem subconicam 0.6–0.8 mm longam subabrupte abeuntibus.

Herbs 10–15 cm tall, base with remnants of old petioles. Petiole purplish, narrow; leaf blade light green, ± oblanceolate, 7–11 × 1.5–2.5 cm, ± sparsely hairy on both surfaces, deeply pinnatisect; lateral lobes in (5 or)6 or 7 pairs, narrowly triangular, 8–19 × 1.2–1.8 mm, ± patent, distal margin entire or with a single tooth at lobe base and straight or ± sigmoid with apical part bent upward; lower lobes often slightly recurved, proximal margin entire and straight; interlobes usually 2–3 × ca. 5 mm, margin ± entire; terminal lobe 1–1.8 × 0.8–1.7 cm, 3-partite, basal segments narrowly lingulate, to 7 mm, and patent, apical segment narrowly lingulate, to 2 mm wide, and apex subacute. Scapes ± equaling leaves, ± densely arachnoid. Capitulum 3.5–4 cm wide. Involucre 0.9–1.1 cm wide, base rounded. Outer phyllaries usually 19–22, ± not imbricate, lanceolate to linear-lanceolate, outermost ones (5–)7–9 × (1.5–)2–3 mm and 2/5–1/2 as long as inner ones, ± loosely appressed, middle part conspicuously colored dark blackish olivaceous and ca. 1 mm wide, with a distinct whitish green 0.5–0.7 mm wide border, margin ± densely ciliate, apex ± flat; inner phyllaries 1.1–1.5 cm, apex flat. Ligules yellow; outer ligules ± flat, outside distally striped grayish pink; inner ligules with dark blackish apical teeth. Stigmas ± black. Anthers without pollen. Achene (only unripe available) pale grayish brown (probably later becoming darker or almost blackish), 4–4.5 mm; body densely spinulose above, subabruptly narrowing into ± subconic 0.6–0.8 mm cone; beak 6–7 mm. Pappus yellowish white, 5–6 mm. Fl. summer. Agamosperm.

• Alpine meadows; 3000–3700 m. Gansu, E Qinghai (Tongde).

43. Taraxacum centrasiaticum D. T. Zhai & C. H. An, J. Aug. 1st Agric. Coll. 18(3): 4. 1995.

中亚蒲公英 zhong ya pu gong ying

Herbs 12–22 cm tall. Petiole usually suffused purplish, long, unwinged; leaf blade deep green, ± linear to linear-oblanceolate, 8–14 × 0.7–2 cm, glabrous, usually deeply divided to midvein; lateral lobes 2–4 pairs, linear to rarely linear-triangular, 5–9 × 1.8–2.5 mm, remote, recurved or ± patent, margin entire; interlobes long, 1.1–1.5(–5) mm wide, margin entire; terminal lobe ± 3-partite, basal segments ± recurved, terminal segment elongated, 3–6 mm wide, and margin entire. Scapes brownish green and often suffused purplish, much overtopping leaves, sparsely arachnoid to subglabrous. Capitulum 1.5–2 cm wide. Involucre 5.5–9 mm wide, base ± rounded to slightly subobconic. Outer phyllaries 10 or 11, blackish green, ± imbricate, narrowly lanceolate to ovate-lanceolate, outermost ones 4.6–6 × 1.3–2 mm and 1/3–2/5 as long as inner ones, ± appressed, with an evident ± white ca. 0.2 mm wide border, margin glabrous, flat below apex; inner phyllaries blackish green, 0.9–1.3 cm, flat below apex. Ligules yellow; outer ligules flat, outside striped purplish; floret tube glabrous or sparsely pubescent. Stigmas blackish green. Achene dark ochraceous brown but later probably dark brown, 3.6–3.9 × ca. 0.9 mm; body tuberculate below, ± densely spinulose above, subabruptly narrowing into a thick subconic 0.7–0.8 mm cone, spinules thin, suberect, and acute; beak 5–6 mm. Pappus ± white, 5–6 mm. Fl. summer.

• Alpine meadows; 3400–3500 m. S Xinjiang.

44. Taraxacum austrotibetanum Kirschner & Štěpánek, **sp. nov.**

藏南蒲公英 zang nan pu gong ying

Type: China. Xizang: "Tibet meridionalis, ca. 55 km situ occid a Gongbo-Gyamda [工布江达]," ca. 4000 m, 29 Jul 1992, *L. Businská & R. Businský 12*, cultivated as JŠ 5099 (holotype, PRA; isotype, PRA).

Plantae laminis foliorum glaberrimis, phyllariis involucralibus externis lineari-lanceolatis usque anguste lanceolatis, atro-viridibus ecorniculatis dense ciliatis immarginatis, ligulis externis intus albis, centralibus pallide flavescentibus, stigmatibus griseo-viridibus, et praecipue acheniis badio-rubris vel ochraceo-badio-rubris, omnino grosse spinulosis, spinulis suberectis vel saepissime sursum arcuatis falciformibus insignes.

Herbs 10–20 cm tall. Petiole greenish or pale pinkish, narrow, very sparsely arachnoid at base; leaf blade light green to mid-green, linear to ± oblong-linear, (4–)7–12 × 0.9–2 cm, ± glabrous on both surfaces, undivided to pinnatifid or pinnatisect; lateral lobes or teeth (3 or)4–6 pairs, ± triangular to ± linear, 2–7 × ca. 1.5 mm, ± recurved to patent, proximal margin ± straight and entire, distal margin entire and ± concave; interlobes broad, margin entire or with a single tooth; terminal lobe elongated, base sagittate, apex subacute. Scapes overtopping leaves, arachnoid. Capitulum 2.5–3 cm wide. Involucre 7–9 mm wide, base narrowly rounded. Outer phyllaries usually 11–15, dark blackish olivaceous, ± not imbricate, narrowly lanceolate to ± linear-lanceolate, outermost ones (4–)5–7(–8) × 1.5–2 mm and 2/5–1/2 as long as inner ones, appressed to ± loosely appressed, paler border not developed or greenish, incon-

spicuous, and to 0.1 mm wide, margin ± densely whitish to yellowish ciliate, apex flat; inner phyllaries 1.2–1.4 cm, apex flat. Ligules white; outer ligules ± flat, outside striped light grayish purple; inner ligules ± pale yellowish, with grayish purple apical teeth. Stigmas gray-green. Anthers polliniferous; pollen grains irregular in size. Achene reddish brown to ochraceous reddish brown when fully ripe, 3.9–4.2 × ca. 1.1 mm; body densely spinulose throughout, less densely at base, subabruptly narrowing into a subcylindric 0.8–1 mm cone, spinules coarse, erect to sickle-shaped pointing upward, and usually laterally compressed; beak ca. 6 mm. Pappus pale yellowish white, ca. 6 mm. Fl. summer. Agamosperm.

• Alpine meadows; ca. 4000 m. S Xizang.

Taraxacum austrotibetanum is distinct in having white florets, ± densely ciliate narrow outer phyllaries, and reddish brown achenes with a conspicuous spinulosity. *Taraxacum roseoflavescens* differs from it in glabrous outer phyllaries and leaf shape. *Taraxacum przevalskii* and *T. tibetanum* differ from *T. austrotibetanum* in their yellow floret color. *Taraxacum przevalskii* also differs in its ovate-lanceolate, 4–6 mm wide outer phyllaries and *T. tibetanum* in its glabrous outer phyllaries.

45. Taraxacum suavissimum Kirschner & Štěpánek, **sp. nov.**

甜蒲公英 tian pu gong ying

Type: China. Yunnan: "Yunnan borealis, opp. Dêqên [德钦] (Atuntze)," 3300–4200 m, 30 Jun & 1 Jul 1992, *L. Businská & R. Businský 7*, cultivated as JŠ 5139 (holotype, PRA; isotype, PRA).

Paratypes: China. Yunnan: *ibidem*, *L. Businská & R. Businský 7*, cultivated as JŠ 6733 and 6229 (PRA).

Plantae foliis demum pinnatisectis lobis lateralibus saepe sursum curvatis, in parte distali linearibus, interlobiis integris vel uni- vel bilobulatis, phyllariis involucralibus exterioribus non imbricatis anguste lanceolatis usque lineari-lanceolatis, adpressis, minute corniculatis, ligulis pallidissime luteis, acheniis immaturis laete ochraceo armeniacis, in maturitate obscure brunneo-rubescentibus, corpore superne distincte spinuloso, in pyramidem crassam ± cylindricam subsensim transiente.

Herbs 12–20 cm tall. Petiole green or purple, narrow, very sparsely arachnoid at base; leaf blade light green to mid-green, linear-oblanceolate, (8–)12–16 × 1.2–3 cm, sparsely arachnoid, usually almost undivided to shallowly lobed for early leaves, pinnatisect for later leaves; lateral lobes or teeth 4–6 pairs, from a broad base abruptly narrowing into a ± linear 3–10 × 1.5–2 mm distal part, often slightly broadened near apex or evenly broad and apex acute, usually ± recurved or patent and distally curved upward, proximal margin ± straight or convex and entire, distal margin ± concave and entire or with one basal tooth; interlobes with margin entire or with a 1 or 2 teeth or lobules; terminal lobe ± elongated, 3-partite, basal segments patent and similar to lateral lobes, terminal segment narrowly triangular and margin entire or with 1 tooth. Scapes purplish green, ± overtopping leaves, arachnoid. Capitulum 3–4 cm wide. Involucre 1–1.2 cm wide, base ± rounded. Outer phyllaries (9–)11–15(–17), dark blackish green, ± not imbricate, narrowly lanceolate to ± linear-lanceolate, outermost ones 5–6(–8) × (1–)1.7–2.2 mm and 1/3–1/2 as long as inner ones, appressed, paler border not developed, margin ± ciliate, apex usually minutely corniculate; inner phyllaries 1.2–1.5 cm, apex ± minutely blackish corniculate. Ligules pale yellowish white; outer ligules ± flat, outside striped grayish purple; inner ligules with grayish purple apical teeth. Stigmas grayish green. Anthers polliniferous; pollen grains irregular in size. Achene initially (when almost ripe) light ochraceous red but finally turning dark grayish reddish brown, (4.3–)4.6–4.9(–5.1) × 1.2–1.3 mm; body densely spinulose in upper half, subgradually narrowing into a ± cylindric 0.8–1.1 × ca. 0.4 mm cone, spinules distinct, straight, and erect-patent; beak 8–9 mm. Pappus pale yellowish white, ca. 7 mm. Fl. summer. Agamosperm.

• Mountain grasslands, along paths; 3300–4200 m. NW Yunnan.

Taraxacum suavissimum differs from the other agamospermous *T.* sect. *Tibetana* species with comparable outer phyllaries and leaf shape. It differs from *T. apargia*, which has dark grayish olivaceous achenes (without reddish color), from *T. delicatum*, which has pollen absent and has a different fruit color and size, and from *T. austrotibetanum*, which has reddish brown achenes and white florets. From outside the limits of the section, *T. sikkimense* of *T.* sect. *Emodensia* has distinctly bordered outer phyllaries and a longer cone.

7. Taraxacum sect. **Emodensia** Kirschner & Štěpánek, **sect. nov.**

喜马拉雅蒲公英组 xi ma la ya pu gong ying zu

Type: *Taraxacum sherriffii* Soest.

Sectio distincta phyllariis involucralibus exterioribus plerumque numerosis, adpressis vel laxe adpressis, lineari-lanceolatis usque linearibus, conspicue cornutis vel corniculatis, saepissime distincte anguste pallide marginatis, flosculis plerumque luteis, stigmatibus non atro-coloratis, plerumque pallide virescentibus, acheniis colore variantibus (stramineis, rubro-badiis, ochraceis vel atro-griseis), corpore plerumque crasso, 1–1.4 mm lato, superne dense spinuloso, spinulis mediocribus rectis erecto-patentibus, in pyramidem vulgo crassam subcylindricam saepissime (0.8–)1–1.4(–1.9) mm longam subabrupte transiente, rostro plerumque 5–7 mm longo, pappo albo.

Petiole narrow; leaf blade deeply pinnatisect. Involucre 6–10 mm wide, base usually narrowly rounded. Outer phyllaries usually numerous (to 25), deep green to dark green, linear-lanceolate or linear, appressed or loosely so, usually distinctly pale bordered, apex conspicuously horned or corniculate. Ligules usually yellow, rarely whitish. Stigmas yellow to yellowish green. Achene variously colored, straw-colored brown, dark red-brown, ochraceous, or dark blackish gray; body ± densely spinulose above, usually subabruptly narrowing into a usually subcylindric (0.8–)1–1.4(–1.9) mm cone, spinules straight and erect to erect-patent; beak usually 5–7 mm. Pappus white. Sexual or agamospermous.

About 12–15 species: China, India, Nepal; 11 species (ten endemic) in China.

The diversity of *Taraxacum* sect. *Emodensia* is centered in Sichuan and Xizang.

Taraxacum heteroloma Handel-Mazzetti (Monogr. Taraxacum, 120. 1907) is a name based on a very heterogeneous set of syntypes, of which some come from Xizang. Most of the syntypes belong to *T.* sect. *Emodensia*, but we were not able to select any lectotype that would be in accordance with the original description. None of the taxa recognized below can be equated with the well-developed syntypes. As a consequence, the name is not used in the present treatment and the problem remains to be studied. Another name reported from China (FRPS 80(2): 52. 1999) is *T. pseudostenoceras* Soest (Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 271. 1961). Its type material belongs to *T.* sect. *Emodensia*, but we failed to find any Chinese material safely referable to this taxon. The name *T. kansuense* Nakai ex Koidzumi (Bot. Mag. (Tokyo) 50: 91. 1936) may belong to *T.* sect. *Emodensia*. However, as the description is imperfect, lacking achenes, and, most importantly, the type material is not currently extant, there is not enough information to deal with the name in detail. The name *T. kawaguchii* Kitamura (Acta Phytotax. Geobot. 15: 77. 1953) is based on a plant deposited in TNS. The specimen and the original description clearly show that the name belongs to *T.* sect. *Emodensia*. However, the type plant is not well preserved, and there are no achenes. We therefore are unable to complete the taxonomic study of this name or taxon.

1a. Pollen grains regular in size (plants sexual).
2a. Achene 3–3.5 mm, cone subconic and 0.4–1 mm ..... 54. *T. deludens*
2b. Achene 4.8–5.2 mm, cone cylindric and 1.2–1.9 mm ..... 55. *T. macula*
1b. Pollen grains irregular in size (plants agamospermous).
3a. Achene red to reddish brown ..... 56. *T. sikkimense*
3b. Achene of different color.
4a. Paler border to outer phyllaries absent or indistinct and very narrow.
5a. Outer phyllaries 0.9–1.3 mm wide; stigmas blackish; leaf lateral lobes conspicuously recurved ..... 47. *T. maurocarpum*
5b. Outer phyllaries 1.5–2 mm wide; stigmas dirty green; leaf lateral lobes patent to slightly recurved ..... 53. *T. ludlowii*
4b. Paler border to outer phyllaries distinct and at least 0.2–0.3 mm wide.
6a. Achene grayish straw-colored brown, yellowish straw-colored brown, or light ochraceous straw-colored brown.
7a. Outer phyllaries 22–25 ..... 46. *T. stenoceras*
7b. Outer phyllaries 11–18.
8a. Outer phyllaries 2.5–3.5 mm wide, apex flat to corniculate; stigmas light brownish yellow ..... 48. *T. kozlovii*
8b. Outer phyllaries 1.5–2.5 mm wide, apex conspicuously horned; stigmas grayish green ..... 50. *T. glaucophylloides*
6b. Achene of different color and darker.
9a. Achene 3.5–4 mm, cone 0.8–0.9 mm; outer phyllaries with pale 0.2–0.3 mm border ..... 49. *T. glaucophyllum*
9b. Achene 4.5–5.9 mm, cone 1–1.5 mm; outer phyllaries with paler 0.3–0.5 mm border.
10a. Achene blackish grayish brown ..... 51. *T. sherriffii*
10b. Achene deep cinnamon brown ..... 52. *T. badiocinnamomeum*

46. Taraxacum stenoceras Dahlstedt, Acta Horti Gothob. 2: 166. 1926.

角苞蒲公英 jiao bao pu gong ying

Herbs 15–20 cm tall. Petiole pinkish, ± unwinged; leaf blade light green, narrowly oblanceolate, 7–14(–17) × 1.2–3 cm, sparsely arachnoid, pinnatilobed to pinnatisect, midvein pinkish; lateral lobes (3 or)4–7 pairs, usually hamate-recurved, 1.5–2 cm, narrow, margin apically sparsely, minutely, or coarsely dentate (to lobulate) or rarely entire; interlobes short, margin entire, dentate, or lobulate; terminal lobe helmet-shaped to triangular, 1.5–2 × 1.2–2.2 cm, margin usually entire. Scapes brownish green, ± equaling leaves, sparsely arachnoid at base but densely arachnoid below capitulum. Capitulum 3–4 cm wide. Involucre 5–7 mm wide, base narrowly rounded. Outer phyllaries 22–25, pale green, ± not imbricate, linear-lanceolate, outermost ones 7–8 × 1.2–1.8 mm and ca. 3/4 as long as inner ones, ± subappressed, with a paler 0.2–0.3 mm wide border, margin glabrous to sparsely ciliate, apex with a thin perpendicular ca. 5 mm horn; inner phyllaries 5–7 mm, with a thin horn below apex. Ligules (pale) yellow; outer ligules flat, outside striped purplish; inner ligules with purple teeth; floret tube outside pubescent. Stigmas dirty yellow to greenish. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, 3.8–4.4 × 1–1.2 mm; body apically spinulose, ± gradually narrowing into a subconic ca. 1.2 mm cone; beak 6–7 mm. Pappus ± white, 5–6 mm. Fl. summer. Agamosperm.

• Disturbed mountain grasslands; 3000–3600 m. NW Sichuan.

Reports of *Taraxacum stenoceras* from SE Gansu, E and SE Qinghai, and Xizang (FRPS 80(2): 52. 1999; Higher Pl. China 11: 781. 2005) remain to be proven.

47. Taraxacum maurocarpum Dahlstedt, Acta Horti Gothob. 2: 176. 1926.

灰果蒲公英 hui guo pu gong ying

Herbs 5–6 cm tall, delicate. Petiole narrow; leaf blade deep green, broadly linear, 3–5.5 × 0.6–0.9 cm, sparsely arachnoid, deeply lobed; lateral lobes 3–5 pairs, narrowly triangular, recurved, margin entire; interlobe margin entire; terminal lobe elongated sagittate. Scapes ± overtopping leaves, sparsely arachnoid but more densely arachnoid below capitulum. Capitulum ca. 2.5 cm wide. Involucre ± narrowly rounded to broadly ob-

conic, 6–7 mm wide. Outer phyllaries 14–19, blackish green, linear-lanceolate, outermost ones 5–9 × 0.9–1.3 mm, unequal, and 1/3–2/3 as long as inner ones, loosely appressed, with a paler indistinct ca. 0.2 mm wide border, margin sparsely ciliate, apex attenuate and with a evident blackish 0.7–1 mm horn; inner phyllaries blackish, 1.1–1.2 cm. Ligules yellow; outer ligules flat, outside striped grayish purple; inner ligules with blackish teeth. Stigmas blackish. Anthers polliniferous; pollen grains irregular in size. Achene blackish brown, 3.3–3.7 × ca. 1 mm; body apically minutely spinulose, subabruptly narrowing into a subconic 1–1.1 mm cone; beak ca. 7 mm. Pappus yellowish white, 5–6 mm. Fl. summer. Agamosperm.

• Alpine grasslands; ca. 4000 m. W Sichuan.

We did not see material confirming reports of *Taraxacum maurocarpum* from Qinghai, Xizang, and Yunnan (FRPS 80(2): 70. 1999; Higher Pl. China 11: 785. 2005).

48. Taraxacum kozlovii Tzvelev, Novosti Sist. Vyssh. Rast. 24: 216. 1987.

大刺蒲公英 da ci pu gong ying

Herbs 5–20 cm tall. Petiole purplish, ± unwinged but dilated at very base; leaf blade light green to grayish green, narrowly oblanceolate, 5–15 × 1.5–2 cm, subglabrous, remotely pinnatilobed, midvein pale green; lateral lobes 2 or 3(or 4) pairs, to 1 cm, narrow, usually recurved to patent, margin usually entire; interlobes long, margin entire; terminal lobe elongated, to 5 cm, margin usually entire. Scapes brownish green, ± overtopping leaves, sparsely arachnoid below capitulum. Capitulum 3–4 cm wide. Involucre 7–11 mm wide, base ± rounded. Outer phyllaries 14–18, pale green to deep green, ± not imbricate, linear-lanceolate, outermost ones 8–9 × 2.5–3.5 mm and ca. 4/5 as long as inner ones, ± loosely appressed with whitish narrow border 0.3–0.4 mm, margin ± glabrous, flat or indistinctly corniculate below apex; inner phyllaries 1.3–1.6 cm, flat to corniculate below apex. Ligules yellow; outer ligules flat, outside striped grayish pink; inner ligules with purple to blackish teeth. Stigmas discolored, brownish yellow. Anthers polliniferous; pollen grains probably slightly irregular in size. Achene (when unripe) yellowish straw-colored brown, 4–4.4 × 1.4–1.6 mm; body apically densely coarsely spinulose with acute spinules and squamules, ± tuberculate to smooth below, abruptly narrowing into a conic 1.1–1.3 mm cone; beak ca. 6 mm. Pappus dirty white, ca. 5 mm. Fl. summer. Probably agamosperm.

• Mountain grasslands; probably above 2500 m. N Gansu.

Taraxacum kozlovii is known only from the type specimen.

49. Taraxacum glaucophyllum Soest, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 266. 1961.

苍叶蒲公英 cang ye pu gong ying

Herbs 15–20 cm tall, base usually thickened by remnants of old petioles. Petiole purplish, ± unwinged; leaf blade glaucous green to grayish green, linear to linear-oblanceolate, ca. 10 × 0.8–1.1 cm, ± glabrous, margin subentire, remotely dentate, or shallowly lobed, midvein pinkish; lateral lobes or teeth 1–3 pairs, sometimes alternate, mostly 3–4 mm, apex linear, narrow, and patent; interlobes long, margin entire; terminal lobe conspicuously elongated, to 3 cm, margin entire. Scapes brownish green, overtopping leaves, ± glabrous to sparsely arachnoid. Capitulum ca. 2 cm wide. Involucre 7–8 mm wide, base ± rounded. Outer phyllaries 10–13, dark green, ± not imbricate, linear-lanceolate, outermost ones 5–7 × 1.2–1.5 mm and 1/2–2/3 as long as inner ones, ± subappressed, with a narrow paler border ± white at base and distally pinkish, margin subglabrous, apex with a conspicuous perpendicular horn; inner phyllaries 1.3–1.5 cm, with a horn below apex. Ligules yellow, subtubular to involute; outer ligules outside striped pale grayish pink. Stigmas dark. Anthers polliniferous; pollen grains irregular in size. Achene dark gray, 3.5–4 × 1.1–1.3 mm; body distally spinulose, subabruptly narrowing into a thick subcylindric 0.8–0.9 × ca. 0.4 mm cone; beak longer than ca. 5 mm. Pappus ± yellowish white, 6–7 mm. Fl. summer. Agamosperm.

• Alpine grassland slopes; 3900–4200 m. Xizang.

Reports of *Taraxacum glaucophyllum* from Qinghai, Sichuan, and Yunnan (FRPS 80(2): 70. 1999; Higher Pl. China 11: 786. 2005) should be revised.

Achenes described in the protologue of *Taraxacum glaucophyllum* probably come from the paratype specimen (Lhasa, *H. E. Richardson 307A*, BM) and are not conspecific with the holotype. The holotype achenes, although also immature, show signs of darkening, and the description of ripe ones (mainly from JŠ 6223B, PRA) is included in the present description.

50. Taraxacum glaucophylloides Kirschner & Štěpánek, **sp. nov.**

灰叶蒲公英 hui ye pu gong ying

Type: China. Sichuan: "Sichuan occid., Litang [理塘], 15–21 km merid.-occid. a Litang," 4100–4250 m, 22–23 Jun 1992, *L. Businská & R. Businský 6*, cultivated as JŠ 6732 (holotype, PRA; isotypes, PRA).

Paratypes: China. Sichuan: *ibidem*, *L. Businská & R. Businský 6*, cultivated as JŠ 5131 and JŠ 6226 (PRA).

A specie valde simili, Taraxaco glaucophyllo Soest, *plantae nostrae praecipue phyllariis involucralibus exterioribus longioribus, densius ciliatis, acheniis stramineis vel ochraceo-stramineis, longioribus, omnino notabiliter densius spinulosis, in pyramidem subcrassam 1–1.2 mm longam abeuntibus differunt.*

Herbs 10–15 cm tall. Petiole purple, unwinged; leaf blade light grayish green often suffused purplish, linear to ± oblong-linear, 5–10 × 0.7–1.6 cm, sparsely arachnoid, usually pinnatilobed to pinnatisect; lateral lobes or teeth 3–5 pairs, ± linear-triangular, slightly pointing upward or patent, margin entire; interlobes ± broad, margin entire; terminal lobe triangular to narrowly triangular, margin entire, basal segments usually obtuse and ± patent. Scapes purplish green, equaling leaves, arachnoid. Capitulum 2.5–3 cm wide. Involucre 9–10 mm wide, base narrowly rounded. Outer phyllaries usually 11–15, ± not imbricate, narrowly lanceolate to ± linear-lanceolate, outermost ones 7–10 × 1.5–2.5 mm and ca. 2/3 as long as inner ones, appressed to ± loosely appressed or erect, middle part blackish green, border evident, paler, greenish white or white often suffused purplish near apex, and ca. 0.5 mm wide, margin ciliate, apex

with large blackish purple horn; inner phyllaries 1.3–1.6 cm, apex purple and with a large blackish horn below it. Ligules yellow; outer ligules ± flat, outside striped blackish purple; inner ligules with ± yellow long apical teeth. Stigmas grayish green. Anthers polliniferous; pollen grains irregular in size. Achene straw-colored brown to slightly ochraceous straw-colored brown when fully ripe, ± laterally compressed, 4–4.5 × 1.3–1.5 mm; body densely spinulose throughout but particularly on ridges, subabruptly to ± abruptly narrowing into a thick ± cylindric 1–1.2 × ca. 0.4 mm cone, spinules crowded and erect to bent upward; beak 7–8 mm. Pappus pale yellowish white, 6–7 mm. Fl. summer. Agamosperm.

• Alpine calcareous meadows; 4100–4300 m. W Sichuan.

Taraxacum glaucophylloides is similar to *T. glaucophyllum* but has totally different achenes.

51. Taraxacum sherriffii Soest, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 272. 1961.

拉萨蒲公英 la sa pu gong ying

Herbs 12–15 cm tall, base often thickened by remnants of old petioles. Petiole pale green, ± unwinged; leaf blade mid-green to slightly grayish green, narrowly oblanceolate to broadly linear in outline, 10–13 × 1.5–1.8 cm, sparsely arachnoid, pinnatilobed to pinnatisect but some almost undivided, midvein pale green; lateral lobes of inner leaves 3–5 pairs, linear-triangular, narrow, usually ± patent to recurved, margin entire or distal side with a single tooth on base; interlobes long, narrow, to 1.5 × 0.3 cm, margin entire; terminal lobe subobtuse, margin usually entire, basal segments ± patent. Scapes brownish green, ± equaling leaves, sparsely arachnoid to subglabrous. Capitulum 2–2.5 cm wide. Involucre 7–10 mm wide, base ± rounded. Outer phyllaries (11–)13–19, blackish green, ± not imbricate, linear-lanceolate, outermost ones 5–8 × 1.3–2 mm and ca. 3/4 as long as inner ones, ± appressed, with a whitish narrow ca. 0.4 mm border, margin glabrous to sparsely ciliate, apex with a conspicuous horn; inner phyllaries 1–1.2 cm, callose below apex. Ligules yellow; outer ligules flat, outside striped pinkish gray; inner ligules with grayish purple teeth. Stigmas slightly grayish or greenish pale yellow. Anthers polliniferous; pollen grains irregular in size. Achene light gray straw-colored brown when unripe but later getting darker and becoming blackish gray(-brown), 4.5–5.9 × 1.1–1.4 mm; body spinulose in upper 1/2–3/5 on ridges and apically also elsewhere, ± subgradually narrowing into a cylindric 1–1.5 mm cone, spinules thick and acute; beak 4–5.5 mm. Pappus ± white, ca. 6 mm. Fl. late spring. Agamosperm.

• Disturbed grasslands; 3500–3600 m. Xizang.

Reports of *Taraxacum sherriffii* from Qinghai (FRPS 80(2): 66. 1999; Higher Pl. China 11: 785. 2005) and NW Yunnan (FRPS 80(2): 66. 1999) need revision.

In the region of Lhasa, Xizang, sexual plants similar to *Taraxacum sherriffii* are found. They are characterized by obconic involucre and smaller and paler achenes. Further study is needed.

52. Taraxacum badiocinnamomeum Kirschner & Štěpánek, **sp. nov.**

棕色蒲公英 zong se pu gong ying

Type: China. Xizang: "Town of Shigatse [日喀则], monastery of Narthang [纳唐寺] SW of the town," 3850–4050 m, 7 Jun 2002, *M. Štefánek 39*, cultivated as JŠ 7815 (holotype, PRA; isotypes, PRA).

Plantae agamospermae, foliis oblongo-linearibus pinnatisectis, lobis lateralibus 4 ad 7 utrinque, ± integris, anguste triangularibus vel lineari-triangularibus, phyllariis involucralibus exterioribus saepe lineari-lanceolatis, conspicue cornutis, marginibus albidis distinctis, stigmatibus pallide virescenti-luteis vel subluteis, acheniis magnis, saturate cinnamomeo-badiis vel saturate badiis, dense spinuloso-squamulosis, in pyramidem subcrassam 1.2–1.4 mm longam subabrupte abeuntibus insignes.

Herbs 12–17 cm tall. Petiole green or pinkish, arachnoid, unwinged or narrowly winged in outer leaves, midvein pinkish; leaf blade ± light green, ± oblong-linear, 5–11 × 1–2 cm, sparsely arachnoid, usually pinnatisect but outer leaves usually shallowly pinnatilobed; lateral lobes 4–7 pairs, narrowly triangular to ± linear-triangular, ± patent to subrecurved, margin entire or on distal side with a single tooth near base; interlobes ± narrow, margin entire; terminal lobe ± triangular, margin ± entire, apex subobtuse. Scapes purplish green, equaling leaves, arachnoid. Capitulum 2.5–3 cm wide. Involucre 0.9–1.1 cm wide, base rounded Outer phyllaries usually 15–22, ± not imbricate, narrowly lanceolate to ± linear-lanceolate, outermost ones 7–9 × 1.3–2.5 mm and ca. 2/3 as long as inner ones, appressed to ± loosely appressed, middle part blackish green, border evident, paler, greenish white to whitish and often suffused purplish near apex, membranous, and 0.3–0.5 mm wide, margin ciliate, apex with large blackish horn; inner phyllaries 1.3–1.7 cm, apex with a blackish horn. Ligules yellow; outer ligules ± flat, outside striped gray; inner ligules with purple long apical teeth. Stigmas pale greenish yellow (almost yellow). Anthers polliniferous; pollen grains irregular in size. Achene initially pale ochraceous brown then getting darker to become deep cinnamon brown or brown when fully ripe, 5–5.6 × 1.2–1.4 mm; body densely spinulose-squamulose in upper half, subabruptly narrowing into a subcylindric 1–1.2 × ca. 0.4 mm cone; beak 5–6 mm. Pappus yellowish white, 5–6 mm. Fl. summer. Agamosperm.

• Alpine calcareous meadows; 3800–4300 m. S Xizang.

Taraxacum badiocinnamomeum is similar to *T. sherriffii* but has a substantially different achene color.

53. Taraxacum ludlowii Soest, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 269. 1961.

林周蒲公英 lin zhou pu gong ying

Herbs to 35 cm tall. Petiole purplish, to 10 cm, ± unwinged; leaf blade paler mid-green, narrowly oblanceolate, 15–20 × 1.6–2.5 cm, ± glabrous, pinnatilobed, midvein pale green or pinkish; lateral lobes 4–6 pairs, triangular, to 1.2 cm, usually ± patent to ± recurved, margin usually entire or rarely with a single tooth or lobule, base broad, apex attenuate and acute; interlobes 10–13 × 5–8 mm, margin entire or rarely with a single tooth or lobule; terminal lobe narrowly triangular-sagittate, elongated to 3.5 cm, margin usually entire, apex acute.

Scapes brownish green but purplish at base, overtopping leaves, arachnoid below capitulum. Capitulum 3–4 cm wide. Involucre 1–1.5 cm wide, base rounded. Outer phyllaries 13–18, dark (blackish) green, ± not imbricate, linear-lanceolate, outermost ones 6–8(–10) × 1.5–2 mm and 2/3–3/4 as long as inner ones, ± appressed, with a pale almost indistinct very narrow border, margin glabrous to sparsely ciliate, with a horn below apex; inner phyllaries 1.2–1.4 cm, with a broad membranous margin, corniculate below apex. Ligules yellow; outer ligules flat, outside striped grayish pink; inner ligules with blackish purple teeth. Stigmas dirty green. Anthers polliniferous; pollen grains probably irregular in size. Achene unknown. Fl. summer. Agamosperm.

• Mountain grassland slopes; ca. 4200 m. Xizang (Lhünzhub).

Taraxacum ludlowii is known only from the type specimen. Reports of collections from other counties in Xizang (FRPS 80(2): 71. 1999) are incorrect.

54. Taraxacum deludens Kirschner & Štěpánek, **sp. nov.**

假蒲公英 jia pu gong ying

Type: China. Sichuan: "Sikang [西康], Taofu [道孚] distr., Taofu, in terra 'loess,'" 3000 m, 16 Sep 1934, *H. Smith 11458* (holotype, UPS; isotype: PRA).

Paratypes: China. Sichuan: "Sikang [西康], Taofu [道孚], Taining (Ngata)," *H. Smith 11088* (PRA, UPS); *H. Smith 12210* (PRA, UPS); *H. Smith 12015* (CAS, UPS); *H. Smith 11865* (UPS); *H. Smith 11758* (UPS); *H. Smith 11920* (UPS).

Plantae sexuales graciles foliis pinnatilobis usque profunde hamato-pinnatisectis, phyllariis involucralibus exterioribus lineari-triangularibus cornutis, viridibus usque atro-viridibus sparse ciliatis, ligulis apice conspicue denticulatis, stigmatibus virescentibus, acheniis colore variantibus, usque ad 3.5 mm longis, pyramide conica 0.4–0.8 mm longa.

Herbs 5–13 cm tall, delicate. Petiole pale green or sometimes pinkish, ± unwinged; leaf blade mid-green, narrowly oblanceolate in outline, 2–8 × 0.8–1.5(–2.3) cm, sparsely arachnoid, pinnatilobed to pinnatisect, midvein pale green or purplish; lateral lobes 2–5 pairs, variably shaped from hamate-triangular to linear-triangular, 2–13 mm, strongly recurved or rarely to ± patent, margin usually entire or rarely sparsely denticulate, apex ± obtuse; interlobes short, narrow, margin entire or with 1 or 2 minute teeth; terminal lobe narrowly helmet-shaped to lingulate, margin entire, apex subobtuse. Scapes brownish green, sparsely to densely arachnoid below capitulum. Capitulum 1.5–3 cm wide. Involucre 5–7 mm wide, base narrowly rounded to ± obconic. Outer phyllaries 13–18, green to blackish green, ± not imbricate, linear-lanceolate to linear-triangular, outermost ones (3–)5–8 × 0.9–1.5 mm and to 3/4 as long as inner ones, appressed to erect, border whitish green and ca. 0.2 mm or not visible, margin sparsely ciliate, with a horn 1–1.5 mm or corniculate below apex or sometimes apex flat; inner phyllaries green, 1–1.4 cm, apex flat to corniculate. Ligules (pale) yellow; outer ligules ± flat, outside striped grayish green to grayish purple; inner ligules with long apically blackish or yellow teeth. Stigmas green. Anthers polliniferous; pollen grains regular in size. Achene gray, straw-colored brown, yellowish, blackish brown, or brick red, 3–3.5 × 1–1.2 mm; body distally subsparsely spinulose, finely squamulose, or ± smooth below, subabruptly narrowing into a subconic 0.4–0.8(–1) mm cone; beak 6–7.5 mm. Pappus yellowish white, 4–5 mm. Fl. late summer. Sexual.

• Mountain grasslands, trail margins, open ground; 3000–3700 m. W Sichuan.

Taraxacum deludens is a variable sexual representative of *T.* sect. *Emodensia*. It is similar to *T. maurocarpum* and *T. stenoceras*. It differs from both in its sexual reproduction, from the former by darker stigmas and much shorter cone, and from the latter by much shorter achenes and cone.

55. Taraxacum macula Kirschner & Štěpánek, **sp. nov.**

斑点蒲公英 ban dian pu gong ying

Type: China. Sichuan: "Sikang [西康], Kangting [康定] (Tachienlu), mont. occid., in prato aprico, graminoso," 3200 m, 15 Jul 1934, *H. Smith 10470* (holotype, UPS; isotype, PRA).

Paratypes: China. Sichuan: "Sikang [西康], Kangting [康定] (Tachienlu) distr., Tapaoshan," 4500 m, *H. Smith 10463* (UPS).

Plantae sexuales foliis plerumque profunde pinnatisectis, phyllariis involucralibus exterioribus lineari-triangularibus attenuatis, ± planis, dense ciliatis, ± immarginatis, stigmatibus viridibus, acheniis stramineo-brunneis usque atro-badiis, usque ad 5.2 mm longis, 1.1–1.4 mm crassis, pyramide cylindrica, usque ad 1.9 mm longa.

Herbs 6–15 cm tall, slender. Petiole green but grayish purple at very base, unwinged; leaf blade mid-green, narrowly oblanceolate in outline, 3–9 × 0.8–1.9 cm, sparsely arachnoid, usually pinnatisect but sometimes almost undivided, midvein usually pale green; lateral lobes 3–7 pairs, usually linear-triangular, to 9 mm, subpatent to recurved, distal margin usually sigmoid and entire; interlobes usually short, narrow; terminal lobe narrowly triangular-sagittate, terminal segment often elongated and 2–2.5 cm and margin entire. Scapes pale brownish green, equaling to overtopping leaves, usually densely arachnoid. Capitulum 2–4 cm wide. Involucre 5–6 mm wide, base obconic. Outer phyllaries 10–16, green to blackish green, ± not imbricate, linear to linear-triangular with attenuate apex, outermost ones 3.5–6.5 × 0.7–1.2 mm and 1/3–2/5 as long as inner ones, ± appressed, some recurved at apex, ± unbordered or indistinctly bordered, margin densely ciliate, apex ± flat to callose; inner phyllaries 1.1–1.5 cm, apex ± flat. Ligules (pale) yellow; outer ligules ± flat, outside striped grayish pink; inner ligules with long teeth grayish purple at apex. Stigmas green. Anthers polliniferous; pollen grains regular in size. Achene pale brown to blackish brown, 4.8–5.2 × 1.1–1.4 mm; body usually ± smooth below, distally with erect acute subsparse spinules, ± abruptly narrowing into a cylindric 1.2–1.9 mm cone; beak ca. 7 mm. Pappus yellowish white, ca. 5 mm. Fl. summer. Sexual.

• Alpine meadows and grasslands; 3200–4500 m. W Sichuan.

Taraxacum macula is another sexual representative of *T.* sect. *Emodensia*. It is distinct in having an unusually long cylindric cone; outer phyllaries very narrow, distally attenuate, and densely ciliate; and, as a rule, distinctly pinnatisect leaves.

56. Taraxacum sikkimense Handel-Mazzetti, Monogr. Taraxacum, 103. 1907.

锡金蒲公英 xi jin pu gong ying

Type: India. Sikkim: "Lachen," 12,000 ft, Jul 16/[18]49, *J. D. Hooker s.n.* (**lectotype, designated here**: K, no. det. 8783).

Herbs (2.5–)6–10(–12) cm tall. Petiole usually purplish, unwinged; leaf blade ± mid-green, narrowly oblong-lanceolate in outline, 2.5–8(–12) × 0.9–1.5 cm, ± sparsely arachnoid, pinnatisect, midvein usually purplish; lateral lobes 3 or 4 pairs, narrowly triangular, strongly recurved, proximal margin ± straight and entire, distal margin at base straight or convex and entire, apex subacute to subobtuse; interlobes long, narrow; terminal lobe narrowly triangular-sagittate or almost 3-partite, margin entire, apex often obtuse. Scapes brownish green, ± equaling leaves, arachnoid. Capitulum 2–3 cm wide. Involucre 0.9–1.2 cm wide, base narrowly rounded. Outer phyllaries 13–19, ± blackish green, subimbricate, linear-triangular to linear-lanceolate, outermost ones 4.5–6 × 1–1.3(–2) mm and 1/3–1/2 as long as inner ones, ± subglabrous, with a whitish to pinkish 0.2–0.3 mm bordered gradual transition into a dark middle band, ± flat or callose below apex; inner phyllaries black-green, 1.1–1.4 cm, apex ± flat. Outer ligules whitish to whitish yellow, ± flat, outside striped purplish; inner ligules pale yellow. Stigmas blackish to dark grayish green. Anthers polliniferous; pollen grains irregular in size. Achene deep red, 4.5–4.8 × 1–1.1 mm; body ± smooth below, distally densely spinulose, ± abruptly narrowing into a cylindric 1–1.3 mm cone, spinules suberect and acute; beak 5–6 mm. Pappus white to slightly yellowish white, ca. 6 mm. Fl. summer. Agamosperm.

Alpine grasslands; 3800–5000 m. Xizang [India (Sikkim), Nepal].

Taraxacum sikkimense is also reported from Qinghai, Sichuan, and Yunnan (FRPS 80(2): 58. 1999; Higher Pl. China 11: 783. 2005), but more evidence is needed.

8. Taraxacum sect. **Mongolica** (Dahlstedt) G. Jacot, J. N. China Branch Roy. Asiat. Soc. 51: 141. 1930.

蒙古蒲公英组 meng gu pu gong ying zu

Taraxacum [unranked] *Mongolica* Dahlstedt, Acta Horti Gothob. 2: 159. 1926.

Plant base whitish arachnoid. Middle leaves usually arachnoid. Petiole unwinged to narrowly winged; leaf blade deeply lobed. Scapes usually arachnoid. Capitulum pointing upward after anthesis. Involucre base rounded. Outer phyllaries 9–17, light green or green, imbricate or not so, linear-lanceolate to ovate, appressed or loosely appressed to erect, usually with distinct venation, almost unbordered or pale bordered, margin usually densely ciliate. Ligules light yellow, yellow, or rarely white. Achene usually pale grayish straw-colored brown, deep brown, straw-colored olivaceous, or rarely reddish, 4–6 × (0.9–)1.1–1.4(–2) mm; body frequently spinulose and tuberculate throughout, usually densely spinulose and squamulose in upper 1/5–1/3, gradually to subabruptly narrowing into a subcylindric to less often subconic 0.7–1.5 mm cone; beak 6–10 mm, thin. Pappus white or yellowish, (4–)6–8 mm.

About 45 species: centered in Japan and NE China; 11 species (nine endemic) in China.

A number of specific names, based on specimens from China belonging to this section, remain unclear.

The names *Taraxacum mongolicum* var. *caninum* G. Jacot, *T. mongolicum* var. *laeve* G. Jacot, and *T. duplex* G. Jacot are based on the material collected by G. Jacot in 1927–1928 in "Tsinan" (now Jinan) in Shandong and originally deposited at SCU, later to be transferred to JSPC. The material, however, was destroyed, probably during WWII, and is not extant. Obvious lectotypes for the names are achene figures 1a, 1b, and 1c, respectively (G. Jacot, J. N. China Branch Roy. Asiat. Soc. 61: pl. 1. 1930). As this problem requires further study, the names remain uninterpreted in the present treatment.

Taraxacum ohwianum Kitamura, described from N Korea, was several times reported to occur in China (e.g., FRPS 80(2): 43. 1999). The holotype, depicted in Kitamura (Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 24: pl. III, f. 4. 1957) is no longer extant, and we have to rely on authentic material in KYO. *Taraxacum ohwianum* is characterized by ovate, broadly pale bordered outer phyllaries and by light straw-colored, 4.5–4.9 × 1.1–1.3 mm achenes, with body densely shortly spinulose above, otherwise usually densely tuberculate, and gradually narrowing into a subcylindric (subconic at base and ± cylindric distally) 1–1.3 mm cone. The closest Chinese taxon (*T. albomarginatum*, incl. *T. mandshuricum*) has achenes substantially less densely spinulose, narrower, and cone much shorter, and cannot be equated with *T. ohwianum*. We failed to find convincing Chinese material belonging to *T. ohwianum*.

The names *Taraxacum antungense* Kitagawa (J. Jap. Bot. 22: 173. 1948), *T. argutedenticulatum* Nakai & Koidzumi (Bot. Mag. (Tokyo) 50: 142. 1936), *T. falcilobum* Kitagawa (Rep. Inst. Sci. Res. Manchoukuo 2: 312. 1938), *T. glaucanthum* Nakai & Koidzumi (Bot. Mag. (Tokyo) 50: 91. 1936, not (Ledebour) Candolle, 1838), *T. hangchouense* Koidzumi (Bot. Mag. (Tokyo) 50: 144. 1936), *T. hondae* Nakai & Koidzumi (Bot. Mag. (Tokyo) 50: 143. 1936), *T. pseudodissectum* Nakai & Koidzumi (Bot. Mag. (Tokyo) 50: 92. 1936), and *T. urbanum* Kitagawa (J. Jap. Bot. 22: 174. 1948) are all based on the material from China collected in the 1930s by Japanese botanists. In spite of a great effort of curators of TI and KYO, and the well-documented type material of H. Koidzumi in TNS, the type material for these names was not found in the collections. All these names, according to their protologues, probably belong to *T.* sect. *Mongolica*. As the original material is missing, and the protologue descriptions are not satisfactorily informative, we leave these names for further investigation.

1a. Ligules white or very pale whitish yellow ..... 61. *T. coreanum*
1b. Ligules of other colors.
2a. Ligules conspicuously orange-colored ..... 65. *T. aurantiacum*
2b. Ligules yellow.
3a. Achene reddish brown to light red ..... 63. *T. junpeianum*

3b. Achene of other colors, usually light straw-colored brown to deep brown.
4a. Outer ligules completely tubular ..... 64. *T. siphonanthum*
4b. Outer ligules flat to canaliculate.
5a. Outer phyllaries ovate to broadly lanceolate.
6a. Achene 0.9–1 mm thick, body gradually narrowing into a thin cylindric cone; outer phyllaries ± imbricate ..... 62. *T. albomarginatum*
6b. Achene 1.1–1.3 mm thick, body abruptly narrowing into a thick or medium-thick conic to subcylindric cone; outer phyllaries ± not imbricate.
7a. Outer phyllaries 12–15; leaf interlobes with a distinct brownish purple spot, filiform dentate to lobulate ..... 66. *T. variegatum*
7b. Outer phyllaries 8–12; leaf interlobes green, unspotted, subentire or remotely dentate, not lobulate ..... 67. *T. lamprolepis*
5b. Outer phyllaries linear-lanceolate to narrowly lanceolate.
8a. Achene light (yellowish) straw-colored brown; achene body ± abruptly narrowing into cone ..... 66. *T. variegatum*
8b. Achene mid-brown, deep brown, or grayish brown; achene body gradually narrowing into cone.
9a. Pollen grains regular in size (plants sexual); pappus 4–5 mm ..... 57. *T. formosanum*
9b. Pollen grains irregular in size; pappus 5–10 mm.
10a. Outer phyllaries 9–15; stigmas pale green ..... 58. *T. mongolicum*
10b. Outer phyllaries 15–20; stigmas dark.
11a. Achene deep pure brown; achene body 1.3–1.4 mm thick, cone 0.9–1.2 mm ..... 59. *T. liaotungense*
11b. Achene grayish brown; achene body 1.1–1.3 mm thick, cone 1.1–1.5 mm ..... 60. *T. erythropodium*

57. Taraxacum formosanum Kitamura, Acta Phytotax. Geobot. 2: 48. 1933.

台湾蒲公英 tai wan pu gong ying

Herbs 8–15 cm tall. Leaves numerous, prostrate to erect-patent; petiole narrow; leaf blade grayish green, narrowly oblanceolate to linear, 6–18 × 1–3 cm, almost glabrous, pinnatilobed to pinnatisect; lateral lobes 3–5 pairs, broadly triangular, often with obtuse broad tooth on apical margin; interlobes broad, margin entire; terminal lobe triangular to helmet-shaped, 1.5–3 × 1–2 cm, often pentagonal, apex rounded to subobtuse. Scapes brownish green, equaling to slightly overtopping leaves, scattered arachnoid. Capitulum ca. 3 cm wide. Involucre pale green, 6–8 mm wide, base ± rounded. Outer phyllaries 13–15, mid-green, ± imbricate, linear-lanceolate to narrowly lanceolate, outermost ones 4.5–6 × 0.8–1.5 mm and 1/3–2/5 as long as inner ones, loosely appressed, distinctly veined, border indistinct, paler green to membranous, and to 0.2 mm wide, margin ± glabrous, apex with a green or purplish thick horn to 1 mm; inner phyllaries 1.1–1.3 cm, apex corniculate. Ligules yellow; outer ligules outside striped blackish purple; inner ligules with blackish apical teeth. Stigmas pale green to ± yellow. Anthers polliniferous; pollen grains regular in size. Achene brown, ca. 4 × 1–1.2 mm; body tuberculate throughout, apically tuberculate-squamulose, gradually narrowing into a subcylindric 0.8–1 mm cone; beak 7–10 mm. Pappus white, 4–5 mm. Fl. Mar–Apr. Sexual. $2n = 16$*.

• Seashore dunes, open ruderal places; below 200 m. Taiwan.

This species was also reported from Liaoning (Kitagawa, Bot. Mag. (Tokyo) 47: 830–831. 1933), but the material belongs to other species.

58. Taraxacum mongolicum Handel-Mazzetti, Monogr. Taraxacum, 67. 1907.

蒙古蒲公英 meng gu pu gong ying

Herbs 8–25 cm. Petiole usually narrow; leaf blade mid-green, oblanceolate, 6–15 × 2–3.5 cm, subglabrous to sparsely arachnoid, pinnatilobed, pinnatisect, or rarely undivided; lateral lobes 3 or 4 pairs, broadly triangular, obtusely deltoid, or broadly linear, patent to recurved, distal margin sparsely dentate or entire, apex obtuse; interlobes broad, sometimes spotted dark purple, margin entire to sparsely dentate; terminal lobe broadly triangular, apex broadly obtuse. Scapes single or rarely branched with an ascending side scape, brownish green, equaling to slightly overtopping leaves, scattered arachnoid but densely arachnoid below capitulum. Capitulum 3–4 cm wide. Involucre mid-green, 1–1.2 cm wide, base ± rounded. Outer phyllaries 9–15, mid-green to pale green, ± not imbricate, linear-lanceolate to narrowly lanceolate, outermost ones 6–9 × 0.8–2.5 mm and ca. 1/2 as long as inner ones, loosely appressed, distinctly veined, border indistinct, paler green to membranous, often suffused pink, and 0.1–0.3 mm wide, margin ± densely ciliate, apex with a green or purplish thick horn to 1.5 mm; inner phyllaries 1.1–1.5 cm, apex flat to corniculate. Ligules yellow; outer ligules outside striped grayish purple; inner ligules with blackish to purple apical teeth. Stigmas pale green. Anthers polliniferous; pollen grains irregular in size. Achene ± brown to grayish brown, 4.2–4.6 × 1.1–1.3 mm; body tuberculate throughout, apically densely tuberculate-squamulose, gradually narrowing into a subconic 1–1.2 mm cone; beak 7–10 mm. Pappus yellowish, ca. 6 mm. Fl. spring, occasionally also to late summer. Agamosperm. $2n = 24$*.

• Abandoned fields, grasslands, along paths and roads; 800–2000(–2800) m. Anhui, Fujian, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Zhejiang.

The stated distribution of *Taraxacum mongolicum* is based on the report in FRPS (80(2): 34. 1999), but material has not been revised and can only be confirmed for Hebei, Shanxi, Sichuan, and Xizang. However, the reported occurrences in Gansu, Qinghai, Taiwan, and Yunnan are improbable, and material under that name in herbaria from these provinces belongs to other taxa.

For *Taraxacum mongolicum* var. *caninum* and *T. mongolicum* var. *laeve* see the discussion of *T.* sect. *Mongolica*, above.

59. Taraxacum liaotungense Kitagawa, Bot. Mag. (Tokyo) 47: 825. 1933.

辽东蒲公英 liao dong pu gong ying

Taraxacum liaotungense f. *lobulatum* Kitagawa.

Herbs 10–15 cm tall. Petiole ± green, arachnoid at base, winged in most leaves but unwinged in inner ones; leaf blade slightly grayish mid-green with a light green midvein, linear-oblanceolate, 7–10 × 1–1.5 cm, sparsely arachnoid, pinnatifid to pinnatisect; lateral lobes (4 or)5 or 6(or 7) pairs, ± triangular to oblong-triangular, 4–8 mm, sometimes from broad base abruptly narrowed into a lingulate distal part, recurved or subpatent, proximal margin entire, distal margin straight to ± concave and entire or with a single tooth; interlobes sometimes faintly spotted light brownish pink, 3–8 × 2–3 mm, margin entire or with a few unequal teeth or lobules; terminal lobe narrowly triangular to narrowly helmet-shaped or 3-partite, distinctly developed, 1–2.3 × 0.8–1.5 cm, distal margin often dentate or incised, apex subacute to acute. Scapes ?brownish green, subequaling leaves, arachnoid. Capitulum ca. 2.5 cm wide. Involucre 7–8 mm wide, base ± rounded. Outer phyllaries 15–19, mid-green to light green with darker middle part and a gradual transition into a whitish border, ± not imbricate, linear-lanceolate to narrowly lanceolate, outermost ones 6–7 × 1.7–2 mm and ca. 1/2 as long as inner ones, ± appressed, margin sparsely ciliate or glabrous, apex with a blackish purple thick horn to 1.3 mm; inner phyllaries 1–1.1 cm, apex corniculate. Ligules yellow; outer ligules flat, outside striped dark gray. Stigmas dark. Anthers polliniferous; pollen grains irregular in size. Achene pure deep brown, 4.2–5.2 × 1.3–1.4 mm; body tuberculate throughout, apically densely tuberculate-squamulose, ± gradually narrowing into a subconic 0.9–1.2 mm cone; beak 5–8 mm. Pappus yellowish to brownish white, 6–7 mm. Fl. spring. Agamosperm.

• Dry grasslands; below 100–400 m. Liaoning.

60. Taraxacum erythropodium Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 2: 304. 1938.

淡红座蒲公英 dan hong zuo pu gong ying

Herbs 15–25 cm tall. Petiole ± purple, subglabrous at base, unwinged or narrowly winged; leaf blade grayish green with a vivid purple midvein, narrowly oblanceolate, (6–)8–13 × 1–3.5 cm, sparsely arachnoid to glabrescent, usually pinnatisect lobed but outer leaves sometimes undivided; lateral lobes 3 or 4 pairs, narrowly triangular to lingulate-elongated, 0.5–1.5 cm, recurved, proximal margin straight to subsigmoid and entire, distal margin straight to ± concave or sigmoid and entire or with a single minute tooth, apex acute; interlobes ca. 15 × 3–4 mm, margin entire or minutely dentate and with large conspicuous brownish purple spots; terminal lobe narrowly triangular to triangular, (0.8–)1.3–3 × 0.8–3 cm, usually indistinctly 3-partite, basal segments ± patent to recurved and with margin ± entire, terminal segment with distal side of segment margin entire or rarely with small teeth or incisions and apex acute and often narrowly lingulate-elongated. Scapes purple in proximal part, ± equaling leaves, arachnoid but later glabrescent. Capitulum ca. 3 cm wide. Involucre 7–8 mm wide, base ± rounded. Outer phyllaries 15–20, light green with a gradual transition into a whitish green border, ± not imbricate, linear-lanceolate to lanceolate, outermost ones 6–7 × 1.5–2.5 mm and ca. 1/2 as long as inner ones, ± loosely appressed, margin sparsely ciliate, apex with a brownish purple horn to 1.5 mm; inner phyllaries 1.3–1.4 cm, apex flat or corniculate. Ligules yellow; outer ligules flat, outside striped blackish. Stigmas dark. Anthers polliniferous; pollen grains irregular in size. Achene grayish brown, 4.9–5.4 × 1.1–1.3 mm; body densely tuberculate throughout, apically densely tuberculate-squamulose, coarsely spinulose on ridges, very gradually narrowing into a narrowly conic 1.1–1.5 mm cone; beak 5–9 mm. Pappus brownish white, ca. 7 mm. Fl. spring. Agamosperm.

• Roadsides, grasslands; 100–400 m. Jilin, Liaoning.

Taraxacum erythropodium is very close to *T. liaotungense*. Most of the differences are found in achenes (color, thickness, length of cone) and also leaf coloration.

61. Taraxacum coreanum Nakai, Bot. Mag. (Tokyo) 46: 62. 1932.

朝鲜蒲公英 chao xian pu gong ying

Taraxacum pseudoalbidum Kitagawa; *T. pseudoalbidum* var. *lutescens* Kitagawa.

Herbs 20–25 cm tall. Petiole suffused purplish or ± green, whitish brown arachnoid above, ± winged; leaf blade mid-green and often ± suffused purplish, ± linear-oblanceolate, 13–20 × (2–)2.5–3(–5) cm, sparsely arachnoid, deeply pinnatisect; lateral lobes (3 or)4–6, usually linear-deltoid to linear-triangular, patent, margin subentire to minutely dentate in outer leaves but dentate and often lobulate in middle and inner ones; lobules also patent, margin sometimes dentate, apex acute to lingulate; interlobes winged, margin dentate-lobulate or rarely entire; terminal lobe flat rhombic to flat triangular, basal segments ± triangular, acute. Scapes brownish green to purplish, ± equaling leaves, arachnoid below and densely arachnoid-lanate below capitulum. Capitulum 2.5–3.5 cm wide. Involucre light green, 0.9–1.1 cm wide, base narrowly rounded. Outer phyllaries 10–12, light green to green, ± not imbricate, ± lanceolate, narrowly ovate, or sometimes to ovate, outermost ones 7–9 × 2.2–3.6 mm and 1/2–3/5 as long as inner ones, loosely appressed, distinctly veined, border not very distinct, ± membranous, to 0.5 mm wide, and sometimes suffused pink near apex, margin ciliate to sparsely so in apical part, with a dark ca. 1 mm horn near apex; inner phyllaries 1.3–1.6 cm, apex callose to corniculate. Ligules white or very pale whitish yellow; outer ligules outside ± pinkish and on both surfaces striped purplish gray; inner ligules with blackish apical teeth. Stigmas deep grayish green. Anthers polliniferous; pollen grains irregular in size. Achene ± straw-

colored brown to light brown, 5.6–6 × 1.4–1.6 mm; body tuberculate or minutely squamulose below, densely squamulose and spinulose in upper 1/5–1/3, subgradually narrowing into a subcylindric 1–1.4 mm cone; beak 8–9 mm. Pappus yellowish, ca. 7 mm. Fl. late spring and summer. Agamosperm. $2n = 32$.

Grasslands, roadsides; below 100–500 m. Liaoning [N Korea].

Taraxacum coreanum is also reported from Hebei, Heilongjiang, and Jilin (FRPS 80(2): 35. 1999; Higher Pl. China 11: 775. 2005), but a revision of the material is needed.

62. Taraxacum albomarginatum Kitamura, Acta Phytotax. Geobot. 4: 103. 1935.

白边蒲公英 bai bian pu gong ying

Taraxacum mandshuricum Nakai ex Koidzumi.

Herbs 15–23 cm tall. Petiole pinkish to green with a green to pinkish midvein, arachnoid, winged in outer leaves but narrow in innermost ones; leaf blade deep green, broadly oblanceolate, 10–15 × 3–5 cm, ± arachnoid, pinnatilobed to pinnatisect; lateral lobes usually 3–5, short and broad in outer leaves, triangular to deltoid in middle ones, and linear-triangular in inner ones, ± patent to subrecurved, margin on proximal and distal sides usually dentate; interlobes broad and dentate-lobulate but narrow in inner leaves; terminal lobe broadly flat-triangular or reduced to 3 teeth at apex of almost undivided leaves, margin often minutely dentate, acute and on inner leaves dentate. Scapes brownish green, floccose-arachnoid but densely so below capitulum. Capitulum 3–4 cm wide. Involucre 1.1–1.2 cm wide, base rounded to slightly truncate. Outer phyllaries 11–16, slightly imbricate, ovate, outermost ones 5.5–8(–9) × 3–5 mm and 2/5–1/2 as long as inner ones, appressed, surface with visible but not conspicuous venation, middle part dark green and ca. 1 mm wide, with a ± evident whitish pale green wide border, margin villous-ciliate, flat or minutely corniculate near apex; inner phyllaries 1.4–1.7 cm, callose to flat near apex. Ligules yellow; outer ligules ± flat, outside broadly striped grayish green; inner ligules with grayish apical teeth; floret tube pubescent. Stigmas grayish green. Anthers polliniferous; pollen grains irregular in size. Achene pale grayish straw-colored brown, 3.9–4.1(–4.3) × 0.9–1 mm; body ± subsparsely spinulose above, gradually narrowing into a thin cylindric 0.6–0.7 mm cone; beak 0.9–1.1 cm. Pappus yellowish white, 7–8 mm. Fl. spring. Agamosperm.

Grasslands; ca. 300 m. Liaoning [N Korea].

Taraxacum albomarginatum is a rather marginal species in *T.* sect. *Mongolica* because of its thin, pale, and ± subsparsely spinulose achenes.

63. Taraxacum junpeianum Kitamura, Acta Phytotax. Geobot. 4: 103. 1935.

长春蒲公英 chang chun pu gong ying

Herbs 12–20 cm tall. Petiole reddish, narrow; leaf blade mid-green to deep green with a pale green to purplish midvein, ± oblanceolate, 6–15 × 1.3–2.5 cm, sparsely arachnoid, pinnatisect, sometimes divided to very midvein; lateral lobes 3–5, narrowly triangular to linear-triangular, patent to subrecurved, proximal margin minutely dentate or entire, distal margin usually with a few minute teeth near base; interlobes 2–3(–4) mm wide, margin with several acute filiform teeth or lobules; terminal lobe triangular to 3-partite, margin entire or with 1 or 2 teeth at base of basal segments, apex acute. Scapes brownish green, overtopping leaves, arachnoid below capitulum. Capitulum 2–3 cm wide. Involucre 0.9–1.1 cm wide, base rounded. Outer phyllaries (10–)13–16, green or suffused pinkish, ± not imbricate, ovate, outermost ones (6–)7–9 × (2.3–)3.5–4(–5.5) mm and 1/2–3/5 as long as inner ones, appressed, surface with a distinct venation, with an indistinct paler membranous whitish green border to 1 mm wide, margin subglabrous, corniculate near apex; inner phyllaries 1.3–1.4 cm. Ligules yellow; outer ligules outside striped gray; ligule tube pubescent. Stigmas ± yellow. Anthers polliniferous; pollen irregular in size. Achene reddish brown to light red, (3.4–)3.6–4(–4.2) × 0.7–0.9 mm; body spinulose above, subgradually narrowing into a thin cylindric 0.7–0.8 mm cone, spinules ± erect-patent and acute; beak 8–9 mm. Pappus yellowish white, 5–6 mm. Fl. spring. Agamosperm.

• Grasslands; ca. 300 m. Jilin.

The sectional position of *Taraxacum junpeianum* is rather uncertain. The characters of outer phyllaries point to *T.* sect. *Mongolica*, but achene traits are outside the generally accepted limits of the section. In any case, the character combination is unique, and the name cannot be equated with any related taxon of *T.* sect. *Mongolica* as was done in FRPS (80(2): 44. 1999).

64. Taraxacum siphonanthum X. D. Sun, X. J. Ge, Kirschner & Štěpánek, Folia Geobot. 36: 210. 2001.

管花蒲公英 guan hua pu gong ying

Herbs 10–20 cm tall. Petiole green or suffused pinkish, narrowly winged; leaf blade deep green to slightly grayish dark green, ± oblanceolate, 8–13 × 2.5–3.5 cm, subglabrous to sparsely arachnoid, pinnatifid to pinnatisect; lateral lobes 4–6, triangular to narrowly triangular, patent, margin entire or with a few minute teeth near base of distal side; interlobes short, ca. 5 mm wide, margin entire; terminal lobe triangular to 3-partite, short, margin entire, apex acute. Scapes brownish green, overtopping leaves, arachnoid below capitulum but later often glabrescent. Capitulum 2–3 cm wide. Involucre 0.9–1.1 cm wide, base subconic to ± narrowly rounded. Outer phyllaries 9–12, green with midvein or middle part blackish green, not imbricate, ovate to narrowly ovate, outermost ones 5–7.5 × 2.2–3 mm and 2/5–1/2 as long as inner ones, ± appressed, surface with a distinct venation, border paler, membranous-whitish green, and usually 0.4–0.6 mm wide, margin glabrous or sparsely ciliate, near apex corniculate or with a horn; inner phyllaries 1.4–1.7 cm, apex corniculate or with a horn. Ligules deep yellow; outer ligules completely tubular, not striped; inner ligules completely tubular, with darker apical teeth; ligule tube pubescent. Stigmas pale brownish yellow, not exserted. Anthers polliniferous; pollen grains irregular in size. Achene light grayish to pale brownish, 5.2–5.7 × ca. 1 mm; body ± smooth below, subdensely spinulose above, subgradually narrowing into a thin cylindric ca. 1 mm cone, spinules long, ± erect-patent, and acute; beak 8–10 mm. Pappus white, 7–8 mm. Fl. late spring. Agamosperm.

• Open woodlands with *Populus davidiana*, *Betula mongolica*, and *Spiraea* spp.; 800–1200 m. Nei Mongol.

In regards to structural differences, *Taraxacum siphonanthum* does not deviate from the pattern observed in other sections of the genus, and its recognition as a separate genus is not justified.

The names *"Neo-taraxacum"* and *"N. siphonanthum"* (Y. R. Ling & X. D. Sun, Bull. Bot. Res., Harbin 21: 175–176. 2001), the latter intended as a new combination based on *T. siphonanthum*, were not validly published.

65. Taraxacum aurantiacum Dahlstedt, Acta Horti Berg. 4(2): 9. 1907.

橘黄蒲公英 ju huang pu gong ying

Herbs 8–20 cm tall. Petiole purple on midvein or green, winged to narrowly winged in outer and middle leaves and unwinged in inner ones, base densely arachnoid; leaf blade glaucous-green and with a purplish or green midvein, narrowly elliptic to narrowly oblanceolate, 6–12 × 1.5–2.5 cm, arachnoid, ± pinnatisect or rarely outer leaves undivided; lateral lobes 3 or 4 pairs, triangular to narrowly triangular, recurved to subrecurved but distal part sometimes patent, apex acute, proximal margin entire or with a few teeth, distal margin usually sigmoid to ± straight and most often entire but sometimes with 1 or 2 acute teeth; interlobes spotted dark brownish purple, 3–5 × 3–4 mm, margin irregularly dentate; terminal lobe narrowly triangular to lingulate-elongated, distal margin concave or sigmoid and usually entire, apex acute. Scapes purplish green, equaling to overtopping leaves, densely arachnoid to almost tomentose. Capitulum 3–4(–5) cm wide. Involucre light olivaceous green, ca. 1 cm wide, base ± rounded. Outer phyllaries 13–17, light olivaceous green, ± not imbricate, narrowly lanceolate to linear-lanceolate, outermost ones 6–7 × (1.5–)2–3 mm and ca. 2/3 as long as inner ones, erect but distal part often erect-arcuate, distinctly veined, border not distinct, suffused brownish purple or membranous, and 0.1–0.3 mm wide, margin ± long ciliate, apex with purplish brown horn; inner phyllaries 1.1–1.3 cm, apex dark corniculate. Ligules orange; outer ligules flat, outside striped faintly brownish purple; inner ligules with dark brownish purple apical teeth. Stigmas dark (brownish) purplish. Anthers without pollen. Achene light grayish straw-colored brown, 4.3–5.1 × 1.2–1.5 mm; body densely squamulose throughout, ± abruptly narrowing into a cylindric to subcylindric (0.7–)0.9–1.2(–1.4) mm cone; beak 5–8 mm. Pappus whitish, ca. 7 mm. Fl. summer. Agamosperm.

• Alpine meadows; ca. 3500 m. S Gansu, W Sichuan.

Taraxacum aurantiacum probably also occurs in SE Xizang as the localities in Sichuan are very close to the Xizang border. This taxon was entirely overlooked as a member of the Chinese flora since its description. The report of *T. aurantiacum* from Afghanistan (Soest in K. H. Rechinger, Fl. Iranica 122: 244. 1977) is erroneous because the voucher specimens and the published description belong to another taxon.

66. Taraxacum variegatum Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 2: 302. 1938.

斑叶蒲公英 ban ye pu gong ying

Herbs 12–20 cm tall. Petiole green, sparsely arachnoid, narrowly winged; leaf blade deep green, ± broadly oblanceolate, 9–20 × (2–)3–6 cm, sparsely arachnoid, pinnatisect; lateral lobes 4–6 pairs, from a broadly triangular base narrowing into linear-triangular distal part or narrowly triangular, ± patent, proximal margin ± entire or dentate, distal margin usually conspicuously filiform dentate, apex acute; interlobes (and lobe bases) with conspicuous brownish purple spot, margin filiform dentate to lobulate; terminal lobe 3-partite, basal segments ± patent and apex acute, terminal segment triangular to narrowly triangular, margin with a few teeth at base or ± entire, and apex acute. Scapes brownish green, subequaling leaves, sparsely arachnoid to arachnoid. Capitulum 4.5–5.5 cm wide. Involucre 1.1–1.4 cm wide, base rounded. Outer phyllaries 12–15, mid-green with darker midvein and margin and apical part usually suffused purplish, ± not imbricate, ± broadly lanceolate to rarely narrowly lanceolate or ± ovate, outermost ones (8–)9–11 × (2.5–)3–4 mm, erect, with prominent venation, paler border not developed, margin glabrous, apex with 1–2.5 mm thick horn; inner phyllaries 1.6–1.9 cm, apex corniculate. Ligules yellow; outer ligules ± flat, outside striped blackish; inner ligule with ± yellow apical teeth. Stigmas dirty yellow to light grayish yellow. Anthers polliniferous; pollen grains irregular in size. Achene light (yellowish) straw-colored brown, (4–)4.1–4.4(–4.6) × 1.1–1.3 mm; body densely spinulose-squamulose throughout or only in upper ca. 1/2 and then other parts ± rugose, ± abruptly narrowing into a subconic (0.7–)0.8–0.9(–1) × 0.3–0.4 mm cone, spinules or squamules short; beak 8–9.5 mm, thin. Pappus yellowish white, 5–6 mm. Fl. spring. Agamosperm.

• Grasslands, roadsides; below 100–400 m. Jilin, Liaoning.

Taraxacum variegatum as treated in FRPS (80(2): 36. 1999, incl. *T. erythropodium*, here treated separately) is also reported from Beijing, Hebei, Heilongjiang, and Nei Mongol, but the material has not been revised.

67. Taraxacum lamprolepis Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 2: 306. 1938.

光苞蒲公英 guang bao pu gong ying

Herbs 7–18 cm tall. Petiole purplish, narrowly winged or (in inner leaves) unwinged; leaf blade mid-green, narrowly oblong, 7–15(–18) × 0.8–3.5 cm, sparsely arachnoid, pinnatisect; lateral lobes 4–6(or 7) pairs, narrowly triangular, linear-triangular, or seldom ± linear, usually 9–17 × 2.5–7 mm, recurved, proximal margin straight and usually entire, distal margin ± straight and entire or with 1–3 teeth; interlobes narrow, margin most often remotely dentate; terminal lobe narrowly triangular-sagittate or ± triangular, usually elongated, with 1 or 2 irregular lobules or incisions, apex acute. Scapes purplish green, equaling or ± overtopping leaves, sparsely arachnoid. Capitulum 3–4 cm wide. Involucre 8–10 mm wide, base ± narrowly rounded. Outer phyllaries 8–12, dark or deep green but sometimes light green or blackish green, ± not imbricate, broadly lanceolate to ovate, outermost ones (6–)7–9(–10) × 2.5–4 mm and 1/2–3/5 as long as inner ones, ± loosely appressed but later often erect-patent, venation often prominent and midvein dark, border paler, light green to whitish green but often suffused purplish, 0.3–1 mm wide, membranous, and with a gradual transition to darker middle part, margin sparsely ciliate near apex, apex ± flat in early capitula but with a thick horn in later ones; inner phyllaries 1.4–1.7 cm, apex ± flat. Ligules yellow; outer ligules flat, outside striped dark gray. Stigmas deep dirty yellow to grayish yellow. Anthers polliniferous; pollen grains irregular

in size. Achene ± light straw-colored brown, 3.7–4.2 × 1.2–1.3 mm; body densely spinulose in upper ca. 1/3, abruptly narrowing into a conic to subcylindric 0.5–0.8 mm cone, spinules short, thin, erect-patent to sometimes patent, and acute; beak 8–9 mm, thin. Pappus yellowish white, 6–8 mm. Fl. spring. Agamosperm.

• Hill slopes, fields; 100–300 m. Jilin.

Taraxacum lamprolepis was described from Jilin. FRPS (80(2): 19. 1999) reported it from Heilongjiang, Liaoning, and E Nei Mongol, but re-examination of the material is needed.

In the original description *Taraxacum lamprolepis* is compared with *T. sinicum*, but in FRPS (80(2). 19. 1999) *T. lamprolepis* is included in *T.* sect. *Sinensia*, corresponding in this conception to our *T.* sect. *Stenoloba*. Neither the achene features nor outer phyllaries point to *T.* sect. *Stenoloba*. The large thick horns developing on outer phyllaries of a few young flowering capitula, reticulate venation of outer phyllaries, relatively thick achenes, and outer phyllary shape all place this taxon in *T.* sect. *Mongolica*.

9. **Taraxacum** sect. **Turrita** Kirschner & Štěpánek, **sect. nov.**

塔状蒲公英组 ta zhuang pu gong ying zu

Type: *Taraxacum turritum* Kirschner & Štěpánek.

Plantae agamospermae subserotinae, plerumque altae, turritae, foliis erectis, rectis, subcoriaceis, pinnatisectis, lobis lateralibus et lobo terminali acuminatis, petiolis anguste alatis, capitulis magnis, phyllariis involucralibus exterioribus numerosis (15 ad 25), angustis, lineari-lanceolatis usque lanceolatis, suberectis usque arcuato-patentibus, olivaceo-viridibus, anguste indistincte marginatis, obscure callosis vel corniculatis, ligulis luteis, tubo flosculorum pubescente, acheniis pallide stramineo-brunneis vel pallide olivaceo-brunneis, longissimis, (4–)5–6.1 mm longis, 1–1.3 mm latis, corpore superne subsparse usque dense spinuloso-squamuloso, sensim vel subabrupte in pyramidem angustam subcylindricam (1–)1.2–2.2 mm longam transiente, rostro 0.8–1.2 cm, pappo albido-lutescente 7–8 mm longo.

Plants usually tall. Leaves erect, straight, subleathery; petiole usually narrowly winged; leaf blade narrow, pinnatisect; lateral and terminal lobes usually acuminate at apex. Capitulum large. Outer phyllaries 15–25, linear-lanceolate to lanceolate, narrow, from suberect to arcuate-patent (of almost evenly "echinate" appearance), olivaceous green, indistinctly narrowly bordered, apex dark callose to less often corniculate. Ligules yellow; floret tube pubescent. Achene light grayish straw-colored brown to light olivaceous brown, (4–)5–6.1 × 1–1.3 mm; body subsparsely to densely spinulose and/or squamulose in upper ca. 1/3, gradually to subabruptly narrowing into a ± thin subcylindric (1–)1.2–2.2 mm cone; beak 0.8–1.2 cm, thin. Pappus yellowish white to light brownish white, 7–8 mm. Agamosperms.

About six species: C Asia to China; three species (all endemic) in China.

1a. Pollen absent ..... 68. *T. turritum*
1b. Pollen present.
2a. Achene 5.3–5.6 mm, cone 1.3–1.6 mm ..... 69. *T. celsum*
2b. Achene 4.2–4.4 mm, cone ca. 1 mm ..... 70. *T. orientale*

68. **Taraxacum turritum** Kirschner & Štěpánek, **sp. nov.**

塔状蒲公英 ta zhuang pu gong ying

Type: China. Yunnan: "Zhongdian [中甸] Plateau (west), a path to Tian Shi Lake, *Abies* forest and alpine meadows," Jun 1995, *A. J. Richards*, cultivated as JK 4056 (holotype, PRA; isotypes, PRA).

Paratypes: China. Yunnan: *ibidem*, cultivated as JK 4052, JK 4053, JK 4054, JK 4055, JK 4058, JK 4059, JK 4061, JK 4062, JK 4063 (PRA); "Zhongdian Co. [中甸县], NW margin of Zhongdian Plateau," 23 May 1999, *R. Businský & L. Businská s.n.*, cultivated as JŠ 7430, JŠ 7436, JŠ 7448 (PRA); "Zhongdian [中甸] Plateau (north), Napa Hai [纳帕海], meadows 7 km NW of the pass," Jun 1995, *A. J. Richards s.n.*, cultivated as JK 4069, JK 4073 (PRA); "Zhongdian [中甸] Plateau (north), Napa Hai [纳帕海], road out of the plateau," Jun 1995, *A. J. Richards s.n.*, cultivated as JK 4064 (PRA); "South end of Zhongdian [中甸] Plateau, ca. 45 km S of Zhongdian," Jun 1995, *A. J. Richards s.n.*, cultivated as JK 4038, JK 4043 (PRA).

Plantae agamospermae, robustae, foliis ± subcoriaceis, plerumque pinnatisectis, lobis lateralibus numerosis, lineari-triangularibus vel linearibus, lobo terminali acuminato, phyllariis involucralibus exterioribus 18 ad 20, anguste lanceolatis vel lineari-lanceolatis, erecto-arcuatis usque arcuato-patentibus, ecorniculatis, stigmatibus luteo-viridibus, antheris polline carentibus, acheniis griseo-stramineis, eximie longis, superne squamuloso-spinulosis, in pyramidem angustam subcylindricam 1–2.2 mm longam ± sensim abeuntibus.

Herbs 15–22 cm tall, usually robust. Petiole pinkish, broadly to narrowly winged; leaf blade light mid-green, ± oblanceolate to linear-oblanceolate, 11–22 × 2–3.5 cm, ± subleathery, sparsely to ± densely arachnoid, usually pinnatisect, midvein usually pinkish near base otherwise pale green; lateral lobes 6 or 7(–9), to 1.8 cm, from ca. 0.8 cm wide at base narrowing into linear or linear-triangular acute distal part, usually ± patent, proximal margin ± straight and entire, distal margin concave and usually with a distinct basal lobule and/or a few teeth; interlobes 3–5 mm wide, margin sparsely dentate; terminal lobe ± narrowly triangular, 1.5–2.5 × ca. 1.5 cm, basal segments patent to subrecurved or ± curved upward, terminal with distal margin concave or straight and usually entire and apex acuminate. Scapes light green but light pinkish at base, ± equaling

leaves, ± densely arachnoid. Capitulum 3.5–4.5 cm wide. Involucre 8–10 mm wide, base broadly obconic. Outer phyllaries 18–20, dark brownish green, narrowly lanceolate to linear-lanceolate, outermost ones 7–9 × 2–3 mm and 2/3–4/5 as long as inner ones, variously erect-arcuate to arcuate-patent but ± patent after anthesis, border paler membranous and 0.1–0.2 mm wide, margin sparsely ciliate and often remotely serrulate, apex dark callose; inner phyllaries 1.2–1.3 cm, apex ± flat. Ligules deep yellow; outer ligules ± flat, outside striped indistinctly grayish green; inner ligules with yellow apical teeth. Stigmas grayish yellowish green. Anthers without pollen. Achene grayish straw-colored brown, (4–)5.3–6.1 × 1–1.2 mm; body ± densely squamulose and spinulose in upper ca. 1/3, ± gradually narrowing into a thin subcylindric (1–)1.5–2.2 mm cone, spinules curved upward; beak 1–1.3 cm. Pappus brownish white, ca. 7 mm. Fl. late spring. Agamosperm.

• Grazed alpine meadows, margins of *Abies* forests; 3200–4300 m. NW Yunnan.

69. Taraxacum celsum Kirschner & Štěpánek, **sp. nov.**

高茎蒲公英 gao jing pu gong ying

Type: China. Sichuan: "Vallis fluminis Gar Qu [甘孜区]," 12 Oct 2004, *P. Sekerka, P. Hanzelka & I. Bulánková 04/70*, cultivated as JŠ 7965 (holotype, PRA; isotypes, PRA).

Plantae agamospermae altae, foliis erectis subcoriaceis pinnatisectis, lobis lateralibus plerumque sursum curvatis, parte distali lingulatis, acutis, lobo terminali vulgo mucronulato, scapis dense araneosis, calathiis usque ad 5 cm latis, saturate luteis, phyllariis involucralibus exterioribus 20 ad 25, lanceolatis vel anguste lanceolatis, phyllariis interioribus fere aequilongis, apice arcuatis usque arcuato-recurvatis, callosis usque cornutis, stigmatibus luteo-viridibus, antheris polliniferis, acheniis griseo-stramineis, eximie longis, superne distincte spinulosis, in pyramidem subcylindricam 1.3–1.6 mm longam subabrupte abeuntibus.

Herbs 25–35 cm tall, robust. Petiole purple, broadly winged in outer leaves but almost unwinged in inner ones; leaf blade light bright green and usually with a pale grayish pink midvein, ± narrowly oblanceolate to linear-lanceolate, 15–25 × 3.5–4.5 cm, subleathery, sparsely to ± densely arachnoid, pinnatisect; lateral lobes 4 or 5(or 6), ca. 2 cm, from ca. 1 cm wide base abruptly narrowing into a lingulate acute distal part, usually conspicuously pointing upward but less often ± patent, proximal margin ± straight, distal margin sigmoid, dentate, and incised; interlobes to 2 cm, margin sparsely dentate, teeth long and narrow; terminal lobe ± broadly triangular to deltoid, 1.5–2(–3.5) × 2–3.5 cm, basal segments patent to curved upward, terminal segment with distal margin concave and entire and apex acute and submucronate. Scapes light green but purplish at base, overtopping leaves, densely arachnoid. Capitulum to 5 cm wide. Involucre 1–1.2 cm wide, base broadly obconic. Outer phyllaries 20–25, light to deep olivaceous green, lanceolate to narrowly lanceolate, outermost ones 9–13 × 3.5–4.5 mm and often almost as long as inner ones, variously arcuate-recurved, paler whitish border 0.1–0.2 mm wide, margin densely ciliate but later glabrescent, apex callose to horned with horn to 1.5 mm; inner phyllaries ca. 1.3 cm, apex ± corniculate. Ligules deep yellow; outer ligules ± flat, outside striped light grayish pink; inner ligules with reddish or yellow apical teeth. Stigmas greenish dirty yellow. Anthers polliniferous, striped brownish red on edges; pollen grains irregular in size. Achene grayish straw-colored brown, 5.3–5.6 × 1–1.3 mm; body ± densely spinulose in upper ca. 1/3, subabruptly narrowing into a subcylindric 1.3–1.6 mm cone, spinules long, thin, and ± suberect; beak ca. 1 cm. Pappus dirty white, 7–8 mm. Fl. late spring. Agamosperm.

• Moist alpine meadows; ca. 3500 m. W Sichuan.

70. Taraxacum orientale Kirschner & Štěpánek, **sp. nov.**

东方蒲公英 dong fang pu gong ying

Type: China. Sichuan: "Opp. Dawu [道孚]: ad ripam dextram fluminis Da Qu," 1 Jun 1992, *L. Businská & R. Businský 2*, cultivated as JŠ 5126 (holotype, PRA; isotypes, PRA).

Plantae agamospermae, mediocres, foliis pinnatilobis usque pinnatisectis, lobis lateralibus triangularibus, lobo terminali anguste triangulari, petiolis anguste alatis, phyllariis involucralibus exterioribus 15 ad 19, lanceolatis usque anguste lanceolatis, suberecto-arcuatis usque arcuato-recurvatis, immarginatis, ecorniculatis, stigmatibus luteo-viridibus, antheris polliniferis, acheniis griseo-stramineis, 4.2–4.4 mm longis, corpore superne dense spinuloso, in pyramidem ± cylindricam ca. 1 mm longam ± abrupte transiente.

Herbs 15–25 cm tall, medium-sized. Petiole dark purple, narrowly winged; leaf blade light green, linear-oblong to ± narrowly oblanceolate, 8–20 × 2–4 cm, ± subleathery, sparsely arachnoid, pinnatilobed on outer leaves to pinnatisect in middle ones, midvein usually brownish purple but distally often light green; lateral lobes (3–)5–7, triangular and distally ± abruptly narrowing into a narrow acute apex, small, subrecurved or less often ± patent, proximal margin straight and entire, distal margin sigmoid and usually entire but sometimes dentate; interlobes short and broad, margin usually entire; terminal lobe ± narrowly triangular, (1–)1.5–2.3(–3.5) × 1–1.5 cm, basal segments patent to subrecurved and apex acuminate, terminal segment with distal margin sigmoid and entire or with a few asymmetric teeth and apex acute to acuminate. Scapes light green but later brownish, often pinkish at base, overtopping leaves, arachnoid but glabrescent. Capitulum ca. 3 cm wide. Involucre 8–10 mm wide, base broadly obconic to flat. Outer phyllaries 15–19, dark olivaceous green but later adaxially often brownish purple, lanceolate to narrowly lanceolate, outermost ones 6–9 × 2–3 mm and 2/5–1/2 as long as inner ones, of various posture from suberect-arcuate to arcuate-recurved, paler border indistinct, margin glabrous, apex often callose; inner phyllaries 1.2–1.3 cm. Ligules deep yellow; outer ligules ± flat, outside striped purplish grayish brown; inner ligules with reddish or yellow apical teeth. Stigmas yellowish green. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, 4.2–4.4 × 1–1.2 mm; body densely spinulose in upper ca. 1/3, ± abruptly narrowing into a thin ± cylindric ca. 1 mm cone, spinules ± long; beak 8–9 mm. Pappus ± white, ca. 7 mm. Fl. late spring. Agamosperm.

• Mountain meadows; 3100–3300 m. W Sichuan.

10. Taraxacum sect. **Qaisera** Abedin, Pakistan J. Bot. 39: 1427. 2007.

乌兹别克斯坦蒲公英组 wu zi bie ke si tan pu gong ying zu

Plants medium-sized. Leaves light green to deep green, arachnoid, not thickened; petiole usually purplish or pinkish, usually broadly to narrowly winged but in inner leaves sometimes unwinged; leaf blade usually pinnatisect; lateral lobes usually triangular, subrecurved. Outer phyllaries usually 13–19, ovate, broadly ovate, or sometimes ovate-lanceolate, usually appressed, loosely appressed erect, or ± erect-patent, venation distinct or not clearly visible, border narrow to broad, apex usually flat or sometimes corniculate. Ligules yellow; ligule tube pubescent with straight hairs. Achene grayish straw-colored brown, 3.6–5 × 0.9–1.2 mm; body often with prominent lateral ridges (narrowly winged), densely shortly spinulose above, abruptly to almost gradually narrowing into a conic to subcylindric 0.4–0.8(–1.1) mm cone; beak usually 6–10 mm, thin. Pappus white or yellowish white.

About 35 species: centered in C Asia; 20 species (19 endemic) in China.

The sectional type, *Taraxacum qaiseri* Abedin from Pakistan, is based on a single, imperfectly prepared and preserved specimen, and it is difficult to interpret the section on this basis. The members of *T.* sect. *Qaisera*, as understood here, are superficially similar to those of *T.* sect. *Taraxacum* but have outer phyllaries very broad, usually ovate to broadly ovate, appressed to erect-patent, and sometimes even imbricate; petioles usually broadly winged; and ligule tube with straight hairs. *Taraxacum* sect. *Qaisera* is comprised of mostly agamospermous hybridogenous species of unknown parentage. We can hypothesize on the basis of morphological similarity that one of the parental taxa may belong to *T.* sect. *Calanthodia*.

Taraxacum ecornutum Kovalevskaja (Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. S.S.R. 17: 14. 1962) was reported to occur in China (FRPS 80(2): 72. 1999). It is a taxon undoubtedly belonging to *T.* sect. *Qaisera*, but we failed to find convincing material supporting this record.

Taraxacum pseudoalpinum Schischkin (Fl. Kazakhst. 9: 437, 571. 1966) and *T. pseudoroseum* Schischkin (Fl. URSS 29: 528, 744. 1964), described from C Tian Shan, belong to *T.* sect. *Qaisera*. They were reported as members of the Chinese flora (FRPS 80(2): 71–72. 1999), but we failed to find any specimens of these two taxa from China.

1a. Pollen absent.
2a. Stigmas yellow ..... 75. *T. florum*
2b. Stigmas discolored ..... 83. *T. aeneum*
1b. Pollen present.
3a. Pollen grains regular in size ..... 86. *T. xinyuanicum*
3b. Pollen grains irregular in size.
4a. Outer phyllaries with thick horns ..... 90. *T. brevicorniculatum* (see also key to *T.* sect. *Ceratoidea*)
4b. Outer phyllaries flat to ± minutely corniculate.
5a. Outer phyllaries patent, arcuate-patent, erect-patent or subrecurved, not appressed to erect.
6a. Outer phyllaries imbricate; leaves ± glabrous ..... 79. *T. tonsum*
6b. Outer phyllaries not imbricate; leaves sparsely arachnoid.
7a. Outer phyllaries with a broad paler border to 2 mm wide ..... 71. *T. horizontale*
7b. Outer phyllaries with a narrow pale border 0.1–0.2 mm wide.
8a. Achene cone subcylindric, 0.8–0.9 mm ..... 72. *T. perplexans*
8b. Achene cone ± conic, 0.5–0.7 mm ..... 80. *T. damnabile*
5b. Outer phyllaries appressed, loosely appressed, or erect.
9a. Outer phyllaries not imbricate.
10a. Achene body abruptly narrowing into a ca. 0.4 mm cone ..... 77. *T. icterinum*
10b. Achene body gradually narrowing into a 0.8–1.1 mm cone.
11a. Outer phyllaries 8–9 mm ..... 84. *T. simulans*
11b. Outer phyllaries 4–7 mm.
12a. Stigmas yellow ..... 81. *T. adglabrum*
12b. Stigmas light discolored ..... 88. *T. puberulum*
9b. Outer phyllaries imbricate.
13a. Stigmas yellow ..... 79. *T. tonsum*
13b. Stigmas discolored.
14a. Involucre base obconic ..... 78. *T. cyathiforme*
14b. Involucre base rounded to truncate.
15a. Outer phyllaries 6–8 mm wide ..... 82. *T. subcontristans*
15b. Outer phyllaries 3–5 mm wide.
16a. Paler border to outer phyllaries 0.5–1 mm wide.
17a. Achene body subabruptly narrowing into a conic 0.7–0.9 mm cone; beak ca. 6 mm; stigmas blackish green ..... 87. *T. potaninii*
17b. Achene body ± gradually narrowing into a subcylindric 0.8–1 mm cone; beak ca. 9 mm; stigmas yellowish green ..... 89. *T. protractifolium*
16b. Paler border to outer phyllaries not developed or 0.1–0.2 mm wide.

18a. Achene cone 0.4–0.6 mm.
19a. Achene body 1–1.2 mm thick, lateral ridges prominent and with large remote spinules; distal margin of leaf lateral lobes dentate; leaf lobes not approximate ..... 73. *T. imbricatius*
19b. Achene body ca. 0.9 mm thick, lateral ridges not prominent and with ± dense, medium-sized spinules; distal margin of leaf lateral lobes entire; leaf lobes approximate ..... 76. *T. abbreviatulum*
18b. Achene cone 0.8–1.1 mm.
20a. Achene 4.3–4.5 mm, cone 0.9–1.1 mm; outer phyllaries 14–17; leaf blade interlobes usually conspicuously spotted purplish brown ..... 74. *T. pseudocalanthodium*
20b. Achene 3.8–4 mm, cone 0.8–0.9 mm; outer phyllaries 17–20; leaf blade interlobes not spotted or faintly so ..... 85. *T. subcalanthodium*

71. Taraxacum horizontale Kirschner & Štěpánek, **sp. nov.**

平枝蒲公英 ping zhi pu gong ying

Type: China. Xinjiang: "Tian Shan [天山], pars montium Borohoro Shan [婆罗科努山], situ occid. a lacu Sayram Hu [塞里木湖]," 2109 m, 29 Sep 2004, *P. Sekerka, P. Hanzelka & I. Bulánková 04/27*, cultivated as JŠ 7957 (holotype, PRA; isotypes, MO, PE, PRA).

Plantae agamospermae, mediocres, foliis laete viridibus, pinnatisectis, lobis lateralibus 4 vel 5 utrinque, interlobiis maculatis, lobo terminali triangulari vel late triangulari, petiolis perlate alatis, phyllariis involucralibus exterioribus 15 ad 20, pallide viridibus, lanceolatis vel ovato-lanceolatis, irregulariter patentibus vel erecto-patentibus usque arcuato-patentibus, stigmatibus sordide luteo-virescentibus, antheris polliniferis, acheniis plerumque 3.6–3.8 mm longis et conspicue latis, superne dense spinulosis, in pyramidem conicam ca. 0.5 mm longam subabrupte abeuntibus.

Herbs 15–20 cm tall. Petiole light green to faintly pinkish, very broadly winged; leaf blade yellowish green and usually with a faintly brownish purple midvein, oblanceolate, 11–20 × 4–5.5 cm, sparsely arachnoid, regularly pinnatisect; lateral lobes 4 or 5 pairs, ± narrowly triangular, to 2.5 × 1.5 cm, patent to subrecurved, distal margin slightly convex or ± sigmoid and usually entire, apex acute; interlobes evident, with purplish brown spots, margin dentate; terminal lobe triangular to broadly triangular, 1.5–2.5 × ca. 1.5 cm, margin entire, apex subacute. Scapes light brownish green, subequaling leaves, usually densely arachnoid. Capitulum ca. 4.5 cm wide. Involucre 1–1.2 cm wide, base ± rounded. Outer phyllaries 15–20, abaxially light green suffused pinkish and with a slightly darker middle part, adaxially slightly glaucous-green, ± not imbricate, lanceolate to ovate-lanceolate, outermost ones 10–12 × (3–)4–5 mm and ca. 3/4 as long as inner ones, ± irregularly patent, erect-patent, or arcuate-patent, laterally with gradual transition into a whitish green border to 2 mm wide and a membranous fringe 0.2–0.3 mm wide, margin sparsely ciliate, apex ± flat; inner phyllaries ca. 1.5 cm. Ligules deep yellow; outer ligules ± flat, outside striped purplish gray; inner ligules with grayish purple teeth at apex; ligule tube pubescent. Stigmas grayish greenish yellow. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 3.6–3.8 × 1.2–1.4 mm; body subdensely spinulose-squamulose above, subabruptly narrowing into a conic ca. 0.5 mm cone; beak 8–10 mm. Pappus dirty white, 6–7 mm. Fl. late spring. Agamosperm.

• Montane meadows and pastures; 2000–2200 m. W Xinjiang.

72. Taraxacum perplexans Kirschner & Štěpánek, **sp. nov.**

惊喜蒲公英 jing xi pu gong ying

Type: China. Xinjiang: "montes Altaj [阿尔泰山], situ boreal. a Qinghe [青河]," 1557 m, 23 Sep 2004, *P. Sekerka, P. Hanzelka & I. Bulánková 04/06*, cultivated as JŠ 7959 (holotype, PRA; isotypes, MO, PE, PRA).

Paratypes: China. Xinjiang: *ibidem*, *P. Sekerka, P. Hanzelka & I. Bulánková 04/06*, cultivated as JŠ 7958 (PRA); Korla Xian [库尔勒县], May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml s.n.*, cultivated as JŠ 7383 (PRA); "Tian Shan [天山], Wang Mu Miao monastery near Tian Chi lake [天池湖]" [probably Xiwang Muzumiao 西王母祖庙], 1950 m, 2 Oct 2003, *P. Sekerka 03/2*, cultivated as JK 4947 (PRA).

Plantae agamospermae, mediocres vel subrobustae, laminis foliorum saturate viridibus, saepissime anguste oblanceolatis, pinnatisectis, lobis lateralibus (4 ad)6 vel 7 utrinque, anguste triangularibus patentibusve, interlobiis purpureo-marginatis, petiolis foliorum exteriorum late alatis, phyllariis involucralibus exterioribus 17 ad 20, lanceolatis vel ovato-lanceolatis, irregulariter patentibus, stigmatibus luteo-viridibus, antheris polliniferis, acheniis 3.9–4.1 mm longis, superne dense squamuloso-spinulosis, in pyramidem subcylindricam 0.8–0.9 mm longam abrupte abeuntibus.

Herbs 15–22 cm tall. Petiole light purplish green, broadly winged in outer leaves but narrowly so in middle ones; leaf blade deep green, narrowly elliptic to narrowly oblanceolate, 10–23 × 3–5.5 cm, ± sparsely arachnoid, pinnatisect, midvein adaxially brownish purple throughout; lateral lobes (4–)6 or 7 pairs, ± narrowly triangular, 1–2.5 × 1–1.5 cm, ± patent but sometimes slightly bent upward, distal margin of upper lobes ± entire but denticulate in lower ones, apex acute; interlobes evident, bordered purplish brown and with raised denticulate margin; terminal lobe triangular to broadly triangular, 1–3.5 × 1.4–3 cm, margin entire or with 1 or 2 asymmetric incisions, apex subacute. Scapes purplish green, ± equaling leaves, usually

densely arachnoid. Capitulum ca. 4 cm wide. Involucre 1–1.2 cm wide, base ± truncate. Outer phyllaries 17–20, abaxially light olivaceous green suffused brownish pink near apex, adaxially pale grayish green, ± not imbricate, ± lanceolate to ovate-lanceolate, outermost ones 9–13 × 3.5–5.5 mm and ca. 2/3 as long as inner ones, ± irregularly patent to sometimes arcuate-patent, with whitish membranous 0.1–0.2 mm wide border, margin sparsely ciliate, apex ± flat; inner phyllaries ca. 1.3 cm. Ligules deep yellow; outer ligules ± flat, outside striped purplish or greenish; inner ligules with yellow teeth at apex; ligule tube pubescent. Stigmas greenish yellow, abaxially dark pubescent. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, 3.9–4.1 × ca. 1.1 mm; body ± densely spinulose-squamulose above, ± abruptly narrowing into a subcylindric 0.8–0.9 mm cone; beak ca. 1 cm. Pappus ± white, 6–7 mm. Fl. late spring. Agamosperm.

• Submontane steppe meadows and pastures; ca. 1500 m. Xinjiang.

73. Taraxacum imbricatius Kirschner & Štěpánek, **sp. nov.**

叠鳞蒲公英 die lin pu gong ying

Type: China. Xinjiang: "Montes Altaj [阿尔泰山], situ boreal. a Qinghe [青河]," 1557 m, 23 Sep 2004, *P. Sekerka, P. Hanzelka & I. Bulánková 04/06*, cultivated as JŠ 7963 (holotype, PRA; isotypes, MO, PE, PRA).

Plantae agamospermae, foliis laete viridibus, anguste ellipticis vel ellipticis, pinnatisectis, lobis lateralibus 4 ad 6 utrinque, subrecurvis usque hamato-recurvis, petiolis late usque anguste alatis, phyllariis involucralibus exterioribus 18 ad 21, saturate olivaceo-viridibus, imbricatis, ovatis usque late ovatis, laxe adpressis, stigmatibus luteo-viridibus, antheris polliniferis, acheniis 3.7–3.9 mm longis, superne dense spinulosis, in pyramidem conicam 0.5–0.6 mm longam abrupte abeuntibus.

Herbs 14–18 cm tall. Petiole light purplish green, broadly winged in outer leaves, narrowly so in middle ones, arachnoid at base; leaf blade light green, ± narrowly elliptic to elliptic, 8–16 × 2.5–4.5 cm, arachnoid, pinnatisect, midvein adaxially brownish purple in proximal part; lateral lobes 4–6 pairs, ± triangular to narrowly deltoid-triangular, to 2 × 1.5 cm, subrecurved to hamate-recurved, distal margin convex and entire or with 1 or 2 teeth, proximal margin straight to concave and entire or with 1 large tooth, apex acute; interlobes short, margin raised and dentate; terminal lobe triangular to broadly triangular, 1–2.5 × 1.5–3 cm, margin usually entire, apex subacute. Scapes green but pinkish at base, ± equaling leaves, usually densely arachnoid. Capitulum ca. 3.5 cm wide. Involucre ca. 1 cm wide, base ± truncate. Outer phyllaries 18–21, deep abaxially olivaceous green suffused brownish pink near apex, ± imbricate, ± ovate to broadly ovate (inner of them to ± lanceolate), outermost ones 6–8 × 3–4.3 mm and 1/2–2/3 as long as inner ones, loosely appressed, with an indistinct dirty membranous 0.1–0.2 mm wide border, margin subglabrous to sparsely ciliate, apex ± flat; inner phyllaries 1.2–1.3 cm. Ligules deep yellow; outer ligules ± flat, outside striped purplish grayish brown; inner ligules with yellow teeth at apex; ligule tube pubescent. Stigmas greenish yellow, abaxially dark pubescent. Anthers polliniferous; pollen grains irregular in size. Achene light grayish olivaceous brown, 3.7–3.9 × 1–1.2 mm, with distinct lateral and ventral ridges; body densely spinulose in upper ca. 1/3, ± abruptly narrowing into a conic 0.5–0.6 × ca. 0.3 mm cone, spinules thin and often slightly recurved; beak ca. 1.1 cm. Pappus dirty white, 6–7 mm. Fl. late spring. Agamosperm.

• Submontane steppe meadows and pastures; ca. 1500 m. N Xinjiang.

74. Taraxacum pseudocalanthodium Kirschner & Štěpánek, **sp. nov.**

假大斗蒲公英 jia da dou pu gong ying

Type: China. Xinjiang: "Ad marginem arvi, coord. geogr.: 41°37′45″N, 81°25′19″E" [Baicheng Xian 拜城县], May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml L11*, cultivated as JŠ 7369 (holotype, PRA; isotypes, MO, PE, PRA).

Plantae agamospermae, foliis laete griseo-viridibus, late oblanceolatis usque oblanceolatis, pinnatisectis vel runcinato-pinnatisectis, lobis lateralibus (3 vel)4 vel 5 utrinque, petiolis late usque anguste alatis, phyllariis involucralibus exterioribus 14 ad 17, obscure olivaceo-viridibus nigricantibus, imbricatis, late lanceolatis vel ovato-lanceolatis, laxe adpressis, stigmatibus laete luteo-viridibus, antheris polliniferis, acheniis vulgo 4.3–4.5 mm longis, superne dense squamuloso-spinulosis, in pyramidem conicam 0.9–1.1 mm longam abrupte abeuntibus.

Herbs 15–20 cm tall. Petiole light purplish green, broadly winged in outer leaves but narrowly winged in middle ones; leaf blade light grayish green with a faintly brownish purple midvein, broadly oblanceolate to oblanceolate, 9–12 × 2–3 cm, sparsely arachnoid, pinnatisect to runcinate-pinnatisect; lateral lobes (3 or)4 or 5 pairs, ± triangular to ± deltoid-triangular, subrecurved, proximal margin straight to slightly concave and entire, distal margin convex and entire or with a few acute teeth, apex acute to sometimes ± obtuse; interlobes usually spotted purplish brown, short, margin often raised and entire; terminal lobe usually helmet-shaped, 2.5–4 × 2.5–3 cm, margin ± entire and often with 1 or 2 incisions, apex subacute. Scapes green but pinkish at base, ± overtopping leaves, usually sparsely arachnoid to glabrescent. Capitulum 3–3.5 cm wide. Involucre ca. 1 cm wide, base ± truncate. Outer phyllaries 14–17, abaxially dark (blackish) olivaceous green and wholly suffused brownish purple, ± imbricate, broadly lanceolate to ovate-lanceolate, outermost 8–9 × 3.5–4.5 mm and ca. 2/3 as long as inner ones, loosely appressed, paler border ± not developed or with membranous ca. 0.1 mm border, margin subglabrous or sparsely ciliate, apex ± flat; inner phyllaries ca. 1.3 cm, apex flat. Ligules deep yellow; outer ligules ± flat, outside striped purplish gray; inner ligules with purplish teeth at apex; ligule tube pubescent. Stigmas light greenish yellow, outside dark pubescent. Anthers polliniferous; pollen grains irregular in size. Achene light grayish olivaceous brown, 4.3–4.5 × ca. 1 mm; body ± densely spinulose-squamulose above, ± abruptly narrowing into a ± thin conic (0.9–)1–1.1 mm cone; beak 9.5–10.5 mm. Pappus white, 6–7 mm. Fl. late spring. Agamosperm.

• Field margins, roadsides; 1800–2000 m. W Xinjiang.

75. Taraxacum florum Kirschner & Štěpánek, **sp. nov.**

金发蒲公英 jin fa pu gong ying

Type: China. Xinjiang: "Ad ripam fluminis Ili He [伊犁河], haud procul ab oppido Yining [伊宁]," 600 m, 30 Sep 2004, *P. Sekerka, P. Hanzelka & I. Bulánková 04/32*, cultivated as JŠ 7961 (holotype, PRA; isotypes, MO, PE, PRA).

Paratypes: China. Xinjiang: "Tian Shan [天山], shore of Tian Chi lake [天池湖]," 1914 m, 1 Oct 2003, *P. Sekerka 03/1*, cultivated as JK 4946 (PRA).

Plantae agamospermae mediocres, foliis saturate viridibus, indistincte brunneo-purpurascentibus, oblanceolatis, pinnatisectis, lobis lateralibus 3 ad 5 utrinque, petiolis exalatis vel anguste alatis, phyllariis involucralibus exterioribus 15 ad 18, obscure griseo-viridibus nigricantibus, subpruinosis, late ovatis usque ovato-lanceolatis, 5–7 mm longis, 3–4.5 mm latis, subimbricatis, laxe adpressis, stigmatibus luteis, antheris polline carentibus, acheniis 3.6–4.1 mm longis, superne dense spinulosis, in pyramidem subcylindricam 0.5–0.8 mm longam sensim abeuntibus.

Herbs 12–20 cm tall. Petiole deep brownish purplish green, narrowly winged or unwinged; leaf blade deep green slightly suffused brownish purple, ± oblanceolate, 10–20 × 1.5–3.5 cm, sparsely arachnoid on purplish brown midvein, pinnatisect; lateral lobes 3–5 pairs, ± narrowly triangular, 6–17 × 5–10 mm, ± patent to subrecurved, proximal margin straight and entire, distal margin ± straight to ± sigmoid and entire or with a few acute teeth, apex acute; interlobes with margin ± entire; terminal lobe broadly triangular, margin entire, apex subacute to mucronate. Scapes purplish brown, subequaling leaves, sparsely arachnoid to glabrescent. Capitulum ca. 3 cm wide. Involucre ca. 8 mm wide, base ± rounded. Outer phyllaries 15–18, abaxially dark (blackish) grayish green, slightly pruinose, and suffused brownish purple in upper ca. 1/3, subimbricate, broadly ovate to ovate-lanceolate, outermost ones (5–)6–7 × (3–)3.5–4.5 mm and ca. 1/2 as long as inner ones, loosely appressed, border whitish and 0.1–0.2 mm wide, margin subglabrous or sparsely ciliate, apex flat; inner phyllaries 1–1.1 cm, apex flat. Ligules deep yellow; outer ligules ± flat, outside striped deep gray; inner ligules with long yellow teeth at apex; ligule tube pubescent. Stigmas pure yellow, abaxially pale yellow pubescent. Anthers without pollen. Achene light grayish olivaceous brown, 3.6–4.1 × 0.8–0.9 mm; body ± densely spinulose above, erect-patent, ± gradually narrowing into a subcylindric 0.5–0.8 mm cone, spinules thin; beak (7–)8–11 mm. Pappus white, ca. 6 mm. Fl. late spring. Agamosperm.

• Gravelly and sandy alluvial sites, pastures, shrubby and ruderal sites; 600–2000 m. Xinjiang.

76. Taraxacum abbreviatulum Kirschner & Štěpánek, **sp. nov.**

短茎蒲公英 duan jing pu gong ying

Type: China. Hubei: "Distr. Shennongjia [神农架林区]," 1800–2800 m, 23–30 Jun 1995, *R. Businský s.n.*, cultivated as JŠ 6344 (holotype, PRA; isotypes, MO, PE, PRA).

Paratypes: China. Hubei: *ibidem, R. Businský s.n.*, cultivated as JŠ 6345, JŠ 6348 (PRA).

Plantae agamospermae submediocres, foliis saturate viridibus, anguste oblanceolatis usque oblanceolatis, pinnatifidis vel pinnatisectis, lobis lateralibus 3 vel 4 utrinque, petiolis foliorum exteriorum late alatis, violaceis, phyllariis involucralibus exterioribus 17 ad 19, atro-viridibus usque obscure olivaceo-viridibus, imbricatis, ovatis vel ovato-lanceolatis, laxe adpressis, stigmatibus luteo-viridibus, antheris polliniferis, acheniis vulgo 3.4–3.5 mm longis, superne dense squamuloso-spinulosis, in pyramidem subconicam 0.4–0.5 mm longam subsensim abeuntibus.

Herbs 12–15 cm tall. Petiole purple, broadly winged in outer leaves but ± unwinged in middle ones; leaf blade deep green with a purplish midvein, narrowly oblanceolate to oblanceolate, 7–9 × 2–3 cm, sparsely arachnoid, pinnatifid to pinnatisect; lateral lobes 3 or 4 pairs, ± triangular, ± recurved to hamate-recurved, proximal margin entire, distal margin convex and entire, apex acute; interlobes short and broad, margin often raised but entire; terminal lobe broadly triangular, margin entire, apex subobtuse. Scapes pale brownish green, overtopping leaves, arachnoid. Capitulum to 4.5 cm wide. Involucre 1–1.2 cm wide, base ± truncate. Outer phyllaries 17–19, abaxially dark olivaceous green to blackish green and suffused brownish purple in upper ca. 1/3, ± imbricate, ± ovate to ovate-lanceolate, outermost ones 8–9 × (3.5–)4.5–5 mm and 1/2–3/5 as long as inner ones, loosely appressed, venation slightly prominent, with whitish membranous border ca. 0.1(–0.2) mm wide, margin sparsely ciliate, apex flat; inner phyllaries 1.4–1.5 cm, apex flat. Ligules deep yellow; outer ligules ± flat, outside striped greenish pinkish gray; inner ligules with grayish purple teeth at apex; ligule tube pubescent. Stigmas greenish yellow, abaxially dark pubescent. Anthers polliniferous; pollen grains irregular in size. Achene light grayish olivaceous brown, 3.4–3.5 × ca. 0.9 mm; body ± densely spinulose-squamulose above, subgradually narrowing into a subconic 0.4–0.5 mm cone; beak ca. 9.5 mm. Pappus ± white, ca. 6 mm. Fl. late spring. Agamosperm.

• Montane meadows and pastures; 1800–2800 m. W Hubei.

77. Taraxacum icterinum Kirschner & Štěpánek, **sp. nov.**

黄疸蒲公英 huang dan pu gong ying

Type: China. Sichuan: "Sichuan occid., urbs Kangding [康定]: in urbis vicinitate boreo-orientali," ca. 2650 m, 30 May 1992, *L. Businská & R. Businský 1*, cultivated as JŠ 5106 (holotype, PRA; isotypes, MO, PE, PRA).

Paratypes: China. Sichuan: *ibidem, L. Businská & R. Businský 1*, cultivated as JŠ 5105, JŠ 5107, JŠ 5108, JŠ 5109, JŠ 6232, JŠ 6364, JŠ 6716, JŠ 7092 (PRA); "W Sichuan, Garze [甘孜区], ad ripam dextram flum. Yalong [雅砻江]," ca. 3450 m, 17 Jun 1992, *L. Businská & R. Businský 5*, cultivated as JŠ 5080, JŠ 6217 (PRA).

Plantae agamospermae mediocres, foliis saturate viridibus, saepe badio-purpurascentibus, pinnatilobis vel pinnatisectis, lobis lateralibus 4 vel 5 utrinque, petiolis late alatis, phyllariis involucralibus exterioribus 13 ad 15, atro-viridibus, laxe adpressis, ovato-lanceolatis, stigmatibus luteo-viridibus, antheris polliniferis, acheniis plerumque 3.7–3.8 mm longis, superne dense squamuloso-spinulosis, in pyramidem subconicam ca. 0.4 mm longam ± abrupte abeuntibus.

Herbs 15–20 cm tall. Petiole purple, broadly winged; leaf blade deep green, sometimes suffused brownish purple, and with a purplish midvein, narrowly oblanceolate to narrowly oblong, 7–15 × 1.5–3 cm, sparsely arachnoid, shallowly pinnatilobed to pinnatisect, margin sometimes undivided and entire in distal ca. 1/3; lateral lobes 4 or 5 pairs, ± broadly triangular, recurved, proximal margin entire, distal margin shallowly sigmoid and entire but dentate in lower lobes, apex acute; interlobes short and broad, margin ± entire; terminal lobe narrowly triangular to helmet-shaped, margin entire, apex acute to mucronate. Scapes brownish green, overtopping leaves, sparsely arachnoid. Capitulum ca. 4 cm wide. Involucre 1–1.2 cm wide, base rounded. Outer phyllaries 13–15, abaxially blackish green, suffused brownish purple in upper part, and slightly pruinose, ± not imbricate, ± ovate-lanceolate, outermost ones 11–13 × 3–6 mm and almost as long as inner ones, loosely appressed, with a whitish 0.1–0.2 mm wide border, margin sparsely ciliate, apex flat; inner phyllaries 1.5–1.6 cm, apex flat. Ligules deep yellow; outer ligules ± flat, outside striped purplish brownish gray; inner ligules with ± yellow teeth at apex; ligule tube pubescent. Stigmas light greenish yellow, abaxially grayish pubescent. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 3.7–3.8 × 0.9–1.1 mm; body ± densely spinulose-squamulose above, ± abruptly narrowing into a subconic ca. 0.4 mm cone; beak ca. 1 cm. Pappus ± white, ca. 7 mm. Fl. late spring. Agamosperm.

• Montane meadows and pastures; 2600–3500 m. W Sichuan.

78. Taraxacum cyathiforme Kirschner & Štěpánek, **sp. nov.**

杯形蒲公英 bei xing pu gong ying

Type: China. Xinjiang: "Montes Tian Shan [天山], vallis Houxia [后峡]: in valle laterali cum arboribus solitaribus (*Picea schrenkiana*) et fruticibus (*Caragana jubata*)," 2561 m, 2 Oct 2004, *P. Sekerka, P. Hanzelka & I. Bulánková 04/42*, cultivated as JŠ 7960 (holotype, PRA; isotypes, MO, PE, PRA).

Plantae agamospermae submediocres, foliis pallide viridibus, anguste ellipticis, pinnatisectis, lobis lateralibus 3 vel 4 utrinque, lineari-triangularibus, elongatis, apice lingulatis, petiolis latissime alatis, involucro basi subturbinato, phyllariis involucralibus exterioribus 12 ad 17, obscure griseo-viridibus, subpruinosis, lanceolatis vel lineari-lanceolatis, laxe adpressis vel erectis, stigmatibus obscure viridibus, antheris polliniferis, acheniis 3.5–3.9 mm longis, superne dense squamuloso-spinulosis, in pyramidem subconicam ca. 0.4 mm longam abrupte abeuntibus.

Herbs 8–12 cm tall. Petiole pale green or purplish, broadly winged; leaf blade light vivid green, narrowly elliptic, 6–12 × 2–3.5 cm, sparsely arachnoid, pinnatisect; midvein brownish pink; lateral lobes 3 or 4 pairs, ± linear-triangular, patent to subrecurved, distal part often lingulate-elongated, proximal margin entire, distal margin shallowly sigmoid, with deep incisions or denticulate, and sometimes entire, apex subacute; interlobes distinct, long, to 15 × 3–4 mm, ± entire or irregularly dentate; terminal lobe narrowly triangular to 3-partite, 2–3 × 1.3–2 cm, terminal segment elongated, usually entire. Scapes brownish green but purplish at base, equaling leaves, sparsely arachnoid. Capitulum 3.5–4 cm wide. Involucre 9–10 mm wide, base obconic. Outer phyllaries 12–17, abaxially grayish green and slightly pruinose, ± not imbricate, linear-lanceolate to lanceolate, outermost ones 7–9 × 2–3.3 mm and ca. 2/3 as long as inner ones, loosely appressed to erect, with a whitish 0.1–0.2 mm wide border, margin subglabrous, apex purplish and initially flat but in later capitula horned; inner phyllaries ca. 1.2 cm, apex ± flat. Ligules deep yellow; outer ligules ± flat, outside striped purplish brown; inner ligules with reddish teeth at apex; ligule tube sparsely pubescent to glabrous. Stigmas grayish green, abaxially blackish pubescent. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 3.5–3.9 × ca. 1.1 mm; body densely spinulose-squamulose above, ± abruptly narrowing into a subconic ca. 0.4 mm cone; beak ca. 5.5 mm. Pappus ± white, ca. 6 mm. Fl. late spring. Agamosperm.

• Montane shrubby slopes; 2500–2600 m. Xinjiang (Tian Shan).

79. Taraxacum tonsum Kirschner & Štěpánek, **sp. nov.**

短毛蒲公英 duan mao pu gong ying

Type: China. Xinjiang: "Urbs Kashi [喀什市]: in locis caespitosis ad Kashgar Hotel," May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml s.n.*, cultivated as JŠ 7379 (holotype, PRA; isotypes, MO, PE, PRA).

Plantae agamospermae mediocres, foliis glaucescenti-viridibus, oblanceolatis, fere glabris, pinnatisectis, lobis lateralibus 3 vel 4(vel 5) utrinque, petiolis alatis, phyllariis involucralibus exterioribus 17 ad 20, pallide olivaceo-viridibus, conspicue albomarginatis, marginibus 0.2–0.4 mm latis, saepissime late ovatis vel ovatis, laxe adpressis, apice planis vel subcorniculatis, stigmatibus saturate luteis, antheris polliniferis, acheniis plerumque 4–4.2 mm longis, superne subdense spinulosis, in pyramidem subcylindricam 0.5–0.6 mm longam subabrupte abeuntibus.

Herbs 15–20 cm tall. Petiole pinkish purple, narrowly to broadly winged; leaf blade grayish green with a faintly pinkish midvein, oblanceolate, 9–19 × 1.7–2.8 cm, ± glabrous, regularly shallowly to deeply pinnatisect; lateral lobes 3 or 4(or 5) pairs, triangular to broadly so, 5–10 × ca. 10 mm, ± patent to subrecurved, distal margin straight to subconcave and sparsely minutely dentate or ± entire, apex acute; interlobes unspotted, 5–8 × ca. 5 mm, margin sparsely dentate or entire; terminal lobe triangular to narrowly triangular, 1–4 × 0.8–2.3 cm, rarely 3-partite, margin entire or sparsely dentate, apex subacute. Scapes light green but purplish at base, subequaling leaves, usually sparsely arachnoid. Capitulum 2–2.5 cm wide. Involucre 8–10 mm wide, base flat, rounded. Outer phyllaries 17–20, light olivaceous green but suffused purplish apically, imbricate, usually ovate to broadly ovate but some ovate-lanceolate, outermost ones (5.5–)7–8 × (3–)3.5–5 mm and 1/2–3/5 as long as inner ones, loosely appressed to erect-patent, with a distinct whitish 0.2–0.4 mm wide border, margin very sparsely ciliate, apex ± flat but subcorniculate in later capitula; inner phyllaries 1.4–1.5 cm. Ligules yellow; outer ligules ± flat, outside striped purplish black; inner ligules with yellow or faintly pink teeth at apex; ligule tube pubescent. Stigmas pure deep yellow. Anthers polliniferous; pollen grains irregular in size. Achene grayish light brown, 4–4.2 × 0.9–1.1 mm; body with prominent lateral

ridges, subdensely spinulose, subabruptly narrowing into a subcylindric 0.5–0.6 mm cone; beak 8–8.5 mm. Pappus dirty white, ca. 6 mm. Fl. late spring. Agamosperm.

• Grasslands, ruderal lawns, pastures; 1200–1400 m. SW Xinjiang (Kashi).

80. Taraxacum damnabile Kirschner & Štěpánek, **sp. nov.**

丑蒲公英 chou pu gong ying

Type: China. Shaanxi/Henan: "Prope limitem provinciarum Shaanxi et Henan, situ boreo-orientali ab oppido Danfeng [丹风]," 1000–1500 m, 29–31 May 1995, *R. Businský s.n.*, cultivated as JŠ 5853 (holotype, PRA; isotypes, MO, PE, PRA).

Paratypes: China. Shaanxi/Henan: *ibidem, R. Businský s.n.*, cultivated as JŠ 5854, JŠ 5855, JŠ 5856, JŠ 5857, JŠ 5858, JŠ 5859, JŠ 5860, JŠ 5861, JŠ 5862 (PRA). Hubei: "Distr. Shennongjia [神农架林区]," 1800–2800 m, 23–30 Jun 1995, *R. Businský s.n.*, cultivated as JŠ 5864, JŠ 5870, JŠ 5871, JŠ 5872 (PRA).

Plantae agamospermae mediocres, foliis obscure viridibus, pinnatisectis, lobis lateralibus numerosis, (4 vel)5 vel 6(vel 7) utrinque, triangularibus, subrecurvis, plerumque lingulato-elongatis, interlobiis badio-purpureis, petiolis alatis, phyllariis involucralibus exterioribus 16 ad 22, irregulariter patentibus usque arcuato-recurvis, ovato-lanceolatis vel lanceolatis, glaberrimis, stigmatibus subgriseo-luteis, antheris polliniferis, acheniis 3.7–3.9 mm longis, superne dense squamuloso-spinulosis, in pyramidem conicam 0.5–0.7 mm longam subsensim abeuntibus.

Herbs 14–17 cm tall. Petiole green or purplish, very broadly winged in outer leaves but narrowly so in inner ones; leaf blade dark green, usually suffused bronze, and with a brownish pink midvein, broadly linear-oblanceolate to narrowly oblong, 10–17 × 2–3.5 cm, arachnoid, pinnatisect; lateral lobes (4 or)5 or 6(or 7) pairs, ± triangular, subrecurved, distal part sometimes lingulate-elongated, proximal margin straight and entire, distal margin shallowly sigmoid to ± straight and usually sparsely denticulate or sometimes entire, apex acute; interlobes with deep purple brown spots, short, 4–7 mm wide, margin irregularly dentate; terminal lobe broadly triangular to helmet-shaped, 1–3 × 1.5–2.5 cm, terminal segment elongated, margin usually entire or with irregular teeth or incisions. Scapes purplish green, subequaling leaves, ± densely arachnoid. Capitulum 3.5–4.5 cm wide. Involucre ca. 1 cm wide, base ± rounded. Outer phyllaries 16–22, abaxially deep olivaceous green and apically brownish pink, ± not imbricate, ovate-lanceolate to lanceolate, outermost ones 9–11 × 3–5 mm and ca. 2/3 as long as inner ones, conspicuously irregularly patent to arcuate-recurved, border light grayish green but later abaxially also suffused brownish purple, membranous, and 0.1–0.2 mm wide, margin glabrous, apex ± callose; inner phyllaries 1.1–1.2 cm. Ligules deep yellow; outer ligules ± flat, outside striped greenish gray; inner ligules with dirty yellow or yellow teeth at apex. Stigmas grayish yellow, abaxially partly blackish pubescent. Anthers polliniferous; pollen grains irregular in size. Achene grayish light brown, 3.7–3.9 × 0.9–1 mm; body with prominent lateral ridges, densely spinulose-squamulose above, ± subgradually narrowing into a ± conic 0.5–0.7 mm cone; beak 1–1.1 cm. Pappus ± white, ca. 6 mm. Fl. late spring. Agamosperm.

• Pastures, shrubby slopes; 1000–2800 m. E Henan, W Hubei, SW Shaanxi.

81. Taraxacum adglabrum Kirschner & Štěpánek, **sp. nov.**

无毛蒲公英 wu mao pu gong ying

Type: China. Xinjiang: "In agro plantarum gossypini," 500 m, May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml L28*, cultivated as JŠ 7395 (holotype, PRA; isotypes, MO, PE, PRA).

Paratype: China. Xinjiang: "In pago Fukang Desert Exp. Station, 44°17′25″N, 87°56′22″E" [Fukang Xian 阜康县], May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml L27*, cultivated as JŠ 7391 (PRA).

Plantae agamospermae submediocres, foliis glaucescenti-viridibus, lineari-oblanceolatis, subglabris, pinnatilobis usque pinnatisectis, lobis lateralibus 4 ad 6 utrinque, late triangularibus, recurvis, petiolis alatis purpurascentibus, phyllariis involucralibus exterioribus 11 ad 13, ovato-lanceolatis usque ovatis, obscure viridibus, late pallide marginatis, laxe adpressis, stigmatibus saturate luteis, antheris polliniferis, acheniis plerumque 4.3–4.5 mm longis, superne subsparse spinulosis, persensim in pyramidem subcylindricam 0.8–1 mm longam abeuntibus.

Herbs to 15 cm tall. Petiole grayish purple to bright purple, winged; leaf blade grayish green, often slightly suffused brownish purple, and with a light purplish midvein, linear-oblanceolate to narrowly oblong, 9–13 × 1.7–2.5 cm, very sparsely arachnoid, pinnatilobed to shallowly pinnatisect but sometimes undivided and coarsely dentate; lateral lobes 4–6 pairs, broadly triangular, to 8 × 10 mm, recurved, proximal margin ± straight and usually entire, distal margin straight or shallowly sigmoid and entire or sparsely denticulate, apex acute; interlobes not conspicuous, short and broad, margin ± entire or with a few small teeth; terminal lobe ± narrowly triangular to almost helmet-shaped, 1.5–3 × 1.5–2 cm, terminal segment subacute to acute, distal margin ± convex and entire or irregularly shallowly lobulate-dentate. Scapes pinkish green at base, purple above after anthesis, ± equaling leaves, arachnoid but later glabrescent. Capitulum ca. 1.5 cm wide, remaining partly closed. Involucre 8–9 mm wide, base flat to subtruncate. Outer phyllaries 11–13, dark green middle part with a gradual transition into light green to whitish green border, ± not imbricate, ovate-lanceolate to ovate, outermost ones 4–6 × 2.5–3.8 mm and 1/3–1/2 as long as inner ones, loosely appressed, border to 1.5 mm wide, margin 0.1–0.2 mm, membranous, subglabrous, and purplish on distal ca. 1/3, apex flat or dark callose; inner phyllaries ca. 1 cm. Ligules dirty yellow; outer ligules canaliculate, outside striped grayish purple; inner ligules with yellow or purplish teeth at apex; ligule tube pubescent. Stigmas deep yellow. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, (3.5–)4.3–4.5 × 0.7–0.8 mm; body with ± prominent lateral ridges, ± sparsely spinulose above, very gradually narrowing into a subcylindric 0.8–1 mm cone; beak ca. 7 mm. Pappus ± white, 6–7 mm. Fl. late spring. Agamosperm.

• Pastures, ruderal sites; 500–1500 m. Xinjiang.

82. Taraxacum subcontristans Kirschner & Štěpánek, **sp. nov.**

圆叶蒲公英 yuan ye pu gong ying

Type: China. Xinjiang: "In pascuo, coord. geogr.: 41°49′56″N, 82°24′05″E" [Baicheng Xian 拜城县], 1127 m, May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml s.n.*, cultivated as JŠ 7374 (holotype, PRA; isotypes, MO, PE, PRA).

Paratypes: China. Xinjiang: *ibidem, P. Sekerka, Zhang Dao Yuan & V. Huml s.n.*, cultivated as JŠ 7376 (PRA); "in populeto culto secundum rivum aquarum, coord. geogr.: 42°04′45″N, 86°34′59″E [corresponding to Yanqi Xian 焉耆县]," 930 m, May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml L23*, cultivated as JŠ 7382 (PRA). Xizang: "The city of Lhasa [拉萨市], in the park Lukang [禄康公元] in the center of Lhasa," ca. 3500 m, 23 Jun 2002, *M. Štefánek 60*, cultivated as JŠ 7848 (PRA).

Plantae agamospermae subrobustae, foliis glaucescenti-viridibus, anguste lanceolatis vel anguste ellipticis, subglabris, irregulariter pinnatisectis, lobis lateralibus 5 vel 6 utrinque, lineari-triangularibus vel anguste triangularibus, patentibus vel recurvis vel sursum curvatis, marginibus distalibus dentatis et lobulatis, interlobiis grosse dentatis vel lobulatis, petiolis alatis, griseo-purpurascentibus, phyllariis involucralibus exterioribus 13 ad 17, olivaceo-viridibus, imbricatis, ovatis usque subrotundatis, laxe adpressis usque erectis, marginibus pallide membranaceo-viridibus 0.2–0.6 mm latis, stigmatibus luteo-viridibus, antheris polliniferis, acheniis 4.5–4.7 mm longis, superne dense spinulosis, in pyramidem subcylindricam 0.9–1 mm longam subabrupte abeuntibus.

Herbs 20–25 cm tall. Petiole grayish purple, winged; leaf blade grayish green, narrowly oblanceolate to narrowly elliptic, 16–20 × 4–5 cm, very sparsely arachnoid, pinnatisect with a complicated irregular pattern, midvein light purplish at base but otherwise light green; lateral lobes 5 or 6 pairs, linear-triangular to narrowly triangular, patent, variously recurved, or curved upward, proximal margin entire, distal margin irregularly dentate and/or lobulate, apex acute; interlobes brownish purple spotted along midvein, to 1.5 cm, margin sparsely coarsely dentate or lobulate; terminal lobe narrowly to broadly triangular, 1.5–3.5 × 3–4 cm, terminal segment narrowly helmet-shaped to lingulate, distal margin concave and with teeth or incisions. Scapes pinkish green at base but otherwise light green, ± overtopping leaves, arachnoid. Capitulum 3–3.5 cm wide. Involucre ca. 1.2 cm wide, base flat to subtruncate. Outer phyllaries 13–17, light brownish olivaceous green suffused brown purplish distally, imbricate, ovate to orbicular-ovate, outermost ones 9–11 × 6–8 mm and 1/2–3/5 as long as inner ones, loosely appressed to erect, border pale green, (0.2–)0.3–0.6 mm wide, and membranous, margin subglabrous, apex flat or corniculate; inner phyllaries 1.3–1.4 cm. Ligules deep yellow; outer ligules flat, outside striped purplish gray; inner ligules with purplish teeth at apex; ligule tube pubescent. Stigmas yellowish green, abaxially blackish pubescent. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 4.5–4.7 × 1.1–1.2 mm; body ± winged with prominent lateral ridges, densely spinulose above, subabruptly narrowing into a subcylindric 0.9–1 mm cone; beak 1.1–1.2 cm. Pappus dirty white, ca. 8 mm. Fl. late spring. Agamosperm.

• Montane pastures and shrubby slopes; 900–3500 m. W Xinjiang, S Xizang.

83. Taraxacum aeneum Kirschner & Štěpánek, **sp. nov.**

谦虚蒲公英 qian xu pu gong ying

Type: China. Xinjiang: "Urbs Kashi [喀什]: in locis caespitosis ad Kashgar Hotel," May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml s.n.*, cultivated as JŠ 7388 (holotype, PRA; isotypes, MO, PE, PRA).

Paratypes: China. Xinjiang: *ibidem, P. Sekerka, Zhang Dao Yuan & V. Huml s.n.*, cultivated as JŠ 7389 (PRA); "In pascuo, coord. geogr.: 41°49′56″N, 82°24′05″E" [Baicheng Xian 拜城县], 1127 m, May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml s.n.*, cultivated as JŠ 7372 (PRA).

Plantae agamospermae mediocres, foliis subglaucescenti-viridibus, anguste oblanceolatis, subglabris, pinnatisectis, lobis lateralibus 3 vel 4(vel 5) utrinque, interlobiis integerrimis badio-purpurascentibus, phyllariis involucralibus exterioribus 14 ad 17, pallide viridibus, venosis, late ovatis usque ovato-lanceolatis, subimbricatis, laxe adpressis vel irregulariter erecto-patentibus, stigmatibus luteo-viridibus, antheris polline carentibus vel raro sparsissime polliniferis, acheniis plerumque 4.4–4.5 mm longis, superne dense spinulosis, in pyramidem subcylindricam 0.9–1.1 mm longam subsensim abeuntibus.

Herbs 16–20 cm tall. Petiole grayish purple, unwinged; leaf blade slightly grayish green, often suffused brownish, and with a purplish brown midvein, ± narrowly oblanceolate, 12–18 × 2–3.5 cm, subglabrous, pinnatisect; lateral lobes 3 or 4(or 5) pairs, narrowly deltoid to hamate, patent with recurved distal part 0.8–1.5 cm, proximal margin entire, distal margin convex to sigmoid and with 1–3 distinct teeth, apex acute; interlobes brownish purple spotted, to 10 × 4 mm, margin usually entire; terminal lobe helmet-shaped to lingulate, 2–3.5 × 1.5–2.5 cm, distal margin concave and subentire or with asymmetric incisions. Scapes purplish at base, brown-purple below capitulum, and otherwise light green, ± equaling leaves, sparsely arachnoid. Capitulum ca. 2.5 cm wide. Involucre 8–10 mm wide, base rounded. Outer phyllaries 14–17, light green suffused purplish at apex, subimbricate, broadly ovate to ovate-lanceolate, outermost ones 7–8.5 × 3–5.5 mm and ca. 2/3 as long as inner ones, loosely appressed to irregularly erect-patent, venation visible, border 0.2–0.4 mm wide and membranous, margin sparsely ciliate, apex flat or callose; inner phyllaries 1.1–1.2 cm. Ligules yellow; outer ligules ± flat, outside striped purplish grayish brown; inner ligules with purplish teeth at apex; ligule tube pubescent. Stigmas yellowish green, abaxially blackish pubescent. Anthers without pollen or pollen sparsely developed; pollen grains irregular in size. Achene light grayish olivaceous brown, 4.4–4.5 × 0.9–1.1 mm; body ± winged with prominent lateral ridges, densely spinulose above and conspicuously so on ridges, subgradually narrowing into a subcylindric 0.9–1.1 mm cone; beak 8–9 mm. Pappus white, ca. 7 mm. Fl. late spring. Agamosperm.

• Pastures, grasslands, ruderal lawns; 1000–1400 m. W Xinjiang.

84. Taraxacum simulans Kirschner & Štěpánek, **sp. nov.**

拟蒲公英 ni pu gong ying

Type: China. Sichuan: "Dêgê [德格], in southern vicinity of the town," 4 Jun 1992, *L. Businská & R. Businský 3*, cultivated as JŠ 5113 (holotype, PRA; isotypes, MO, PE, PRA).

Plantae agamospermae subparvae, foliis saturate viridibus, saepissime anguste oblanceolatis, araneosis, pinnatisectis, lobis lateralibus 4 ad 6 utrinque, vulgo anguste triangularibus, patentibus, interlobiis dentatis, petiolis dense araneosis, purpurascentibus, in foliis exterioribus perlate alatis, phyllariis involucralibus exterioribus 13 ad 17, obscure olivaceo-viridibus, lanceolatis usque ovatis, laxe adpressis, stigmatibus sordide luteis, antheris polliniferis, acheniis plerumque 4.3–4.5 mm longis, superne subsparse distincte spinulosis, in pyramidem subconicam vel subcylindricam 1–1.1 mm longam persensim abeuntibus.

Herbs 9–13 cm tall. Petiole purple, densely arachnoid, broadly winged in outer leaves but ± narrow in inner ones; leaf blade deep green, narrowly oblanceolate to narrowly elliptic, 6–10 × 1.5–3 cm, arachnoid, pinnatisect, midvein light green but light purplish at base; lateral lobes 4–6 pairs, linear-triangular to narrowly triangular, to 1 cm, patent but some subrecurved or pointing upward, proximal margin entire, distal margin ± straight to subconcave and irregularly dentate, apex acute; interlobes not spotted, 3–9 mm wide, margin irregularly dentate; terminal lobe narrowly to broadly triangular, 1.5–3.5 × 3–4 cm, terminal segment narrowly triangular to flat-deltoid, to 1 × 1.5 cm, margin entire, apex acute. Scapes pinkish green at base but otherwise light green, ± equaling leaves, arachnoid. Capitulum 4–4.5 cm wide. Involucre 9–10 mm wide, base flat. Outer phyllaries 13–17, dark olivaceous green suffused purplish distally, not imbricate, lanceolate to ovate, largest ones 8–9 × (3–)3.5–4 mm and ca. 3/5 as long as inner ones, loosely appressed, border whitish membranous and 0.1–0.3 mm wide, margin sparsely ciliate, apex ± flat or corniculate; inner phyllaries 1.2–1.3 cm. Ligules deep yellow; outer ligules flat, outside striped greenish gray; inner ligules with yellow teeth at apex; ligule tube pubescent. Stigmas dirty yellow. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 4.3–4.5 × 0.7–1 mm; body subsparsely but distinctly spinulose above, very gradually narrowing into a subconic to subcylindric 1–1.1 mm cone; beak 1–1.1 cm. Pappus dirty white, 5–6 mm. Fl. late spring. Agamosperm.

• Montane grasslands; 3200–3300 m. W Sichuan (Dêgê).

85. Taraxacum subcalanthodium Kirschner & Štěpánek, **sp. nov.**

亚大斗蒲公英 ya da dou pu gong ying

Type: China. Xinjiang: "Tian Shan [天山]: ad locum Glacial Station in praerupto alveo fluminis (convexo angustissimo) Houxia [后峡] dicto," 2135 m, May 1999, *P. Sekerka, Zhang Dao Yuan & V. Huml s.n.*, cultivated as JŠ 7396 (holotype, PRA; isotypes, MO, PE, PRA).

Plantae agamospermae submediocres, foliis glaucescenti-viridibus, saepissime brunnescentibus, oblanceolatis, pinnatisectis, lobis lateralibus 4 ad 6 utrinque, triangularibus vel anguste triangularibus, subrecurvis, integerrimis, phyllariis involucralibus exterioribus 17 ad 20, imbricatis, obscure olivaceo-viridibus vel atro-viridibus, lanceolatis usque ovatis, laxe adpressis, apice planis vel subcorniculatis, stigmatibus luteo-virescentibus, antheris polliniferis, acheniis 3.8–4 mm longis, superne dense spinulosis, in pyramidem saepissime subconicam 0.8–0.9 mm longam subabrupte abeuntibus.

Herbs 12–15 cm tall. Petiole grayish purple, winged; leaf blade grayish green, usually suffused bronze, and with a light purplish gray midvein, narrowly oblanceolate to oblanceolate, 6–12 × 1.7–3.7 cm, very sparsely arachnoid, regularly pinnatisect; lateral lobes 4–6 pairs, triangular or narrowly triangular, to 1.5 × 1.2 cm, subrecurved, distal margin ± straight and entire, proximal margin entire or with a single broadly triangular tooth at base, apex acute; interlobes not spotted or faintly spotted, ca. 6 × 4–8 mm, margin usually ± entire; terminal lobe triangular, broadly triangular, or sometimes ± helmet-shaped, terminal segment with an entire margin, apex acute. Scapes purple-green at base but otherwise light green, ± equaling leaves, arachnoid. Capitulum 2.5–3 cm wide. Involucre 8–9 mm wide, base flat. Outer phyllaries 17–20, dark olivaceous green to blackish green and suffused purplish distally, imbricate, lanceolate to ovate, outermost ones 7–8 × 3–4 mm and 1/2–3/5 as long as inner ones, loosely appressed, border whitish membranous and 0.1–0.2 mm wide, margin sparsely ciliate, apex flat or ± corniculate; inner phyllaries 1.2–1.3 cm. Ligules deep yellow; outer ligules flat, outside striped greenish gray; inner ligules with yellow teeth at apex; ligule tube pubescent. Stigmas dirty (greenish) yellow. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 3.8–4 × 0.9–1 mm; body ± densely spinulose above, subabruptly narrowing into a subconic to subcylindric 0.8–0.9 mm cone; beak 8–8.5 mm. Pappus ± white, ca. 5 mm. Fl. late spring. Agamosperm.

• Montane grasslands; 2000–2500 m. Xinjiang (Tian Shan).

86. Taraxacum xinyuanicum D. T. Zhai & C. H. An, Acta Phytotax. Sin. 34: 318. 1996.

新源蒲公英 xin yuan pu gong ying

Herbs 5–18 cm tall. Petiole ± purplish, narrow; leaf blade mid-green, ± broadly oblanceolate, 4–10 × 1.5–3.5 cm, sparsely arachnoid but later glabrescent, deeply pinnatisect; lateral lobes 3–5, ± triangular to triangular-deltoid, subpatent to ± recurved, distal margin convex and entire or with 1 or 2 teeth; interlobes broad, margin dentate and/or lobulate; terminal lobe triangular to helmet-shaped, margin ± entire. Scapes greenish, ± overtopping leaves, sparsely arachnoid but densely so below capitulum. Involucre 6–7 mm wide, base ± rounded. Outer phyllaries 12–15, pale green, not imbricate, ovate-lanceolate to lanceolate, outermost ones ca. 6 × 2–3 mm and 2/5–1/2 as long as inner ones, ± patent, margin glabrous to sparsely ciliate, flat below apex; inner phyllaries 0.9–1.2 cm, apically flat. Ligules yellow; outer ligules flat, outside faintly striped grayish; floret tube outside glabrous. Stigmas discolored. Anthers polliniferous; pollen grains regular in size. Achene grayish straw-colored brown, ca. 2.5 × 0.8–0.9 mm; body ± smooth below, apically spinulose, ± abruptly narrowing into a thick subconic 0.2–0.3

mm cone; beak ca. 5 mm. Pappus white, 5–6 mm. Fl. spring and summer. Sexual. $2n = 16$*

• Gravelly slopes, roadsides; ca. 1500 m. Xinjiang.

Taraxacum xinyuanicum is the first sexual taxon recognized within *T.* sect. *Qaisera*.

87. Taraxacum potaninii Tzvelev, Novosti Sist. Vyssh. Rast. 24: 220. 1987.

新疆蒲公英 xin jiang pu gong ying

Herbs 15–35 cm tall. Petiole pinkish green, narrow; leaf blade pale green to mid-green, ± oblanceolate, 10–15 × 2.5–3.5 cm, sparsely arachnoid but later glabrescent, margin subentire to shallowly lobed; lateral lobes 2–5, ± flat triangular, ± recurved, distal margin straight and entire or dentate; interlobes indistinct; terminal lobe not clearly developed, broadly triangular, apex ± acute. Scapes brownish green, ± overtopping leaves, subglabrous. Involucre 9–10 mm wide, base rounded. Outer phyllaries 13–16, dark green with a broad paler border, subimbricate, ovate-lanceolate to lanceolate, outermost ones 7–9 × 3–4 mm and ca. 1/2 as long as inner ones, ± appressed, border 0.5–1 mm, margin sparsely ciliate, flat and not corniculate below apex; inner phyllaries 1.3–1.8 cm, apically flat. Ligules (?pale) yellow; outer ligules flat, outside striped dark; inner ligules with purplish long teeth. Stigmas dark to blackish green. Achene grayish straw-colored brown, 4.2–4.7 × 1–1.1 mm; body ± smooth below, apically subsparsely spinulose with thin acute spinules, ± subabruptly narrowing into a conic 0.7–0.9 mm cone; beak ca. 6 mm. Pappus yellowish white, ca. 5 mm. Fl. summer. Agamosperm.

• Mountain slopes; 2000–2400 m. W Xinjiang (Tian Shan).

Taraxacum potaninii is known from the type specimen only. The locality given on the type label differs from that in the protologue, but the description fully matches the material.

88. Taraxacum puberulum G. E. Haglund, Bot. Not. 1938: 313. 1938.

疏毛蒲公英 shu mao pu gong ying

Herbs to 15 cm tall. Petiole purplish, narrowly winged to narrow; leaf blade grayish pale green, narrowly oblanceolate, 10–13 × 1.5–2.5 cm, sparsely arachnoid but later glabrescent, pinnatisect; lateral lobes 4 or 5, ± narrowly triangular to triangular, subpatent to ± recurved, distal margin straight to ± concave and entire or minutely dentate; interlobes 5–10 mm, margin usually remotely dentate; terminal lobe triangular to triangular-sagittate, 1.2–2 × 1.2–1.5 cm, apex ± acute. Scapes brownish green, ± overtopping leaves, sparsely arachnoid at base but densely arachnoid below capitulum. Involucre 7–8 mm wide, base rounded to ± truncate. Outer phyllaries 13–16, pale green with a paler border, ± not imbricate, ovate-lanceolate, outermost ones 5–7 × 2–3 mm and 1/2–2/3 as long as inner ones, ± subappressed, border 0.2–0.5 mm, margin glabrous to sparsely ciliate, flat to corniculate below apex; inner phyllaries 1.1–1.3 cm, apically minutely corniculate. Ligules yellow; outer ligules flat, outside striped brownish purple; inner ligules with purple or dirty yellow teeth; floret tube outside pubescent. Stigmas dirty yellow to pale greenish. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, 3.8–4 × 0.8–0.9 mm; body ± smooth below, apically spinulose with thin long acute spinules, ± gradually narrowing into a cylindric 0.8–1 mm cone; beak ca. 8 mm. Pappus pure white, 5–6 mm. Fl. spring. Agamosperm.

• Grasslands; ca. 1300 m. SW Xinjiang (Kashi).

Taraxacum puberulum is based on a single wild specimen and a few cultivated plants. The taxon has many features of *T.* sect. *Ceratoidea* (achene characters, outer phyllary color, shape, and posture), but in other attributes it approaches *T.* sect. *Qaisera*.

89. Taraxacum protractifolium G. E. Haglund, Bot. Not. 1938: 311. 1938.

长叶蒲公英 chang ye pu gong ying

Herbs to 25 cm tall, subrobust. Petiole purplish, winged; leaf blade grayish green with a pinkish midvein, oblanceolate to broadly linear, 10–18 × 2.5–5 cm, subglabrous, regularly deeply lobed; lateral lobes 3–6 pairs, triangular, ± patent, apical margin concave and entire or minutely dentate, apex acuminate; terminal lobe triangular, apex subobtuse. Scapes brownish green, ± equaling leaves, apically arachnoid when young. Capitulum ca. 4 cm wide. Involucre 1.1–1.5 cm wide, base broadly rounded. Outer phyllaries 15–19, ± imbricate, ovate to ovate-lanceolate, outermost ones 8–11 × 3–4.5 mm and ca. 1/2 as long as inner ones, loosely appressed to erect, usually not distinctly veined, middle part blackish green, border whitish pale green and to 1 mm wide, margin glabrous, not corniculate below apex; inner phyllaries 1.7–1.8 cm. Ligules deep yellow; outer ligules outside striped purplish; inner ligules with pinkish apical teeth; floret tube pubescent. Stigmas greenish. Anthers polliniferous; pollen grains irregular in size. Achene 4.2–4.5(–5) × 0.9–1 mm; body sparsely tuberculate to smooth at base, subdensely spinulose below cone, apically ± gradually narrowing into a 0.8–1 mm subcylindric cone, spinules distinct, thin, straight, and acute; beak ca. 9 mm. Pappus white. Fl. early summer. Agamosperm.

• Grasslands. SW Xinjiang.

90. Taraxacum brevicorniculatum Koroleva, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 93. 1940.

短角蒲公英 duan jiao pu gong ying

Herbs 10–20(–25) cm tall. Petiole pale green or sometimes pinkish, ± winged; leaf blade bright light green with a greenish midvein, oblanceolate, (8–)10–14(–23) × 2–3 cm, sparsely arachnoid, sometimes undivided, usually pinnatilobed to pinnatisect, sometimes lyrate-runcinate (lobes in lower ca. 1/2); lateral lobes 4 or 5, triangular to deltoid, ± patent to subrecurved, distal margin usually convex to ± sigmoid and subentire, apex acute; interlobes ca. 10 × 5–8 mm, margin entire or sparsely denticulate; terminal lobe flat-triangular to flat-deltoid, margin entire, apex mucronate. Scapes pale green at base but brownish green above, usually overtopping leaves, floccose-arachnoid and densely so below capitulum. Capitulum 2.5–3.5 cm wide. Involucre 9–10 mm wide, base rounded to slightly obconic. Outer phyllaries (12 or)13–15(or 16), light green, ± not imbricate, ovate-lanceolate to lanceolate, outermost ones 5.5–8

× 2–3 mm and 2/5–2/3 as long as inner ones, loosely appressed, erect to rarely irregularly patent, border ± distinct, whitish membranous, and 0.3–0.5(–0.9) mm wide, margin ± glabrous, apex suffused red with a short obtuse horn to 1 mm; inner phyllaries 1.3–1.5 cm, callose to minutely (ca. 0.3 mm) corniculate near apex. Ligules yellow; outer ligules ± flat, outside broadly striped grayish pink; inner ligules with dirty yellow or pinkish apical teeth. Stigmas dirty yellow to slightly greenish yellow. Anthers polliniferous; pollen grains irregular in size. Achene grayish pale brown, (3.6–)4.2–4.5(–5) × (0.8–)0.9–1.2 mm; body densely spinulose in upper 1/3–1/5, subgradually to subabruptly narrowing into a thin ± cylindric (0.7–)1.1–1.6 mm cone, spinules distinct, ± long, acute; beak (6–)6.5–7.5(–8) mm. Pappus white, 5–6.5 mm. Fl. spring and early summer. Agamosperm. $2n = 24$.

Meadows and pastures, usually on subsaline soils; 1500–2000 m. W Xinjiang [Kazakhstan].

Taraxacum brevicorniculatum is often a weed in plantations of *T. koksaghyz* in Russia and other countries where *T. koksaghyz* is grown as a source of biosynthetic rubber. *Taraxacum brevicorniculatum* is often mistakenly equated or confused with the sexual diploid *T. koksaghyz* of *T.* sect. *Ceratoidea*, which can be distinguished by purely yellow stigmas, fleshy glaucous grayish green leaves, obtuse leaf lobes, outer phyllaries with thin mostly 2.5–4 mm horns, inner phyllaries with thin mostly 1.7–2 mm horns, regular pollen, and achenes 2.8–3.8 × 0.7–0.9 mm with a beak to 4.5 mm. *Taraxacum brevicorniculatum* also has a much lower root rubber content. Genetic analyses (P. van Dijk, unpubl.) show that the triploid *T. brevicorniculatum* is a hybridogenous species with *T. koksaghyz* as one of the parental taxa. *Taraxacum brevicorniculatum* is in many respects intermediate between *T.* sect. *Ceratoidea* and *T.* sect. *Qaisera*.

11. **Taraxacum** sect. **Ceratoidea** Kirschner & Štěpánek, Phyton (Horn) 48: 63. 2008.

角状蒲公英组 jiao zhuang pu gong ying zu

Leaves usually slightly fleshy, light green to pale glaucous-green, sometimes suffused bronze, not spotted, subglabrous. Outer phyllaries usually light to yellowish green with an indistinct paler or whitish border but often reddish near apex, usually appressed to loosely appressed or erect, ovate, lanceolate, or rarely linear-lanceolate, usually 4–6.5 × 1–3.5 mm, apex with horn or at least corniculate. Outer ligules usually pale yellow, outside striped faintly reddish. Stigmas pure yellow. Achene light grayish straw-colored brown, usually 3–5 mm, to 0.9 mm wide; body relatively densely spinulose above, gradually to subgradually narrowing into subconic to subcylindric (0.7–)0.8–1(–1.6) mm cone, spinules usually thin, straight, erect, and acute; beak (3.5–)5–7(–8.5) mm. Pappus white to snow white, usually 5–7 mm.

About six to eight species: centered in C Asia; two species in China.

Taraxacum glaucanthum (Ledebour) Candolle (Prodr. 7: 147. 1838, not Nakai & Koidzumi, 1936), another member of *T.* sect. *Ceratoidea*, was described from NE Kazakhstan in the vicinity of the Chinese border and might be detected in northwesternmost Xinjiang.

Taraxacum monochlamydeum Handel-Mazzetti (Monogr. Taraxacum, 43. 1907) was repeatedly reported to occur in Xinjiang (since G. E. Haglund in Persson, Bot. Not. 1938: 310. 1938). During that time, *T. bicorne* was believed to be a member of *T.* sect. *Ceratophora* (Handel-Mazzetti) A. P. Khokhrjakov (= *T.* sect. *Borealia* in the present treatment) and generally overlooked. Schischkin and Tzvelev (Fl. URSS 29: 483. 1964) recognized *T. bicorne* as a member of *T.* sect. *Macrocornuta* s.l. The Chinese material seen, partly also identified as *T. monochlamydeum* by G. E. Haglund, belongs to *T. bicorne*, and *T. monochlamydeum* probably is confined to more western parts of C Asia (being common in Turkmenistan and Uzbekistan). The occurrence of *T. monochlamydeum* in China remains to be confirmed, and further study is needed.

1a. Stigmas dirty yellow to light greenish yellow; pollen grains irregular in size; involucre 9–10 mm wide at base; paler outer phyllary border 0.3–0.9 mm wide .... 90. *T. brevicorniculatum* (see *T.* sect. *Qaisera*)

1b. Stigmas pure yellow; pollen grains regular in size; involucre to 8 mm wide at base; paler outer phyllary border 0.1–0.4 mm wide.

2a. Leaf lateral lobes with entire distal margin; inner phyllaries with a thin horn; achene beak 3–4.5 mm ..... 91. *T. koksaghyz*

2b. Leaf lateral lobes with denticulate distal margin; inner phyllaries with a thick short horn; achene beak 7–9 mm ..... 92. *T. bicorne*

91. Taraxacum koksaghyz Rodin, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 187. 1933 [*"koksaghyz"*].

橡胶草 xiang jiao cao

Herbs 4–15 cm tall. Petiole pale green, winged; leaf blade light glaucous grayish green with a light green to rarely pinkish midvein, narrowly oblanceolate to broadly oblanceolate, 3–7(–10) × 1.2–3 cm, ± fleshy, very sparsely arachnoid to glabrous, undivided, margin remotely denticulate to regularly pinnatilobed to pinnatifid; lateral lobes 2 or 3(–5) pairs, broadly triangular, patent to subrecurved, proximal margin ± straight and entire, distal margin convex and entire, apex obtuse to subacute; interlobes not spotted, broad, margin entire; terminal lobe usually triangular, margin entire, apex subobtuse. Scapes light green or pinkish, ± overtopping leaves, arachnoid. Capitulum 2–3 cm wide. Involucre 5–8 mm wide, base obconic-rounded. Outer phyllaries 8–13, light green sometimes distally suffused purplish, not imbricate, linear-lanceolate to narrowly ovate, outermost ones 5.5–7 × (1–)1.2–2.2(–2.5) mm and 1/2–4/5 as long as inner ones but sometimes equaling them, loosely appressed to erect, border whitish light green or ± membranous and 0.1–0.3 mm wide, margin sparsely ciliate to glabrous, apex with a 2.5–4 mm horn of perpendicular to erect position; inner phyllaries 8–12 mm, apex with a thin 1–2 mm horn. Ligules light yellow; outer ligules flat, outside not striped or faintly striped purplish; inner ligules with yellow teeth at apex. Stigmas pure yellow. Anthers polliniferous; pollen grains regular in

size. Achene light grayish straw-colored brown, 2.8–3.8 × 0.7–0.9 mm; body ± densely spinulose above, subgradually narrowing into a subcylindric (0.5–)0.7–1 mm cone, spinules usually irregularly bent upward and not squamulose; beak 3–4.5 mm. Pappus ± white, 3.5–4.5 mm. Fl. late spring and early summer. Sexual. $2n = 16$.

Medium-moist subsaline pastures with *Achnatherum splendens*, path margins, riverbanks; 1600–2000 m. W Xinjiang [Kazakhstan].

92. Taraxacum bicorne Dahlstedt, Ark. Bot. 5(9): 29. 1906.

双角蒲公英 shuang jiao pu gong ying

Herbs 4–17 cm tall. Petiole pale green, narrowly winged; leaf blade glaucous-green with a light green to pinkish midvein, narrowly oblanceolate to narrowly oblong, 3–12 × 1.1–2.5 cm, slightly fleshy, glabrous, shallowly pinnatilobed to pinnatifid; lateral lobes usually 4 or 5 pairs, deltoid, falcate, or broadly deltoid-triangular, patent to hamate-recurved, proximal margin ± entire, distal margin ± denticulate, apex acute; interlobes often bordered reddish, margin subentire; terminal lobe triangular to 3-partite, margin ± entire, apex acute to subobtuse. Scapes brownish or purplish green, often overtopping leaves, arachnoid. Capitulum 2–3 cm wide. Involucre 5–8 mm wide, base narrowly rounded. Outer phyllaries 9–14, light green, sometimes suffused purplish, ± not imbricate, ovate to broadly lanceolate, outermost ones 4–6(–7) × 1.7–2.8 mm and 1/4–1/3 as long as inner ones, loosely appressed to erect, border indistinct, whitish light green, with a gradual transition, and 0.1–0.4 mm wide, margin ± glabrous, apex with a ± thick suberect horn to 2 mm; inner phyllaries 1–1.4 cm, apex with thick short horn and often laterally dilated. Ligules light yellow; outer ligules flat, outside striped brownish purple; inner ligules with yellow teeth at apex; ligule tube pubescent. Stigmas pure yellow. Anthers polliniferous; pollen grains regular in size. Achene light grayish straw-colored brown, 3.7–4.2 × 0.8–0.9 mm; body ± densely spinulose above, subgradually narrowing into a subcylindric 0.8–1 mm cone, spinules thin, usually suberect, and not squamulose; beak 7–9 mm. Pappus bright white, 5–6 mm. Fl. late spring and early summer. Sexual.

Subsaline pastures, grasslands; 600–1800 m. Gansu, Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan].

Reports of *Taraxacum bicorne* from Nei Mongol and Ningxia (Higher Pl. China 11: 779. 2005) remain to be proven.

12. Taraxacum sect. **Macrocornuta** Soest, Acta Bot. Neerl. 9: 304. 1960.

大角蒲公英组 da jiao pu gong ying zu

Leaves deep green and suffused purplish or spotted on interlobes, usually thin, not thickened; petiole ± unwinged; leaf blade undivided to pinnatisect in a complicated manner. Outer phyllaries dark green, blackish green, or mid-green but often with a purplish apex or borders or entirely suffused purplish, linear-lanceolate to ovate-lanceolate, usually arcuate to patent or rarely erect-patent, apex callose to corniculate; inner phyllaries often of unequal width, apex flat to horned. Stigmas usually discolored. Achene grayish straw-colored brown, usually 3–4 × 0.8–1 mm; body ± densely spinulose above, subabruptly to ± gradually narrowing into a subcylindric to cylindric 0.4–2 mm cone, spinule usually long, thin, and erect-patent; beak usually longer than 7–8 mm, thin. Pappus snow white.

About 25 species: centered in the region from Iran to C Asia; one species in China.

Taraxacum sect. *Macrocornuta* in China requires additional study where only one species was identified with certainty, but the diversity might be higher.

Taraxacum sect. *Macrocornuta* was not subjected to a taxonomic revision. The names published on the material from the vicinity of China form a complex of agamospermous and sexual populations, and without a field population study it is difficult to delimit individual taxonomic units. *Taraxacum alatavicum* Schischkin (Fl. URSS 29: 477, 731. 1964), *T. lipskyi* Schischkin (Fl. Turkmen. 7: 383. 1960), and *T. longipyramidatum* Schischkin (Fl. URSS 29: 489, 735. 1964) were reported from Xinjiang (C. H. An, Fl. Xinjiang. 5: 420, 425, 426. 1999; FRPS 80(2): 37, 48, 49. 1999), but both the complexity of the group and the lack of convincing material to prove the records make it advisable not to include these names in the present treatment. *Taraxacum wallichii* Candolle is a sexual taxon described from India; the name usually covers the whole section in the literature. We have failed to find any Chinese material approaching the morphology of *T. wallichii*.

The name *Taraxacum repandum* N. Pavlov refers to a taxon occurring in southwesternmost Tian Shan in Kazakhstan. It is a morphologically peculiar species, rather isolated in the flora of C Asia, and difficult to assign to a section. It might belong to *T.* sect. *Macrocornuta* as a marginal member, but further study is needed. We consider the report of its occurrence in China (FRPS 80(2): 63. 1999) as an error.

93. Taraxacum multiscaposum Schischkin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 8. 1937.

多莛蒲公英 duo ting pu gong ying

Herbs 12–25 cm tall. Petiole purple, unwinged; leaf blade mid-green with a pinkish midvein, narrowly oblanceolate, 4–17 × 1.5–3 cm, subglabrous to glabrous, shallowly pinnatilobed to pinnatisect but sometimes undivided and margin dentate; lateral lobes usually 2–4 pairs, deltoid to narrowly triangular, usually patent, proximal margin ± entire, distal margin ± entire or rarely remotely denticulate, apex subacute; interlobes broad, margin subentire; terminal lobe ± triangular, margin ± entire, apex subacute. Scapes purple, overtopping leaves, glabrescent. Capitulum 2.5–3.5 cm wide. Involucre ca. 1 cm wide, base rounded. Outer phyllaries 8–12, light green, slightly pruinose, and later suffused brownish pink, not imbricate, ovate to broadly lanceolate, outermost ones 4–7 × 2.5–4 mm and 1/3–1/2 as long as inner ones, reflexed with tips pointing toward scape, border indistinct, membranous, or pinkish and ca. 0.1 mm wide, margin ± glabrous, apex flat to corniculate; inner phyllaries 1.2–1.4 cm, apex dark corniculate. Ligules light yellow; outer ligules flat, outside striped faintly light grayish green; inner ligules with

yellow or light grayish teeth at apex; ligule tube pubescent. Stigmas light grayish green. Anthers polliniferous; pollen grains regular in size. Achene light grayish straw-colored brown, 3.7–4.2 × 0.7–0.9 mm; body ± densely spinulose above or often almost throughout, ± gradually narrowing into a subcylindric 1–1.5mm cone, spinules thin and usually suberect; beak 6–8 mm. Pappus bright white, 5–6 mm. Fl. spring and early summer. Sexual. $2n = 16$.

Ruderal sites, pastures, along roads and paths, grasslands; 1200–2000 m. W Xinjiang [Kazakhstan].

13. **Taraxacum** sect. **Atrata** Kirschner & Štěpánek, **sect. nov.**

黑蒲公英组 hei pu gong ying zu

Type: *Taraxacum subglaciale* Schischkin.

Plantae alpinae vel subnivales graciles, foliis plerumque indivisis, lobulatis, lineari-lanceolatis vel oblongo-lanceolatis, scapis plerumque glaberrimis, phyllariis involucralibus exterioribus non imbricatis vel inconspicue imbricatis, anguste lanceolatis usque lanceolatis, plerumque in parte media latissimis, subobtusis, planis vel callosis, raro minute corniculatis, paucis vel mediocriter numerosis (7 ad 15), atro-viridibus vel obscure viridibus, albo- vel pallidius marginatis, marginibus distinctis vel inconspicuis, 0.1–0.6 mm latis, glabris vel raro sparsissime ciliatis, phyllariis interioribus planis vel interdum callosis, acheniis plerumque 4–5.5 mm longis (pyramide inclusa), omnino laevibus vel raro sublaevibus et tuberculis sparsis minutissimis in parte superiore praeditis, pyramide carentibus vel in pyramidem indistinctam, raro late conicam sensim abientibus, rostro crassiusculo disrumpente 1.5–5(–7) mm longo, pappo albo-lutescente 4–7 mm longo.

Plants delicate, usually glabrous to subglabrous. Petiole unwinged; leaf blade usually narrow, undivided or shallowly lobed. Capitulum often nodding after anthesis. Outer phyllaries 7–15, blackish green to dark green, ± of equal length, appressed, loosely appressed, or rarely erect, narrowly lanceolate to lanceolate, usually broadest in middle, almost unbordered to bordered, margin usually glabrous but seldom sparsely ciliate, apex without a horn but sometimes callose. Ligules yellow, lilac, pinkish to violet. Achene usually grayish straw-colored brown to blackish brown, (3.9–)4–5(–5.7) × 0.8–1 mm; body smooth or less often sparsely minutely tuberculate above, cone absent or achene body gradually narrowing into an indistinct cone, cone (when developed) broadly conical to conical and 0.4–0.8 mm; beak 1.5–5(–7) mm, ± thick, easily breaking off. Pappus yellowish white or white, 4–7 mm.

About 15 species: C Asia; five species (one endemic) in China.

Taraxacum sect. *Atrata* has a center of diversity in NW China (W Xinjiang), Kazakhstan, Kyrgyzstan, NW Mongolia, and perhaps elsewhere in C Asia.

Taraxacum sect. *Oligantha* is the closest section to *T.* sect. *Atrata* but differs from it in having densely hairy scapes, imbricate and hairy outer phyllaries (often hairy on adaxial and/or abaxial surfaces and ciliate) of paler color, outer phyllaries with a blackish corniculate apex, achene beak very thick (not caducous), and pappus fragile. Another similar taxon, *T. glabrum* of *T.* sect. *Glabra*, differs in the well-developed distinctly narrower cone and thin beak.

In addition to the species given below, there is another name, *Taraxacum alpigenum* Dshanaëva (Fl. Kirgizsk. S.S.R. 1: 116. 1967), based on the material from a border range between W Xinjiang and Kyrgyzstan (Torugart Range). We have not seen the original material, and the protologue does not give enough facts to compare the name with the other members of the section (with the exception of the achene characters). If it proves to be a separate species, it should be included in the Chinese flora.

1a. Ligules deep pink to pinkish violet ..... 98. *T. lilacinum*
1b. Ligules yellow.
2a. Achene 4.5–5 mm; outer phyllaries 10–15.
3a. Stigmas blackish green; outer phyllaries ovate to ovate-lanceolate; achene beak 4–5 mm ..... 94. *T. sinotianschanicum*
3b. Stigmas deep yellow; outer phyllaries narrowly lanceolate; achene beak 1.5–3 mm ..... 95. *T. goloskokovii*
2b. Achene 3.9–4.1 mm; outer phyllaries 7–10.
4a. Achene body sparsely spinulose above; leaf blade oblanceolate ..... 96. *T. pseudoatratum*
4b. Achene body ± smooth; leaf blade ± linear ..... 97. *T. subglaciale*

94. Taraxacum sinotianschanicum Tzvelev, Novosti Sist. Vyssh. Rast. 24: 220. 1987.

东天山蒲公英 dong tian shan pu gong ying

Herbs 5–12 cm tall. Petiole pale green, ± unwinged; leaf blade probably mid-green, oblanceolate, 6–8 × 1.5–2 cm, glabrous, pinnatilobed, midvein pale green; lateral lobes 2 or 3 pairs, triangular to deltoid, to 1 cm, usually patent, margin usually entire; interlobes short, broad, margin ± entire; terminal lobe triangular. Scapes brownish green, ± equaling leaves, glabrous. Capitulum 2–3 cm wide. Involucre 8–11 mm wide, base rounded. Outer phyllaries 11–14, almost black, ± imbricate, ovate to ovate-lanceolate, outermost ones 5–7 × 2.5–4 mm and ca. 1/2 as long as inner ones, ± appressed to suberect, unbordered, margin ± glabrous, flat below apex; inner phyllaries 1.3–1.7 cm, flat below apex. Ligules yellow; outer ligules outside striped grayish pink; inner ligules with purple to blackish teeth. Stigmas blackish green. Anthers polliniferous. Achene grayish straw-colored brown, 4.5–5.2 × 0.9–1 mm; body ± smooth or apically very sparsely minutely tuberculate, very indistinctly and gradually narrowing into a broadly conic 0.6–0.9 mm cone or cone not discernible at all; beak 4–5 mm, thick. Pappus ± white, 6–7 mm. Fl. summer.

• Alpine slopes; ca. 3500 m. W Xinjiang (Tian Shan).

Taraxacum sinotianschanicum is known from the type specimen only. It deviates from the most common pattern of *T.* sect. *Atrata* in having outer phyllaries ± imbricate and of a broader shape.

95. Taraxacum goloskokovii Schischkin, Fl. URSS 29: 748. 1964.

小叶蒲公英 xiao ye pu gong ying

Herbs 5–8 cm tall. Petiole pinkish green, ± unwinged; leaf blade mid-green, linear to linear-oblanceolate, 5–8 × (0.3–)0.5–0.7(–1.2) cm, glabrous, undivided, margin entire or with irregular short linear lateral teeth (1–3 on each side) or pinnatisect; lateral lobes 2 or 3 pairs, linear-triangular, to 5 mm, usually subrecurved, margin entire; interlobes narrow, margin ± entire; terminal lobe linear-triangular, base sagittate. Scapes brownish green, equaling leaves, glabrous. Capitulum ca. 1.5 cm wide. Involucre 6–7 mm wide, base ± rounded. Outer phyllaries 10–15, deep grayish green, not imbricate, narrowly lanceolate, outermost ones 5–6(–7) × 1.3–2 mm and ca. 1/2 as long as inner ones, ± appressed to loosely appressed, border paler, narrow, and indistinct or sharply delimited and 0.1–0.3 mm wide, margin glabrous, flat to blackish callose below obtuse apex; inner phyllaries 1–1.2 cm, flat to subcorniculate below apex. Ligules yellow; outer ligules outside striped pinkish black. Stigmas deep (pale brownish) yellow. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, ca. 5 × 0.9–1 mm; body ± smooth or apically with a few minute tubercles, cone not discernible; beak 1.5–3 mm, ± thick. Pappus ± white, ca. 5.5 mm. Fl. summer. Agamosperm.

Along alpine streams, stream terraces; 3000–3700 m. SW Xinjiang [Kazakhstan].

96. Taraxacum pseudoatratum Orazova, Fl. Kazakhst. 9: 491. 1966.

窄边蒲公英 zhai bian pu gong ying

Taraxacum atratum Schischkin, Fl. URSS 29: 743. 1964, not G. E. Haglund (1948).

Herbs 5–10 cm tall. Petiole ± green, narrowly winged; leaf blade mid-green, ± oblanceolate, 5–8 × 1.2–2 cm, glabrous, undivided to shallowly sinuate-lobed, margin entire; lateral lobes 1 or 2 pairs, broadly triangular, to 5 mm, ± patent, margin entire; interlobes not distinctly developed, margin entire; terminal lobe broadly triangular, margin entire. Scapes brownish green, equaling leaves, glabrous. Capitulum ca. 2 cm wide. Involucre 8–10 mm wide, base narrowly rounded. Outer phyllaries 7–9, blackish green to deep grayish green, not imbricate, lanceolate to narrowly lanceolate, often broadest in middle or tapering from base, outermost ones 5–7 × 1.5–2.3 mm and ca. 1/2 as long as inner ones, ± appressed, border paler, narrow, and not always distinct or to 0.3 mm wide, margin glabrous or rarely sparsely ciliate, apex ± flat; inner phyllaries 1.1–1.4 cm, apex flat. Ligules yellow; outer ligules outside striped grayish pink. Stigmas yellow to dirty yellow. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, ca. 4 × 0.9–1 mm; body with sparse minute spinules or tubercles in a narrow zone in upper part, gradually narrowing into a conic 0.4–0.5 mm cone; beak ca. 5 mm, not thin. Pappus ± white, ca. 6 mm. Fl. summer. Agamosperm.

Alpine or subalpine grasslands; probably above 3000 m. Xinjiang [Kazakhstan].

97. Taraxacum subglaciale Schischkin, Fl. URSS 29: 743. 1964.

寒生蒲公英 han sheng pu gong ying

Herbs 4–8 cm tall. Petiole purplish, unwinged; leaf blade mid-green, ± linear, 4–6 × 0.5–0.8 cm, glabrous, usually with a few lobules or pinnatisect but sometimes undivided; lateral lobes 1 or 2 pairs, linear-triangular to linear, usually ± recurved, margin entire; interlobes narrow, margin entire; terminal lobe linear, elongated-lingulate, basal segments ± linear and subrecurved. Scapes brownish green, overtopping leaves, glabrous. Capitulum ca. 1.5 cm wide. Involucre 5–6 mm wide, base subobconic. Outer phyllaries 8–10, middle part deep grayish green with a very gradual transition into paler border, not imbricate, ± narrowly lanceolate, outermost ones 4.5–5 × ca. 1.5 mm and ca. 1/3 as long as inner ones, ± appressed to loosely appressed, border narrow, paler grayish green to whitish, and 0.2–0.3 mm wide, margin glabrous, flat below apex; inner phyllaries 1–1.2 cm, ± flat to blackish callose below apex. Ligules yellow. Stigmas yellowish green. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, 3.9–4.1 × ca. 0.9 mm; body ± smooth or apically with a few almost invisible tubercles, cone not discernible or broadly conic and 0.6–0.8 mm; beak 4–4.5 mm, ± thick. Pappus ± white, ca. 5 mm. Fl. summer. Agamosperm.

Alpine slopes, on moist shallow soils; 3500–4500 m. Xinjiang [Kazakhstan].

98. Taraxacum lilacinum Schischkin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 4. 1937.

紫花蒲公英 zi hua pu gong ying

Herbs 4–12 cm tall. Petiole green to pinkish, unwinged; leaf blade mid-green, ± spatulate-oblanceolate, 2.5–8 × 0.5–1.7 cm, glabrous, undivided, margin usually remotely dentate or less often with remote short triangular lobules, apex subacute. Scapes brownish green, usually overtopping leaves, glabrous. Capitulum 2–2.5 cm wide. Involucre 7–9 mm wide, base broadly rounded. Outer phyllaries 8–13, middle part deep grayish green to blackish green, ± not imbricate, ± lanceolate, often broadest in middle, outermost ones 4–5(–8) × 1.5–2.3 mm and 1/2–2/3 as long as inner ones, ± appressed, unbordered or with a gradual transition into paler to whitish 0.1–0.3 mm wide border, margin glabrous, flat below apex; inner phyllaries 1.1–1.4 cm, ± flat below apex. Ligules deep pink to light pinkish violet; outer ligules faintly striped deeper pink. Stigmas dark (probably dark green). Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, 4–4.5 × ca. 0.9 mm, smooth to very sparsely minutely tuberculate above, cone indistinct with body very gradually narrowing in beak; beak 2.5–4 mm, ± thick. Pappus white, 5–6 mm. Fl. summer. Agamosperm.

Wet alpine slopes, gravelly sites, alpine meadows; 3000–3800 m. Xinjiang (Ketmen Tau, Tian Shan) [Kazakhstan, Kyrgyzstan].

Plants morphologically similar to *Taraxacum lilacinum* but sexual have been reported (D. T. Zhang et al., Acta Bot. Boreal.-Occid. Sin. 17: 1–7. 1997), and their status remains to be studied.

14. Taraxacum sect. Arctica Dahlstedt, Acta Fl. Sueciae 1: 37. 1921.

北极蒲公英组 bei ji pu gong ying zu

Plants small, delicate. Leaves usually subglabrous to glabrous; petiole unwinged or rarely narrowly winged; leaf blade undivided or shallowly to deeply lobed, indentation sparse. Outer phyllaries usually few, 8–11(–15), ± blackish green to dark green, broadly ovate to broadly lanceolate, usually less than 5–6 mm, ± appressed to loosely appressed, rarely erect, unbordered or bordered whitish or purplish, margin usually glabrous or rarely ciliate, apex usually corniculate. Ligules yellow, pale yellow, whitish, white, or pinkish. Stigmas discolored. Achene brown, olivaceous brown, blackish, reddish, straw-colored brown, gray, etc., usually 3.5–4.5 mm, not thick; body very sparsely to ± densely spinulose and/or tuberculate above, ± gradually narrowing into a conic to subconic 0.3–0.8 mm cone; beak to 5 mm, thin to slightly thickened. Pappus white.

More than 40 species: tundra of European Arctic, Alps of Europe, mountains of C Asia; one species (endemic) in China.

Taraxacum sect. *Arctica* has rarely been reported to occur in C Asia or China, and reports (e.g., FRPS 80(2). 1999) did not cover members of the section. However, there are several taxa described from that territory that belong to it on the basis of achene and outer phyllary characters. They are *T. junatovii* Tzvelev (SW Mongolia), *T. heptapotamicum* Schischkin and *T. atrans* Schischkin (C Tian Shan), and *T. tzvelevii* Schischkin (Tajikistan). *Taraxacum alatopetiolum*, endemic to China, also belongs to this group.

Taraxacum altaicum Schischkin (Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1949(1–2): 6. 1949), reported as a Chinese species in FRPS (80(2): 37. 1999), is a marginal member of *T.* sect. *Arctica* or an intermediate between *T.* sect. *Arctica* and *T.* sect. *Borealia*. It occurs in the Russian part of the Altai and perhaps might be found in northernmost Xinjiang. However, the description in FRPS does not correspond to the characters of the species, and no Chinese material of this species has been revised by us.

99. Taraxacum alatopetiolum D. T. Zhai & C. H. An, J. Aug. 1st Agric. Coll. 18(3): 2. 1995.

翼柄蒲公英 yi bing pu gong ying

Herbs 4–6 cm tall. Petiole narrowly winged; leaf blade ± mid-green, oblanceolate, 2.5–4.5 × 0.5–0.9 cm, ± glabrous, not divided or margin shallowly pinnatilobed to remotely dentate; lateral lobes or teeth 1 or 2 pairs, triangular, 1–2 mm, patent to subrecurved, margin entire; interlobes broad or not developed in undivided leaves, margin entire; terminal lobe triangular, margin entire, apex subacute. Scapes suffused purplish, ± equaling leaves, arachnoid and densely white arachnoid below capitulum. Capitulum ca. 2 cm wide. Involucre 5–6 mm wide, base rounded. Outer phyllaries 11–15, surface evenly blackish dark gray, ± imbricate, ovate to broadly ovate, outermost ones (2.2–)3–4.5(–5.5) × (2.5–)3–4.2 mm and 1/2–3/5 as long as inner ones, appressed, margin glabrous, apex almost flat in first capitula but black corniculate in later ones; inner phyllaries blackish, 1–1.3 cm, ± flat or corniculate below apex. Ligules golden yellow; outer ligules flat, outside striped gray; floret tube glabrous. Stigmas blackish. Achene blackish brown, 3.7–4.3 × 1–1.1 mm; body sparsely and minutely spinulose or tuberculate above, ± gradually narrowing into a conic 0.5–0.6 mm cone; beak 4–5 mm. Pappus slightly yellowish white, ca. 5 mm. Fl. summer.

• Wet alpine grasslands; ca. 3400 m. Xinjiang.

Taraxacum alatopetiolum is similar to *T. atrans* Schischkin but differs in having more numerous outer phyllaries.

15. Taraxacum sect. Glabra Dahlstedt, Acta Fl. Sueciae 1: 36. 1921.

光果蒲公英组 guang guo pu gong ying zu

Herbs small, glabrous. Leaves undivided. Outer phyllaries blackish green, ± not imbricate, ovate-lanceolate to linear-lanceolate, erect to arcuate-patent, without a paler border, margin glabrous, apex acute and ± flat. Achene long, slender, usually 4.3–5.7 × ca. 0.8 mm; body smooth or very sparsely spinulose or tuberculate above, very gradually narrowing into a subcylindric to cylindric 0.4–0.8 mm cone; beak 5–7 mm, thin. Pappus white or yellowish white, 5–6 mm.

Two species: centered in the Asiatic Arctic and reaching mountains of S Siberia and adjacent regions; one species in China.

For differences between *Taraxacum* sect. *Glabra* and *T.* sect. *Atrata* see the description of the latter and comments there.

100. Taraxacum glabrum Candolle, Prodr. 7: 147. 1838.

光果蒲公英 guang guo pu gong ying

Herbs 6–20 cm tall, base glabrous. Petiole purplish, to 10 cm, very narrow, glabrous; leaf blade deep green with a purplish midvein, oblong-spatulate, 2.5–8 × 0.8–1.9 cm, glabrous, undivided, margin entire or remotely sinuate-dentate, apex subobtuse to obtuse; teeth 1–3 pairs, apex obtuse. Scapes brownish green, ± equaling but later overtopping leaves, glabrous. Capitulum 3–4 cm wide. Involucre 7–10 mm wide, base rounded. Outer phyllaries 13–18, dark blackish green, ± not imbricate, ovate-lanceolate to narrowly lanceolate, outermost ones 5–7 × 1.9–2.6 mm and ca. 1/3 as long as inner ones, erect to patent, paler border not developed, margin glabrous, apex subacute and ± flat; inner phyllaries 1.2–1.5 cm, ± flat near apex. Ligules deep yellow; outer ligules outside faintly striped grayish green; inner ligules with dark apical teeth. Stigmas grayish green. Anthers polliniferous; pollen grains irregular in size. Achene grayish light brown, 4.8–5.5 × ca. 0.8 mm; body smooth, very gradually narrowing into subcylindric to a cylindric (0.6–)0.8 × ca. 0.3 mm cone; beak 5–7 mm. Pappus yellowish white, 5–6 mm. Fl. summer. Agamosperm. $2n = 24$.

Wet mossy subalpine to alpine sites, vicinity of springs; 1600–3000 m. N Xinjiang [Kazakhstan, Mongolia, Russia (Altai)].

16. Taraxacum sect. **Borealia** Handel-Mazzetti, Monogr. Taraxacum, [xi]. 1907.

北方蒲公英组 bei fang pu gong ying zu

Plants medium-sized, rarely robust. Leaves usually mid-green, not thickened, sparsely arachnoid to subglabrous; petiole broadly winged to narrowly winged; leaf blade shallowly to deeply pinnatilobed to pinnatisect; lobes most often patent. Scapes usually growing laterally from leaf rosette, not from center. Outer phyllaries green to blackish green, ± not imbricate, lanceolate to ovate, loosely appressed, erect or erect-patent, usually with a paler broad to narrow border, margin glabrous to sparsely ciliate, apex with a conspicuous horn or sometimes only so in later capitula. Ligules yellow or whitish. Achene grayish straw-colored brown, rarely brown or reddish, usually 4–5 × 0.9–1.1 mm; body shortly spinulose above, usually subabruptly narrowing into a conic to subcylindric 0.5–1.4 mm cone; beak usually 6–11 mm, thin. Pappus white or yellowish white.

About 80 species: mostly in circumpolar subarctic regions, many in mountains of C Asia; three species (two endemic) in China.

Several species of *Taraxacum* sect. *Borealia* were described from the vicinity of the Chinese border: *T. karakoricum* Soest from the Karakoram of Pakistan, *T. stanjukoviczii* Schischkin from Upper Badakhshan of Tajikistan, and *T. pavlovii* Orazova from SE Kazakhstan. They have not been found in the material available but their occurrence in China is not improbable.

Variation is often but not always observed in the development of horns in the outer phyllaries. The first capitula to blossom often have flat or callose outer/inner phyllaries while later capitula have a distinct horn on the phyllaries.

1a. Ligules white ..... 103. *T. pingue*
1b. Ligules yellow.
2a. Outer phyllaries with a sharply delimited pale 0.1–0.4 mm wide border ..... 101. *T. roborovskyi*
2b. Outer phyllaries with a gradual transition from dark middle part into a pale 0.6–1 mm wide border ..... 102. *T. qirae*

101. Taraxacum roborovskyi Tzvelev, Novosti Sist. Vyssh. Rast. 24: 215. 1987.

高山蒲公英 gao shan pu gong ying

Herbs 20–35 cm tall. Petiole pinkish, narrowly winged; leaf blade mid-green with a pinkish midvein, oblanceolate, 15–25 × 3–4 cm, subglabrous, remotely and shallowly pinnatilobed; lateral lobes 2 or 3 pairs, deltoid, patent, margin ± entire; interlobes broad and long, margin entire; terminal lobe helmet-shaped to triangular, margin entire. Scapes brownish green, overtopping leaves, sparsely arachnoid below capitulum. Capitulum 30–40 mm wide. Involucre 1–1.2 cm wide, base rounded. Outer phyllaries ca. 19, black-green with sharply delimited white border, ± not imbricate, lanceolate, outermost ones 12–14 × 2.5–3.5 mm and 3/4–4/5 as long as inner ones, ± appressed, border (0.1–)0.3–0.4 mm wide, margin ± glabrous, with a thick large horn ca. 2 mm below apex; inner phyllaries 1.3–1.6 cm, with a thick horn below apex. Ligules yellow; outer ligules flat, outside striped purplish gray; inner ligules with purple teeth. Stigmas grayish green. Anthers without pollen. Achene unknown. Fl. summer. Agamosperm.

• Mountain meadows; probably above 2500 m. W Xinjiang (Tian Shan).

Taraxacum roborovskyi is known from the type specimen only.

102. Taraxacum qirae D. T. Zhai & C. H. An, J. Aug. 1st Agric. Coll. 18(3): 3. 1995.

策勒蒲公英 ce le pu gong ying

Herbs 5–12 cm tall. Petiole usually suffused purplish, winged in some leaves, base arachnoid; leaf blade mid-green with a green to pinkish midvein, ± oblanceolate, 2–9 × 1–1.5 cm, subglabrous, shallowly pinnatilobed to remotely dentate; lateral lobes or teeth 3–5 pairs, broadly triangular, 2–4 mm, usually recurved, margin entire; interlobes broad or not developed in undivided dentate leaves, margin entire; terminal lobe triangular, margin entire, apex subobtuse, basal lobules or teeth ± recurved. Scapes suffused purplish, ± overtopping leaves, sparsely arachnoid to subglabrous. Capitulum 2.5–3 cm wide. Involucre 8–10 mm wide, base ± rounded. Outer phyllaries 8–11, middle part blackish with a gradual transition into a whitish to white border, not imbricate, narrowly lanceolate, outermost ones 9–14 × 2–4 mm and ca. 3/4 as long as inner ones, ± loosely appressed, border 0.6–1 mm wide, margin glabrous, apex conspicuously corniculate; inner phyllaries blackish, 1.3–1.8 cm, corniculate below apex. Ligules yellow; outer ligules flat, outside striped gray; inner ligules with gray apical teeth. Stigmas blackish. Anthers polliniferous; pollen grains irregular in size. Achene ochraceous brown when unripe but later getting darker and becoming dark brown, 4.2–4.5 × 1–1.1 mm; body spinulose above, ± abruptly narrowing into a subconic 0.8–0.9 mm cone, spinules thin, erect-patent, and acute; beak 5–6 mm. Pappus ± white, ca. 6 mm. Fl. summer. Agamosperm.

• Mountain meadows and pastures; ca. 3100 m. S Xinjiang (Qira).

Taraxacum qirae, a species described from the Kunlun Shan, is clearly a member of *T.* sect. *Borealia*. Its closest relative, *T. pavlovii* Orazova, growing in C Tian Shan of Kazakhstan, differs in having substantially more numerous outer phyllaries and totally different achenes. The geographically closest member of this section, *T. karakoricum* Soest, lacks the whitish borders to the outer phyllaries and has a different leaf shape. The latter species might be found in China as it was described from the Karakoram of Pakistan, not far from the Chinese border.

103. Taraxacum pingue Schischkin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 3. 1937.

尖角蒲公英 jian jiao pu gong ying

Herbs 5–10 cm tall. Petiole usually suffused pinkish, winged, base arachnoid; leaf blade mid-green, ± oblanceolate to narrowly ovate, 4–8 × 1–2.5 cm, sparsely arachnoid, undivided and dentate to remotely shallowly lobulate, midvein pale pur-

plish but distally green; interlobes not developed; leaf apex subobtuse to acute. Scapes brownish green, subequaling leaves, arachnoid. Capitulum 3–4 cm wide. Involucre 1.1–1.5 cm wide, base rounded. Outer phyllaries 13–19, ± blackish green with a whitish border, not imbricate, ovate-lanceolate, largest ones 5–11 × 2–3.5 mm and ca. 3/5 as long as inner ones, ± loosely appressed, border membranous and to 0.5 mm wide, margin sparsely ciliate to glabrous, apex with a conspicuous thick horn; inner phyllaries blackish, 1.3–1.9 cm, corniculate below apex. Ligules white; outer ligules flat, outside striped grayish purple. Stigmas blackish green. Anthers polliniferous; pollen grains irregular in size. Achene light straw-colored brown, 4.5–4.8 × ca. 1 mm; body subsparsely spinulose above, subabruptly narrowing into a thick conic 0.7–0.8 mm cone; beak 6.5–8 mm. Pappus ± white, ca. 8 mm. Fl. summer. Agamosperm.

Alpine meadows, below glaciers; 2800–3000 m. NW Xinjiang (summit area of Saur Mountains) [NE Kazakhstan].

Reports of *Taraxacum pingue* from Hejing Xian and Taxkorgan Xian (FRPS 80(2): 46. 1999) require further study.

17. Taraxacum sect. **Parvula** Handel-Mazzetti, Monogr. Taraxacum, [xi]. 1907.

小花蒲公英组 xiao hua pu gong ying zu

Plants usually small to medium-sized. Petiole usually narrowly winged; leaf blade light grayish green or glaucous green, pinnatilobed to pinnatisect; lobes not numerous, triangular, simple, margin usually entire or sparsely denticulate. Involucre usually 7–10 mm wide, base subobconic to ± rounded. Outer phyllaries not numerous, usually 8–12(–20), pale green to light glaucous green with a narrow darker middle strip and paler surface, narrowly lanceolate to ± ovate, subimbricate, appressed to erect but sometimes some arcuate, border whitish and very narrow. Ligules yellow. Achene pale straw-colored brown, ochraceous, pale reddish straw-colored brown, or grayish to whitish straw-colored brown, 3.8–5.2 × 0.7–0.9(–1) mm; body sparsely spinulose above, usually very gradually narrowing into a subcylindric 0.8–1.4 mm cone; beak 6–8 mm, thin. Pappus white, 5–7 mm. Sexual or agamospermous.

About 20 species: centered in the Himalaya, mainly in India, Nepal, and Pakistan; five species (two endemic) in China.

The name *Taraxacum indicum* Handel-Mazzetti (Monogr. Taraxacum, 50. 1907) (see FRPS 80(2): 26. 1999), according to the majority of the syntypes, belongs to *T.* sect. *Parvula*. However, the heterogeneity of the syntypes and their unsatisfactory quality do not allow a safe interpretation. The name requires further detailed study and is not interpreted in the present treatment.

1a. Pollen absent ..... 105. *T. dasypodum*
1b. Pollen present.
2a. Stigmas ± yellow ..... 104. *T. parvulum*
2b. Stigmas pale greenish yellow to dark green.
3a. Outer phyllaries 11–14, 1.5–2.2 mm wide ..... 108. *T. mitalii*
3b. Outer phyllaries 16–20, 3.5–5 mm wide.
4a. Achene grayish light brown, 4.8–5 mm; cone 1–1.2 mm ..... 107. *T. consanguineum*
4b. Achene pale yellowish brown to pale grayish ivory white, 3.5–4.5 mm; cone (0.6–)0.7–0.9 mm ..... 106. *T. vendibile*

104. Taraxacum parvulum Candolle, Prodr. 7: 149. 1838.

小花蒲公英 xiao hua pu gong ying

Taraxacum himalaicum Soest.

Herbs 5–10 cm tall, small. Petiole pale green to pinkish, arachnoid at base, narrow to narrowly ± winged; leaf blade pale grayish green, oblanceolate to broadly oblanceolate, 4–9 × 1.2–2 cm, almost glabrous, pinnatilobed; lateral lobes in 1–3 pairs, triangular to deltoid, recurved, margin ± entire; interlobes long, margin ± entire; terminal lobe triangular-sagittate, margin entire, apex ± acute. Scapes brownish green, ± equaling leaves, arachnoid. Capitulum 1.5–2.5 cm wide. Involucre 6–8 mm wide, base broadly subconic to ± rounded. Outer phyllaries 8–10, pale grayish green, ± imbricate, ± lanceolate or narrowly so, outermost ones (4–)4.5–5.5 × (1.5–)1.8–2.3 mm and 1/3–1/2 as long as inner ones, appressed, narrow middle part blackish green, border getting paler from pale greenish near middle to whitish green near margin and 0.2–0.3 mm wide, margin subglabrous, apex bordered pinkish and ± flat; inner phyllaries 1–1.2 cm, apex ± flat. Ligules yellow; outer ligules outside faintly striped grayish pink. Stigmas yellow to pale grayish yellow. Anthers polliniferous; pollen grains ± regular in size. Achene pale brownish orange, 3.8–4.6 × 0.8–0.9 mm; body ± smooth below, subsparsely spinulose above, apically gradually narrowing into a subcylindric (0.8–)1–1.2(–1.4) mm cone, spinules short and thin; beak ca. 6 mm. Pappus white, 6–7 mm. Fl. late spring to summer. Predominantly sexual.

Grassland slopes, pastures, river terraces; 2000–4500 m. Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal].

The report of *Taraxacum parvulum* from Xinjiang is based on the report by Soest (Wentia 10: 38. 1963). The reports from NE Qinghai and N Shanxi (FRPS 80(2): 26. 1999; Higher Pl. China 11: 772. 2005) are incorrect.

105. Taraxacum dasypodum Soest, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 265. 1961.

丽江蒲公英 li jiang pu gong ying

Herbs 4–7 cm tall, small, base thickened by remnants of old petioles and arachnoid. Petiole pale green, ± winged; leaf blade pale grayish green, oblanceolate to broadly oblanceolate, 4–7 × 1.2–2 cm, sparsely arachnoid to glabrescent, pinnatilobed or shallowly so; lateral lobes 2 or 3, triangular to deltoid, ± patent to recurved, margin entire; interlobes short, margin entire; terminal lobe triangular, margin entire or sometimes with a single tooth, apex subobtuse. Scapes brownish green, ± equaling leaves, arachnoid. Capitulum ca. 2 cm wide. Involucre

6–7 mm wide, base broadly subconic. Outer phyllaries 8–11, pale green, ± imbricate, ovate to ovate-lanceolate, outermost ones 3–5 × 1.8–2.1 mm and ca. 1/2 as long as inner ones, appressed, narrow middle part blackish green, border getting paler from pale greenish near middle to whitish green near margin and 0.6–0.7 mm wide, margin subglabrous, apex subobtuse, bordered pinkish, and with a blackish callosity or ± flat; inner phyllaries 10–11 × ca. 2 mm, callose near apex. Ligules yellow; outer ligules outside faintly striped grayish pink; inner ligules with black apical teeth. Stigmas yellow. Anthers without pollen. Achene (not fully ripe) deep straw-colored brown, ca. 5 mm; body almost smooth, with sparse minute tubercles or smooth, apically indistinctly and very gradually narrowing into a subcylindric 1–1.3 mm cone; beak 3–4 mm. Pappus white, ca. 5 mm. Fl. late spring to summer. Agamosperm.

• Dry mountain pastures; ca. 2700 m. NW Yunnan (Lijiang).

Taraxacum dasypodum is known only from the type gathering.

106. Taraxacum vendibile Kirschner & Štěpánek, **sp. nov.**

普通蒲公英 pu tong pu gong ying

Type: China. Yunnan: "Zhongdian [中甸] plateau (north), Napa Hai [纳帕海], meadows 7 km to NW of pass," 4000–4230 m, Jun 1995, *A. J. Richards s.n.*, cultivated as JK 4070 (holotype, PRA; isotypes, MO, PE, PRA).

Paratypes: China. Sichuan: "Limes inter Sichuan et Tibet, opp. Dêgê [德格], in oppidi vicinitate meridionali," ca. 3250 m, 4 Jun 1992, *L. Businská & R. Businský 3*, cultivated as JŠ 5114 (PRA); *ibidem*, ca. 3500 m, 6 Jun 1992, *L. Businská & R. Businský 4*, cultivated as JŠ 5119, JŠ 5125 (PRA). Xizang: "Nyingchi [林芝] (= Linchi), in vicinitate orientali," ca. 3400 m, 27 Jul 1992, *L. Businská & R. Businský 11*, cultivated as JŠ 5103 (PRA); "Yarlung-Tsang-Pu [雅鲁藏布江] (Brahmaputra), regio curvaturae magnae [great bend region]," ca. 3300 m, 21 Jul 1992, *L. Businská & R. Businský 10*, cultivated as JŠ 5086, JŠ 5090 (PRA); "Zayü Co. [察隅县], Salween – Irrawaddy divide, W below No La Pass," 3600 m, 17 Jun 1999, *R. Businský & L. Businská 9*, cultivated as JŠ 7443 (PRA); "Zayü Co. [察隅县], E side of Zayü Qu [察隅曲] valley system, the confluence ca. 20 km NE of Zayü town [察隅]," 3550 m, 1 Jul 1999, *R. Businský & L. Businská 14*, cultivated as JŠ 7439 (PRA); "Zayü Co. [察隅县], upper valley system of Dulong Jiang [独龙长] (Taron River) W branch," 3950 m, 24 Jun 1999, *R. Businský & L. Businská 11*, cultivated as JŠ 7451 (PRA); "Zayü Co. [察隅县], Mekong – Salween divide (Hengduan Shan Mts.) [横断山脉], W of Doker La Pass," 3650 m, 5 Jun 1999, *R. Businský & L. Businská 8*, cultivated as JŠ 7432 (PRA). Yunnan: "Zhongdian [中甸] plateau (north), Napa Hai [纳帕海], meadows 7 km to NW of pass," 4000–4230 m, Jun 1995, *A. J. Richards s.n.*, cultivated as JK 4067, JK 4068, JK 4071, JK 4074, JK 4075, JK 4076, JK 4077, JK 4078, JK 4079 (PRA); "Opp. Dêqên [德钦] (= Atuntze), in oppidi vicinitate meridio-orientali," 3300–4200 m, 30 Jun – 1 Jul 1992, *L. Businská & R. Businský 7*, cultivated as JŠ 5135, JŠ 5137 (PRA); "N of Dali [大理], mountain pass, 3581 m," 8 Oct 2007, *P. Sekerka s.n.*, cultivated as JK 5182 (PRA); "Likiang [丽江]," 1990, *J. Soják s.n.*, cultivated as JK 712 (PRA); "Zhongdian Co. [中甸县], abandoned forest road 16 km NW of Zhongdian [中甸]," 3600–3700 m, 15 May 1999, *R. Businský & L. Businská 2*, cultivated as JŠ 7447 (PRA). Russia. Altai: "Aigulakskiy chrebet Mts., distr. Ust'-Ulagan, meadows at Mortvye Ozera Lake, near Ulaganskiy Pereval Pass," 1850–1990 m, 2 Jul 1988, *J. Kirschner s.n.*, cultivated as JK 52 (PRA); "Distr. Ust'-Kan, below Yabaganskiy Pereval Pass," ca. 1300 m, 27 Jun 1988, *J. Kirschner s.n.*, cultivated as JK 36 (PRA); "Distr. Ust'-Kan, rocks above Yabaganskiy Pereval Pass," ca. 1950 m, 28 Jun 1988, *J. Kirschner s.n.*, cultivated as T 191 (PRA); "Distr. Onguday, Khabarovka, valley of Malyi Il'gumen river," 29–30 Jun 1988, *J. Kirschner s.n.*, cultivated as JK 59 (PRA); "Distr. Onguday, near confluence of rivers Katun and Chuya," 1 Jul 1988, *J. Kirschner s.n.*, cultivated as T 190 (PRA).

Plantae agamospermae, mediocriter altae, foliis angustis, pinnatipartitis, lobo terminali parvo, lobis lateralibus 4 ad 9 utrinque, parvis, triangularibus usque anguste triangularibus, interlobiis latis dentatis, petiolo late alato, conspicue roseo-purpureo, scapis dense floccosis, phyllariis involucralibus externis 16 ad 20, erectis usque subpatentibus, ovatis usque lanceolatis, stria centrali griseo-viridi et marginibus latis pallidis, in parte superiore rubro-violaceis, stigmatibus sordide luteis vel luteo-viridibus, acheniis angustis, perpallide stramineis, in pyramidem angustam subcylindricam gradatim abeuntibus.

Herbs 12–16(–25) cm tall, ± medium-sized. Petiole pinkish to purplish, short, ± broadly winged; leaf blade grayish green and slightly suffused reddish brown, oblanceolate to narrowly oblanceolate in outline, usually 8–14 × 1.5–2.5(–4) cm, sparsely arachnoid, deeply pinnatilobed, midvein pale green and adaxially sparsely arachnoid; lateral lobes 4–9, triangular, narrowly triangular, or deltoid, 0.8–1.2 × 4–10 mm, ± patent, proximal margin straight to ± concave and ± entire or sometimes with several minute teeth, distal margin ± straight to slightly sigmoid and entire or with a few teeth; interlobes not spotted, 4–8 mm wide, margin dentate, teeth of variable length and density and with an attenuate apex; terminal lobe ± broadly triangular, distal margin ± straight and entire, apex acute or mucronate. Scapes pinkish to purplish green at base, ± equaling leaves, ± densely floccose-arachnoid. Capitulum ca. 4 cm wide, sometimes nodding after anthesis. Involucre 1–1.1 cm wide, base rounded. Outer phyllaries 16–20, lanceolate to ovate, outermost ones 7–10 × 3.5–4.5 mm and 1/2–2/3 as long as inner ones, erect, erect-patent, or loosely appressed, middle part dark grayish green with a gradual transition into a pale whitish green ca. 1 mm wide border, apical 1/4–1/3 usually suffused purplish, margin sparsely ciliate, apex often slightly recurved, usually flat below tip; inner phyllaries 1.2–1.4 cm, apex flat. Ligules golden yellow; outer ligules ± flat, outside striped dark grayish, with black apical teeth; inner ligules with yellow or red apical teeth. Stigmas dirty yellow to greenish. Anthers polliniferous; pollen grains regular in size. Achene very pale yellowish brown to grayish ivory white, 3.5–4.5 × 0.7–0.9 mm; body narrow, relatively densely shortly spinulose in upper 1/5–1/4, very gradually narrowing into a relatively thick subcylindric (0.6–)0.7–0.9 mm cone, spinules ± erect; beak 8.5–10 mm. Pappus slightly yellowish white, 6–7 mm. Fl. late spring to summer. Agamosperm.

Mountain grasslands and pastures, along mountain paths; 3200–4300 m. W Sichuan, SE Xizang, NW Yunnan [Russia].

A marginal member of *Taraxacum* sect. *Parvula*, *T. vendibile* is widely distributed in Yunnan. While the achene characters (color, narrow shape, a very gradual transition of achene body into the cone) clearly belong to this section, the outer phyllary coloration is quite unique. A comparable pattern is found only in the closely related *T. consanguineum*.

107. Taraxacum consanguineum Kirschner & Štěpánek, **sp. nov.**

近亲蒲公英 jin qin pu gong ying

Type: China. Xizang: "Zayü Co. [察隅县], middle valley system of Dulong Jiang [独龙长] (Taron River) E branch," 3900 m, 22 Jun 1999, *R. Businský & L. Businská s.n.*, cultivated as JŠ 7434 (holotype, PRA; isotypes, MO, PE, PRA).

Paratype: China. Xizang: *ibidem*, *R. Businský & L. Businská s.n.*, cultivated as JŠ 7433 (PRA).

A Taraxaco vendibili Kirschner & Štěpánek *interlobiis foliorum obscure fusco-violaceis, phyllariis involucralibus externis longioribus, stigmatibus obscurioribus et acheniis longioribus fuscogriseisque differt.*

Herbs 12–20 cm tall, ± medium-sized. Petiole pinkish to purplish, short, ± broadly winged; leaf blade deep grayish green and slightly suffused reddish brown, oblanceolate to narrowly oblanceolate in outline, usually 8–14 × 1.5–3 cm, sparsely arachnoid, deeply pinnatilobed, midvein pinkish and adaxially sparsely arachnoid; lateral lobes 4–9, ± triangular, ± patent, distal margin ± straight to slightly sigmoid and entire or with a few teeth, proximal margin straight to ± concave and ± entire but sometimes with several minute teeth; interlobes distinctly colored brownish purple (spot often also covering bases of lateral lobes), broad, margin dentate to lobulate, teeth and lobules of variable length and density and with an attenuate apex; terminal lobe ± broadly triangular to 3-partite, distal margin ± entire, apex acute or mucronate. Scapes pinkish to purplish green at base, ± equaling leaves, ± densely floccose-arachnoid. Capitulum 4–4.5 cm wide. Involucre 1–1.2 cm wide, base rounded. Outer phyllaries 16–20, lanceolate to ovate, outermost ones 9–11 × 3.5–5 mm and 1/2–2/3 as long as inner ones, ± erect-patent, middle part dark grayish green with a gradual transition into a pale whitish green ca. 1 mm wide border, apical 1/4–1/3 usually suffused purplish, margin sparsely ciliate, apex often slightly recurved and usually flat below tip; inner phyllaries 1.2–1.4 cm, apex flat. Ligules golden yellow; outer ligules ± flat, outside striped dark grayish, with black apical teeth; inner ligules with reddish apical teeth. Stigmas pale greenish to greenish, abaxially blackish pilose. Anthers polliniferous; pollen grains regular in size. Achene grayish brown, 4.8–5 × 1–1.1 mm; body narrow, shortly spinulose in upper ca. 1/4, very gradually narrowing into an almost cylindric 1–1.2 mm cone, spinules ± erect; beak 1–1.2 cm. Pappus dirty white, ca. 7 mm. Fl. late spring to summer. Agamosperm.

● Mountain grasslands; ca. 3900 m. SE Xizang.

Taraxacum consanguineum differs from the closely related *T. vendibile* primarily in the color and size of achenes and cone length, in the leaf coloration (a dark spot on the interlobes), longer outer phyllaries, and darker color of stigmas.

108. Taraxacum mitalii Soest, Wentia 10: 46. 1963.

亚东蒲公英 ya dong pu gong ying

Herbs 8–15 cm tall. Petiole usually purplish to pinkish, arachnoid at base, narrow to narrowly winged; leaf blade grayish green, sometimes suffused brownish purple, ± oblanceolate, 7–11(–13) × 1.3–2 cm, arachnoid but later sparsely so, pinnatisect or less often pinnatilobed, midvein light green; lateral lobes 2–4 pairs, triangular to deltoid, recurved, proximal margin straight and ± entire, distal margin usually denticulate and straight or convex but in inner leaves often concave, apex acute; interlobes short, margin often raised and with a few teeth; terminal lobe triangular-sagittate but sometimes hastate, to 3 cm, margin ± entire or often with incisions or lobules, apex ± acute. Scapes brownish purple, subequaling leaves, arachnoid. Capitulum 2.5–3.5 cm wide. Involucre 8–9 mm wide, base ± rounded. Outer phyllaries 11–14, light grayish green, subimbricate, ± lanceolate or ovate-lanceolate, outermost ones 6–7 × 1.5–2.2 mm and 1/2–3/5 as long as inner ones, appressed, some erect-patent, narrow middle part blackish green, border getting paler from pale greenish near middle to whitish green near margin and 0.1–0.3 mm wide, margin subglabrous, apex pinkish and ± callose; inner phyllaries 1.2–1.5 cm, apex ± callose. Ligules yellow; outer ligules outside striped blackish pink; inner ligules with ± yellow apical teeth. Stigmas yellowish green but dark green when dry. Anthers polliniferous; pollen grains irregular in size. Achene light grayish straw-colored brown, 3.9–4.3 × 0.9–1 mm; body ± smooth below, ± densely spinulose above, apically subgradually narrowing into a subcylindric to subconic 0.9–1.1 mm cone, spinules thin and ± erect; beak ca. 7 mm. Pappus white, ca. 5 mm. Fl. late spring to summer. Agamosperm. $2n = 24$.

Mountain pastures and grasslands, along paths; 3000–4300 m. S Xizang [India, Myanmar, Nepal].

Taraxacum mitalii has been mistakenly classified as a member of *T.* sect. *Tibetana*, but leaf, outer phyllary, and achene characters point to *T.* sect. *Parvula*.

18. Taraxacum sect. **Piesis** (Candolle) A. J. Richards ex Kirschner & Štěpánek, Folia Geobot. Phytotax. 28: 297. 1993.

窄苞蒲公英组 zhai bao pu gong ying zu

Pyrrhopappus sect. *Piesis* Candolle, Prodr. 7: 144. 1838.

Involucre usually narrow at base, 4–6 mm wide, rarely 9–10 mm wide. Outer phyllaries linear to linear-lanceolate, usually appressed to erect, border usually pale greenish or pinkish, narrow, and membranous, apex callose to conspicuously corniculate.

Achene only sparsely and shortly spinulose above, gradually to (rarely) subabruptly narrowing into a subcylindric 0.4–1.9 mm cone; beak well developed, 2–7.5 mm. Pappus dirty yellowish to pale pinkish brown. Only sexual, predominantly diploid species.

About eight species: from W Europe to C Asia, Russia (SW Siberia), and China, with highest diversity centered in Turkey and the Caucasus; one species in China.

109. Taraxacum bessarabicum (Hornemann) Handel-Mazzetti, Monogr. Taraxacum, 26. 1907.

窄苞蒲公英 zhai bao pu gong ying

Leontodon bessarabicus Hornemann, Suppl. Hort. Bot. Hafn. 88. 1819.

Herbs 8–17 cm tall. Leaves prostrate to erect-patent, subglabrous; petiole pale green, rarely suffused pinkish, winged; leaf blade mid-green to pale yellowish green, narrowly oblanceolate to narrowly elliptic, 8–18 × 1.5–2.5 cm, almost undivided, dentate, or pinnatisect; lateral lobes 4–6, usually patent, often slightly forward pointing, rarely triangular and downward pointing, distal margin ± convex and with 1(or 2) prominent tooth, apex acuminate; interlobes usually short to indistinct or less often narrowly triangular-elongate, margin usually entire; terminal lobe triangular to elongate, 1–2 × 0.8–1 cm, margin entire or sparsely dentate, apex acuminate to subobtuse. Scapes ± equaling leaves, sparsely arachnoid, rarely with bractlets below capitulum. Capitulum 1–2 cm wide. Involucre almost cylindric, 5–7 mm wide, base narrowly rounded to obconic. Outer phyllaries 14–21, pale green to pale pinkish brown, linear to linear-lanceolate, (4–)5–6.5 × (0.6–)1–1.6(–2) mm, appressed, with an indistinct pale 0.2–0.4 mm wide border, slightly callose to minutely corniculate below apex. Ligules pale yellow; outer ligules subcanaliculate, outside striped reddish or pinkish gray; inner ligules canaliculate, with yellow or reddish apical teeth. Stigmas yellow, dirty yellow, or pale green. Anthers polliniferous; pollen grains regular in size. Achene pale grayish straw-colored brown, (4.5–)5–5.5(–6.5) mm; body sparsely to densely and usually shortly spinulose above, gradually to subabruptly narrowing into a subcylindric 1.1–1.4(–1.7) mm cone; beak 4.5–5 mm. Pappus pale pinkish brown, 5.5–6.5 mm. Fl. Jul–Oct. Sexual. $2n = 16$.

Wet saline meadows and pastures; 400–2000 m. Ningxia, Xinjiang [Kazakhstan, Mongolia, Russia].

The big gap between the common occurrence of *Taraxacum bessarabicum* in Xinjiang and an isolated locality in Ningxia might be a result of imperfect exploration of the regions between them. In particular, the species is to be looked for in W Nei Mongol.

19. Taraxacum sect. **Erythrocarpa** Handel-Mazzetti, Monogr. Taraxacum, [xi]. 1907.

紫果蒲公英组 zi guo pu gong ying zu

Plants usually medium-sized, base without a tunic or with a few old petioles. Petiole unwinged or winged; leaf blade pinnatisect; lateral lobes few to numerous, usually triangular to narrow, margin often dentate or lobulate. Capitulum usually 3–4 cm wide. Outer phyllaries usually 12–20, lanceolate to broadly ovate, long, often imbricate, appressed, loosely appressed, or less often arcuate-recurved, usually distinctly broadly or narrowly bordered, apex usually corniculate or horned. Ligules yellow; floret tube glabrous. Achene red, reddish brown, brown, castaneous, or straw-colored brown, usually 4.3–5.5 mm; body usually densely spinulose above, usually subabruptly narrowing into a distinct cylindric 1–1.5 mm cone, spinules long and thin; beak usually 0.8–1.3 cm. Pappus ± white.

About 40 species: centered in the Mediterranean region and Iran; one species (endemic) in China.

The name *Taraxacum tianschanicum* Pavlov (Vestn. Akad. Nauk Kazakhsk. S.S.R. 8: 30. 1950) was published on the basis of the material from the southwesternmost Tian Shan and probably belongs to *T.* sect. *Erythrocarpa*. It was reported to occur in China (FRPS 80(2): 64. 1999). We failed to find any specimen of this taxon from China. Also, geographically the occurrence of *T. tianschanicum* in China is rather improbable.

110. Taraxacum russum Kirschner & Štěpánek, **sp. nov.**

红蒲公英 hong pu gong ying

Type: China. Guizhou: "Guiyang [贵阳市]," 1996, *P. Štorch s.n.*, cultivated as JK 4023 (holotype, PRA; isotypes, MO, PE, PRA).

Paratypes: China. Guizhou: *ibidem*, *P. Štorch s.n.*, cultivated as JK 4024 (PRA); "Tongzi [桐梓]," ca. 1800 m, 1996, *P. Štorch s.n.*, cultivated as JK 4025 (PRA). Yunnan: "Kunming [昆明市], 'Stone Forest' [石林]," 1990, *J. Soják s.n.*, cultivated as JK 711 (PRA); "Yiliang [宜良], weed in hotel garden, 2800 m," Jun 1995, *A. J. Richards s.n.*, cultivated as JK 4029 (PRA).

Plantae agamospermae, mediocriter altae, foliis pinnatisectis, immaculatis, lobo terminali parvo, triangulari vel trilobato, lobis lateralibus 5 ad 7 utrinque, ± patentibus, triangularibus usque peranguste triangularibus, interlobiis subangustis, petiolo angusto vel subalato, rubro-purpureo, scapis araneosis, phyllariis involucralibus externis 15 ad 19, erectis usque arcuate patentibus, lanceolatis usque ovatis, viridibus, sub apice corniculatis, margine albido, ca. 0.4 mm lato, stigmatibus obscuris, polline irregulari, acheniis angustis cinnamomeis, pyramide 1–1.2 mm longa angusta.

Herbs 9–15(–25) cm tall, base densely whitish arachnoid. Petiole purple, 2–3 cm, ± unwinged; leaf blade mid-green to slightly grayish green, oblanceolate to narrowly oblanceolate, usually 7–14 × 1.5–3 cm, sparsely to densely arachnoid, deeply pinnatisect, midvein arachnoid and adaxially purple; lateral lobes 5–7, narrowly triangular in outer leaves but in middle leaves from broad base abruptly narrowed into a linear distal part, ± patent to slightly recurved, proximal margin ± entire, distal margin sigmoid and with a few linear long teeth near

base; interlobes with purple-brown spots, to 5 mm, sparsely dentate, teeth large; terminal lobe ± triangular to 3-partite, terminal and basal segments narrow, often lingulate, apex acute. Scapes pinkish green, ± equaling leaves, arachnoid. Capitulum 2.5–3 cm wide. Involucre 1–1.1 cm wide, base rounded. Outer phyllaries 15–19, dark green and slightly pruinose, lanceolate to ovate, 8–10 × 3–4.5 mm, erect, ± patent, or arcuate-recurved, with a evident whitish (0.1–)0.2–0.4 mm border, margin sparsely ciliate, apex usually purplish and usually corniculate; inner phyllaries 1.2–1.4 cm, often corniculate near apex. Ligules (paler) yellow; outer ligules subcanaliculate, outside striped dark grayish; inner ligules with yellow to reddish apical teeth. Stigmas grayish green. Anthers without pollen. Achene cinnamon brown, 4.2–4.5 × 0.8–0.9 mm; body narrow, relatively densely shortly spinulose-squamulose above, very gradually narrowing into a cylindric 1–1.2 mm cone; beak 8–9.5 mm. Pappus slightly yellowish white, ca. 5 mm. Fl. late spring. Agamosperm.

• Ruderal sites, dry grasslands; 1500–2000 m. Guizhou, Yunnan.

Taraxacum russum is probably native to China. The relatively robust growth; long, corniculate, and distinctly bordered outer phyllaries; and relatively large achenes point to *T.* sect. *Erythrocarpa*. The species is characterized also by cinnamon brown achenes, absence of pollen, deep grayish green stigmas, spotted interlobes, and arachnoid leaves.

20. **Taraxacum** sect. **Suavia** Kirschner & Štěpánek, Folia Geobot. 39: 264. 2004.

香花蒲公英组 xiang hua pu gong ying zu

Plant base with remnants of brownish dry petioles. Petiole narrow, unwinged; leaf blade deeply lobed, with lobes most often patent. Scapes densely arachnoid. Involucre base rounded to slightly truncate. Outer phyllaries 9–12, ± imbricate, orbicular-ovate to broadly ovate, mostly 5–6(–7) mm, appressed, with broad paler margin, apex usually corniculate. Achene 4.5–5 mm; body grayish straw-colored or red, densely spinulose above, very gradually narrowing into a conic-subcylindric 0.4–0.9 mm cone, spinules short and thin; beak 3–6 mm, slightly thickened. Pappus white [or whitish yellow], 5–6 mm. Fl. early spring.

About ten species: from Russia (S Altai) to Mongolia, Kyrgyzstan, and N China; one species (endemic) in China.

The occurrence of members of this section is imperfectly explored due to early vernal flowering and scarce material in herbarium collections. For the time being, a single species is known from China. Several distinct taxa, however, are known to occur in the close vicinity of the Chinese border in Kyrgyzstan and may also be found in China (Kirschner & Štěpánek, Preslia 77: 263–276. 2005). *Taraxacum sumneviczii* Schischkin (Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1949(1–2): 8. 1949) was reported to occur in China (FRPS 80(2): 64. 1999) but the species was not present in the material studied by us. In all likelihood, the records are referable to *T. pseudosumneviczii*.

The name *Taraxacum wutaishanense* Kitamura (Acta Phytotax. Geobot. 40: 145. 1989), in all likelihood, belongs to *T.* sect. *Suavia*. However, the original material consists of a single plantlet without achenes, and the interpretation of the name is uncertain. The plant may also belong to *T.* sect. *Stenoloba* or *T.* sect. *Dissecta*.

Members of *Taraxacum* sect. *Suavia* are similar to those of *T.* sect. *Dissecta* but have longer achenes with a very gradual transition into a short conic-subcylindric cone, short beak, and suborbicular outer phyllaries.

111. **Taraxacum pseudosumneviczii** Kirschner & Štěpánek, **sp. nov.**

假紫果蒲公英 jia zi guo pu gong ying

Type: China. Xinjiang: "Tian Shan [天山], 43°02′16″N, 86°47′16″E, alpine meadows with *Stipa purpurea*" [Hejing Xian 和静县], 3255 m, 4 Oct 2003, *P. Sekerka 03/9*, cultivated as JK 4950 (holotype, PRA; isotype, PRA).

A Taraxaco sumneviczii Schischkin, *specie valde simili, phyllariis involucralibus minoribus, numerosis, late ovatis usque ovato-lanceolatis, calathiis vix opertis, floribus tubulosis, stigmatibus obscurioribus et pyramide espinulosa bene distinguendum.*

Herbs 6–10 cm tall, delicate, base arachnoid and with a tunic. Petiole purplish, 1–2 cm, ± unwinged; leaf blade pale green with a pale greenish midvein, ± narrowly oblanceolate in outline, 4–7 × 0.8–1.2 cm, sparsely to densely arachnoid, deeply pinnatisect; lateral lobes 6–8, ± linear, 4–5 × 1–1.5 mm, ± patent or sometimes slightly curved upward, proximal margin straight to concave and entire, distal margin straight to ± sigmoid and entire or with a single tooth near base; interlobes ± short and narrow, margin entire or very sparsely dentate; terminal lobe ± narrowly triangular, 3-partite, basal segments narrow, 3–4 × ca. 1 mm, and patent, terminal segment narrowly spatulate, 8–10 × 1–2 mm, and apex acute. Scapes green but base pinkish green, ± equaling leaves, ± densely arachnoid. Capitulum 1–1.5 cm wide, remaining unopened. Involucre 6–7 mm wide, base rounded. Outer phyllaries 11–15, dark green, broadly ovate to ovate-lanceolate, outermost ones 3.5–5 × 2–2.5 mm and ca. 1/3 as long as inner ones, loosely appressed, dark middle part with a gradual transition into a paler to whitish 0.2–0.5 mm wide border, margin sometimes sparsely denticulate and glabrous or sparsely ciliate near apex, apex ± flat or dark callose; inner phyllaries 1.2–1.3 cm, apex ± flat. Ligules ± yellow, short; outer ligules ± tubular, outside striped grayish red; inner ligules usually with yellow apical teeth. Stigmas pale grayish green. Anthers without pollen. Achene reddish brown, 4.4–5.1 × 1–1.2 mm; body densely shortly spinulose in upper ca. 1/3, very gradually narrowing into a thick subconic 0.6–1 mm cone, spinules thin and ± erect; beak ca. 4 mm, ± thick. Pappus white, 5–5.5 mm. Fl. spring. Agamosperm.

• Mountain steppe dry grasslands; 3000–3300 m. Xinjiang (Tian Shan).

21. Taraxacum sect. **Dissecta** Soest, Proc. Kon. Ned. Akad. Wetensch., C, 69: 377. 1966.

多裂蒲公英组 duo lie pu gong ying zu

Early vernal small plants, base with a tunic. Petiole unwinged; leaf blade arachnoid, deeply lobed, lateral lobes patent or recurved. Scapes arachnoid. Involucre with rounded base, usually 7–10 mm wide. Phyllaries with apex flat and not corniculate or rarely slightly callose; outer phyllaries 10–16, imbricate or not so, appressed to patent, with a distinct paler border, margin ciliate. Florets yellow; stigma discolored. Outer and inner phyllaries flat, without corniculation at apex, rarely slightly callose. Achene grayish straw-colored brown, brown, or red, densely spinulose above, 3–4.4 × 0.7–0.9 mm; body subabruptly or ± abruptly narrowing into a cylindric to conic-subcylindric 0.5–0.9 mm cone; beak 6–9 mm. Pappus white.

About ten species: widespread from E Kazakhstan, S Siberia, and Mongolia to NW China; one species (endemic) in China.

Taraxacum sect. *Dissecta* is usually referred to under the name *T. dissectum* (Ledebour) Ledebour, which is an agamospermous species of C Siberia and the Baical Lake region of Russia, probably not reaching China. Another species of this section, also reported to occur in China, is *T. compactum* Schischkin (Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1949(1–2): 5. 1949). It is known to occur in the Russian Altai and might be found in NW Xinjiang, but it has not been authoritatively identified in the Chinese material. *Taraxacum collinum* Candolle (Prodr. 7: 149. 1838) is an agamospermous species widespread in the Irkutsk region of Russia, and it might reach NE China (reported to occur in China by Tzvelev, Sosud. Rast. Sovetsk. Dal'nego Vostoka 6: 398. 1992; Krasnikov, Fl. Sibir. 13: 277. 1997). However, no material of this taxon was observed in the herbarium material studied.

112. Taraxacum spadiceum Kirschner & Štěpánek, **sp. nov.**

枣红蒲公英 zao hong pu gong ying

Type: China. Xinjiang: "Tian Shan [天山]: praeruptus alveus fluminis Houxia [后峡] dictus," May 1999, *P. Sekerka, D. Y. Zhan & V. Huml s.n.*, cultivated as JŠ 7381 (holotype, PRA; isotypes, MO, PE, PRA).

Plantae graciles, foliis dissectis, lobis lateralibus patentibus vel subrecurvis, phyllariis involucralibus exterioribus 10 ad 13 saturate viridibus vel atro-viridibus, (3–)5–6 mm longis, 2.2–4 mm latis, peranguste albomarginatis, stigmatibus pallide griseo-viridibus, antheris polline carentibus, acheniis brunneis vel castaneo-brunneis, 3.2–3.8 mm longis, 0.7–0.8 mm latis, in pyramidem 0.6–0.8 mm longam cylindricam subabrupte abeuntibus.

Herbs 8–11 cm tall. Petiole green or purplish brown, narrow, sparsely arachnoid; leaf blade mid-green, linear-oblanceolate, 3.5–8 × 0.7–1.3 cm, sparsely arachnoid, deeply pinnatisect, midrib green to pinkish and ± glabrous; lateral lobes 4 or 5 pairs, narrowly triangular to linear-triangular, ca. 5 × 2 mm, patent to subrecurved, distal margin convex or straight and entire or sparsely dentate; interlobes narrow, margin usually denticulate; terminal lobe narrowly triangular to 3-partite, margin entire. Scapes brownish or purplish green, overtopping leaves, sparsely arachnoid. Capitulum to 2.5 cm wide. Involucre 7–8 mm wide, base rounded. Outer phyllaries 10–13, imbricate, ovate to broadly ovate, outermost ones (3–)5–6 × 2.2–4 mm and 1/3–1/2 as long as inner ones, appressed, margin ciliate, apex ± flat; inner phyllaries 1–1.4 cm, apex blackish callose or flat. Ligules yellow; outer ligules flat, striped purplish gray outside; inner ligules with yellow or gray apical teeth. Stigmas light grayish green. Anthers without pollen. Achene pure brown or castaneous brown, 3.2–3.8 × 0.7–0.8 mm; body subdensely spinulose in upper ca. 1/4, subabruptly narrowing into a ± cylindric 0.6–0.8 mm cone; beak ca. 6 mm. Pappus white, 4–5 mm. Fl. spring. Agamosperm.

• Dry gravelly slopes, dry grasslands; 500–1000 m. Xinjiang (Tian Shan).

Taraxacum dissectum (Ledebour) Ledebour and *T. compactum* Schischkin differ from *T. spadiceum* in fruit color and in having broadly bordered outer phyllaries. The former two species and *T. collinum* Candolle are polliniferous. *Taraxacum pawlodarskum* Doll from Kazakhstan has a very different leaf shape and fruit color, and *T. ustamenum* Doll from Kazakhstan has a different fruit color and outer phyllary shape. The latter species belongs to *T.* sect. *Erythrosperma* and has distinctly corniculate phyllaries.

22. Taraxacum sect. **Erythrosperma** (H. Lindberg) Dahlstedt, Acta Fl. Sueciae 1: 36. 1921.

红种子蒲公英组 hong zhong zi pu gong ying zu

Taraxacum [unranked] *Erythrosperma* H. Lindberg, Acta Soc. Fauna Fl. Fenn. 29(9): 18. 1908.

Plants usually small, base with a tunic. Petiole unwinged; leaf blade pinnatisect; lateral lobes numerous, usually narrow, often dentate or lobulate. Capitulum small, mostly 2–3 cm wide. Outer phyllaries usually 10–18, often imbricate, linear-lanceolate to ovate, short, loosely appressed to arcuate-recurved, indistinctly bordered or pale bordered, apex usually corniculate. Ligules yellow; floret tube glabrous. Achene red, red-brown, brown, grayish pink, or straw-colored brown, 3.2–4.2 mm; body usually densely spinulose above, subabruptly to gradually narrowing into a distinct cylindric 0.7–1.2 mm cone; beak usually 4–9 mm. Pappus ± white.

About 180 species: mainly in Europe and the Mediterranean region; one species (introduced) in China.

Several forms are found in China, but only one has been identified as a known species. The name *Taraxacum erythrospermum* Andrzejowski refers to a sexual member of this section, confined to the E part of C Europe; in the literature (e.g., FRPS 80(2): 65. 1999) it covers most of *T.* sect. *Erythrosperma*.

113. Taraxacum scanicum Dahlstedt, Ark. Bot. 10(11): 21. 1911, s.l.

瑞典蒲公英 rui dian pu gong ying

Herbs 10–20 cm tall. Petiole purplish, ± unwinged; leaf blade deep green, narrowly elliptic, usually 5–10 × 1.5–2.5 cm, sparsely arachnoid to subglabrous, deeply pinnatisect, midvein green or adaxially purplish and sparsely arachnoid; lateral lobes 3–5, triangular to narrowly triangular in outer leaves but in middle leaves narrowly triangular to linear-triangular, ± patent to slightly recurved, proximal margin ± entire, distal margin sigmoid to straight and entire or with several teeth or lobules near base; interlobes often with purplish brown margin, narrow, margin dentate and lobulate; terminal lobe ± triangular in outer leaves but 3-partite in middle ones, terminal segment elongated, narrow, often lingulate, with a few teeth or lobules at base, and apex acute. Scapes pinkish green but later purplish, ± equaling leaves, arachnoid. Capitulum 2.5–3 cm wide. Involucre 7–9 mm wide, base ± rounded. Outer phyllaries 10–15, lanceolate to narrowly so, 6.5–9 × 1–3.5 mm, ± patent to almost reflexed, abaxially deep green, adaxially pale glaucous green, border adaxially ± evident, whitish, and 0.1–0.2 mm wide, margin sparsely ciliate, apex usually corniculate; inner phyllaries 1.2–1.5 cm, often corniculate near apex. Ligules yellow; outer ligules flat, outside striped dark grayish green. Stigmas yellowish green. Anthers polliniferous; pollen grains irregular in size. Achene light brown to slightly reddish brown, 3.4–3.6 × 0.8–0.9 mm; body narrow, subdensely shortly spinulose above, subgradually narrowing into a thin cylindric 0.9–1 mm cone; beak 7–8 mm. Pappus slightly yellowish white, ca. 5 mm. Fl. spring. Agamosperm. $2n = 24$.

Park grasslands, ruderal grasslands; 400–500 m. Liaoning [native to Europe].

This species is introduced from Europe, where the *Taraxacum scanicum* group consists of several closely related taxa (for review, see Vašut et al., Preslia 77: 197–210. 2005). The Chinese plant is in all respects, particularly in leaf shape, outer phyllaries, floret characters, and size and shape of achenes, almost identical with *T. scanicum* s.s., with the exception of the almost brown achenes (the European *T. scanicum* has achenes more reddish brown).

23. Taraxacum sect. Taraxacum

西洋蒲公英组 xi yang pu gong ying zu

Taraxacum officinale F. H. Wiggers, s.l.

Plants medium-sized or robust. Leaves numerous; petiole unwinged or winged; leaf blade usually broad (3–6 cm), deeply lobed to pinnatisect; lateral lobes variously triangular or deltoid, margin usually dentate or lobulate; interlobes evident, often spotted or bordered tan or brownish purple, margin usually dentate. Capitulum 3–7 cm wide. Involucre usually more than 1.2 cm wide, base rounded or flat. Outer phyllaries (12–)15–25(–28), usually mid-green to deep green and sometimes pruinose, variously arranged, broadly linear, linear-lanceolate, or less often lanceolate, usually 12–16 × 2.5–3.5 mm, usually irregularly patent to reflexed, unbordered or with inconspicuous narrow paler borders, apex usually flat but not infrequently callose or sometimes minutely corniculate. Ligules yellow; floret tube glabrous or sparsely arachnoid with variously curved soft thin hairs. Achene grayish straw-colored brown or light olivaceous brown, usually 3–4.5 mm; body densely spinulose in upper 1/4–1/3, ± abruptly narrowing into a conic to subcylindric 0.2–0.9 mm cone; beak usually 0.9–1.3 cm, thin. Pappus white to dirty white, usually 6–7 mm. Sexual or agamospermous.

Numerous species: mostly known from Europe; three (or perhaps more) species (one endemic, two introduced) in China.

Taraxacum sect. *Taraxacum* in Europe has over 1,000 recognized agamospermous species, but in other continents the knowledge of this section is fragmentary. China has few agamospermous species in this section. One species described from China undoubtedly belongs to *T.* sect. *Taraxacum*, and another couple of agamospermous species were identified as *T. oblongatum* and *T. rhodopodum*. The low quality of herbarium material and lack of specialized collections do not allow any detailed taxonomic analysis. *Taraxacum* sect. *Taraxacum* is represented in China by several species, probably mostly introduced, and their taxonomy requires further study.

The name *Taraxacum officinale* is generally used to cover the diversity of this section. Until recently, the effective lectotypification restricted the usage of this name to what is most often called *T.* sect. *Crocea* M. P. Christiansen, a northern and alpine section. A corrected typification, returning the name to the most common usage (in the sense of *T.* sect. *Ruderalia*) was published recently (Kirschner & Štěpánek, Taxon 60: 219. 2011). From now on, the name *T. officinale* in its broad sense may be used for what is here treated as *T.* sect. *Taraxacum* (*T.* sect. *Ruderalia*), and the older records under *T. officinale* usually belong to this section, which is widespread in China.

The type specimen of *Taraxacum brassicifolium* Kitagawa (Rep. Inst. Sci. Res. Manchoukuo 2: 308. 1938) was not traced. From the description it is obvious that the type plant was an enormously robust "bloated" specimen. The taxon most probably belongs to *T.* sect. *Taraxacum* (the only feature not in full accordance with this assumption is the minute corniculation of outer phyllaries, but taxa in *T.* sect. *Taraxacum* do not infrequently have this trait). The whitish membranous bractlets on the receptacle margin are treated as a monstrosity. Because of the lack of material and insufficient original description, we do not include the taxon in this treatment.

As the following three species represent a minor fragment of totally unexplored morphological variation and taxonomic complexity of the section in China, we refrain from providing the identification key.

114. Taraxacum oblongatum Dahlstedt in Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 9: 27. 1930.

椭圆蒲公英 tuo yuan pu gong ying

Herbs 10–25 cm tall. Petiole pinkish purple, winged; leaf blade deep green with a light green midvein sometimes pinkish near base, ± oblong-oblanceolate, 7–18 × 3–4 cm, sparsely arachnoid to subglabrous, ± pinnatisect; lateral lobes 3–5 pairs,

± triangular, relatively broad, usually hamate-recurved, distal margin convex and usually entire or seldom denticulate; interlobes short but proximal ones longer, margin entire or denticulate, often with a raised dark border; terminal lobe ± helmet-shaped or almost rounded, base often cordate, proximal margin ± straight or sigmoid, distal margin convex and ± entire, apex subobtuse to obtuse and mucronate. Scape light green but later brownish purple, ± arachnoid. Capitulum 3.5–5 cm wide. Involucre base ± rounded. Outer phyllaries 14–18, regularly arranged, linear-lanceolate to lanceolate, (10–)11–13(–14) × 2.3–3.5 mm, arcuate-recurved, abaxially dark green and often suffused purplish brown, adaxially grayish green, ± unbordered. Ligules deep yellow; outer ligules flat, outside striped light grayish brownish purple. Stigmas dark grayish green to almost blackish. Anthers polliniferous; pollen grains variable in size. Achene grayish straw-colored brown, (3.4–)3.8–4.3 mm, ± densely spinulose in upper ca. 1/4, ± abruptly narrowing into a ± conic 0.5–0.6 mm cone; beak 1–1.1 cm. Pappus ± white, ca. 6 mm. Fl. spring. Agamosperm. $2n = 24$.

Lawns, ruderal sites. Yunnan [native to Europe].

115. Taraxacum yinshanicum Z. Xu & H. C. Fu in Ma, Fl. Intramongol. 6: 330. 1982.

阴山蒲公英 yin shan pu gong ying

Herbs to 35 cm tall, robust. Petiole probably pinkish, winged; leaf blade deep green or ± glaucous green, ± broadly oblanceolate, 10–25 × 2.5–4 cm, ± sparsely arachnoid, pinnatilobed to pinnatisect; lateral lobes usually 4 or 5, ± narrowly triangular, from broad base abruptly narrowing into a linear-triangular distal part, ± patent to pointing upward, proximal margin convex and usually denticulate, distal margin usually concave and ± denticulate at base, apex acute, midvein arachnoid and probably pinkish; interlobes broad, margin denticulate; terminal lobe broadly triangular to flat deltoid, basal lobules patent and with an acute apex, terminal segment with an acute apex. Scape brownish green, overtopping leaves, arachnoid. Capitulum ca. 2.5 cm wide. Involucre base ± rounded. Outer phyllaries 15–18, lanceolate to linear-lanceolate, ca. 11 × 1.5 mm, recurved, abaxially dark green, adaxially glaucous green, margin glabrous, apex flat; inner phyllaries ca. 1.5 cm. Ligules yellow; outer ligules flat, outside striped purplish. Stigmas dark green. Anthers polliniferous. Achene grayish straw-colored brown, 3.3–3.5 × ca. 1.2 mm, densely spinulose above, abruptly narrowing into a subconic 0.7–0.8 mm cone; beak 8–9 mm. Pappus ± white, 5–6 mm. Fl. early summer.

● Mountain forest margins. Nei Mongol.

The type specimen undoubtedly belongs to this section. On the other hand, the figure in the protologue (loc. cit.: 289, pl. 113) probably is not conspecific with the type and may belong to another section.

116. Taraxacum rhodopodum Dahlstedt ex M. P. Christiansen & Wiinstedt in Raunkiaer, Dansk Exkurs.-Fl., ed. 5, 310. 1934.

红座蒲公英 hong zuo pu gong ying

Herbs to 25 cm tall, medium-sized. Petiole purplish, winged in most leaves; leaf blade deep green, ± broadly oblanceolate, 11–18 × 3–4 cm, sparsely arachnoid, pinnatisect, midvein purplish and arachnoid; lateral lobes 4–6, ± narrowly triangular to narrowly deltoid, usually patent, sometimes subrecurved, proximal margin ± straight and usually entire or rarely denticulate, distal margin usually ± straight or convex and entire or ± denticulate, apex acute; interlobes short, broad, margin denticulate or entire; terminal lobe triangular to helmet-shaped, margin usually entire or with a single incision, apex subacute. Scape brownish purple, overtopping leaves, arachnoid. Capitulum ca. 5 cm wide. Involucre 1.2–1.5 cm wide, base ± rounded. Outer phyllaries 13–16, lanceolate to broadly lanceolate, 13–14 × 2–3 mm, recurved to reflexed, abaxially dark green, adaxially suffused brownish purple, margin ± glabrous, apex flat; inner phyllaries 1.5–1.8 cm, neighboring pairs often fused and then very broad. Ligules deep yellow; outer ligules flat, outside striped grayish green. Stigmas yellowish green. Anthers polliniferous; pollen grains irregular in size. Achene grayish straw-colored brown, 3.2–3.5 mm; body ± densely spinulose above, ± abruptly narrowing into a ± conic 0.5–0.6 mm cone, spinules thin and acute; beak 9.5–10.5 mm. Pappus ± white, ca. 7 mm. Fl. late spring. $2n = 24$.

Mountain grasslands, along paths; 3600–3700 m. Naturalized in Yunnan [native to (or at least described from) Europe].

72. ASKELLIA W. A. Weber, Phytologia 55: 6. 1984.

假苦菜属 jia ku cai shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Crepis sect. *Ixeridopsis* Babcock, Univ. Calif. Publ. Bot. 22: 212. 1947.

Herbs, perennial, usually rather delicate, with a slender taproot and often with shoot-bearing lateral roots. Stems rather low, slender, often branched from base. Leaves in basal rosette or along stem, usually small, with orbicular to obovate and spatulate blade attenuate into a long petiole-like base, glabrous. Synflorescence mostly with rather few capitula. Capitula erect, with 5–15 florets. Involucre narrowly cylindric. Phyllaries in few series, glabrous [or setulose or arachnoid hairy]; outer phyllaries usually less than 1/4, rarely to 1/3, as long as inner ones; inner phyllaries linear-lanceolate, equal. Receptacle naked. Florets yellow or more rarely pale purplish red. Achene usually pale brown, slenderly cylindric to slenderly fusiform, with 10 thin equal ribs, apically truncate, attenuate, or shortly beaked. Pappus white, of scabrid bristles, usually caducous or persistent.

About 11 species: C, NE, and SW Asia, North America; six species (one endemic) in China.

Treatment of *Askellia* (with a basic chromosome number of $x = 7$) as a separate genus instead of as a section of *Crepis* (*C.* sect. *Ixeridopsis*) has been corroborated recently both by Sennikov and I. D. Illarionova (Komarovia 5: 57–115. 2008), based, in particular, on carpological investigations,

and Enke and Gemeinholzer (Taxon 57: 756–758. 2008), based on molecular phylogenetic analyses, yet with uncertain systematic position. More recently, J. W. Zhang et al. (in prep.) revealed in their molecular phylogenetic analyses of subtribe Crepidinae that *Askellia* is part of a well-supported clade including *Ixeridium*, *Ixeris*, and *Taraxacum* and sister to a subclade including *Ixeris* and *Ixeridium*.

1a. Corolla 7–9 mm; anther tube 2–2.5 mm; plants 2–4 cm tall ..... 4. *A. pygmaea*
1b. Corolla 9–14 mm; anther tube 3–5 mm; plants 3–30 cm tall.
2a. Stem branched only apically; lower and middle stem leaves 5–9 cm ..... 5. *A. pseudonaniformis*
2b. Stem branched already from base and appearing as few to many stemmed; lower and middle stem leaves 1.5–4 cm, or if rarely to 8 cm then branches repeatedly divaricately branched.
3a. Plants 4–30 cm tall; branches several to usually many, ascending, repeatedly divaricately and intricately branched; leaves to 8 cm ..... 6. *A. flexuosa*
3b. Plants 4–10(–15) cm tall; branches few to many, procumbent to erect, never repeatedly divaricately and intricately branched; leaves to 4 cm.
4a. Leaf axils inconspicuously white lanate; stem leaves (except uppermost) as large as basal leaves ..... 2. *A. alaica*
4b. Leaf axils glabrous; stem leaves always smaller than basal leaves.
5a. Florets yellow (when fresh); longest outer phyllary 3–4 mm ..... 1. *A. karelinii*
5b. Florets pale purplish red (when fresh); longest outer phyllary 2–2.5 mm ..... 3. *A. lactea*

1. Askellia karelinii (Popov & Schischkin ex Czerepanov) W. A. Weber, Phytologia 55: 6. 1984.

乌恰假苦菜 wu qia jia ku cai

Crepis karelinii Popov & Schischkin ex Czerepanov, Fl. URSS 29: 757. 1964; ?*Askellia ladyginii* Tzvelev; *Youngia karelinii* (Popov & Schischkin ex Czerepanov) Kamelin; *Y. pygmaea* (Ledebour) Ledebour var. *caulescens* Ruprecht; *Y. pygmaea* var. *dentata* Ledebour.

Herbs 4–10 cm tall, perennial, glabrous, glaucescent. Roots and subterranean shoots often branched and slender. Stem delicate, erect, branched from base, leafy. Basal and lower stem leaves petiolate; petiole equaling or shorter to rarely longer than leaf blade; leaf blade elliptic, elliptic-oblanceolate, or spatulate, 0.5–4 × 0.3–1.5 cm, undivided to pinnatipartite, base gradually attenuate into petiole, margin subentire to sinuate-dentate, apex acute to obtuse; lateral lobes (if present) toothlike. Middle stem leaves sessile or subsessile, oblanceolate, otherwise similar to lower stem leaves. Upper stem leaves linear to subulate, smaller. Synflorescence corymbiform, with few capitula. Capitula with 10–12 florets; peduncle filiform, shorter than to ± as long as involucre. Involucre narrowly cylindric, 8–11[–13] × 3–4 mm. Phyllaries green, abaxially glabrous; outer phyllaries ovate to ovate-lanceolate, longest 3–4 mm, apex acute; inner phyllaries 8, margin scarious, apex acute to obtuse. Florets yellow. Corolla 1.1–1.4 cm. Anther tube 3–4 mm. Achene pale yellowish, fusiform, 4.5–7 mm, apically more attenuate. Pappus 5–8 mm. Fl. and fr. Aug.

Gravelly or gravelly-sandy areas particularly on floodplains; 2600–4600 m. Qinghai, Xinjiang, ?Xizang [Kazakhstan, Kyrgyzstan, SC Russia].

Askellia ladyginii was recently described from a few collections from Xizang and distinguished from *A. lactea* by partly pinnately lobed leaves. Unlike *A. lactea* its florets are described as yellow. It has not been possible yet to study the material, but from the description it matches *A. karelinii* and appears hardly worth recognition as a separate species, though *A. karelinii* has otherwise so far not been reported from Xizang.

2. Askellia alaica (Krascheninnikov) W. A. Weber, Phytologia 55: 6. 1984.

红齿假苦菜 hong chi jia ku cai

Crepis alaica Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 182. 1933; *Youngia alaica* (Krascheninnikov) Kamelin.

Herbs 5–10(–15) cm tall, perennial, inconspicuously white lanate in leaf axils otherwise glabrous, glaucescent. Roots and subterranean shoots slender. Stem delicate, sparsely branched mostly from base, leafy. Basal and lower stem leaves obovate to oblanceolate, 1.5–3.5 × 0.7–1.5(–2) cm, undivided to shallowly pinnatifid with wide lobes, base petiole-like attenuate, margin irregularly sinuate-dentate with coarse acute teeth, apex obtuse to subacute. Middle and upper stem leaves few, similar to lower stem leaves but usually sessile, only uppermost leaves smaller. Synflorescence corymbiform, with few capitula. Capitula with 9 or 10 florets; peduncle much shorter than involucre. Involucre narrowly cylindric, 10–11 × 2–3 mm. Phyllaries dark green, glabrous, apex ± acute; outer phyllaries ovate to lanceolate, longest 3–4 mm; inner phyllaries 8(–10), margin thin and scarious. Florets orangish yellow or sometimes tinged pink. Corolla 1–1.7 cm. Anther tube ca. 5 mm. Achene yellowish reddish brown, slenderly fusiform, 7–7.5 mm, apically conspicuously attenuate. Pappus 5.5–6.5 mm, persistent. Fl. and fr. Jul–Aug. $2n = 14$.

Alpine gravelly or rocky stream banks, scree slopes; ?2500–4500 m. SW Xinjiang [E Kyrgyzstan, NE Tajikistan].

Askellia alaica, under the name *Crepis alaica*, has been reported generally from the border range between China, E Kyrgyzstan, and NE Tajikistan (Czerepanov, Fl. URSS 29: 653. 1966). So far, no substantiated records from Chinese territory are known (C. H. An, Fl. Xinjiang. 5: 460. 1999), although its presence must be assumed. The description is based on those by Czerepanov (Fl. URSS 29: 653. 1966) and Babcock (Univ. Calif. Publ. Bot. 22: 532. 1947).

3. Askellia lactea (Lipschitz) W. A. Weber, Phytologia 55: 7. 1984.

红花假苦菜 hong hua jia ku cai

Crepis lactea Lipschitz, Repert. Spec. Nov. Regni Veg. 42: 159. 1937; *Askellia minuta* (Kitamura) Sennikov; *C. minuta* Kitamura; *Youngia lactea* (Lipschitz) Kamelin; *Y. pygmaea* (Ledebour) Ledebour var. *purpurea* C. Winkler ex O. Fedtschenko.

Herbs 3–4[–10] cm tall, perennial, glabrous, glaucescent. Roots and subterranean shoots often branched and slender. Stem delicate, erect or sometimes procumbent, branched from base or middle, leafy. Basal and lower stem leaves with a 1–1.5 cm petiole; leaf blade elliptic to narrowly elliptic-ovate, 7–10 × ca. 6 mm, base cuneate, margin entire or sinuate-dentate, apex acute. Upper stem leaves similar to lower stem leaves but narrowly elliptic, smaller, sometimes tinged with purple, margin entire. Synflorescence corymbiform, with few to several capitula. Capitula with 10–12 florets; peduncle filiform, 0.5–2 cm. Involucre narrowly cylindric, 8–10 × 3–4 mm. Phyllaries abaxially glabrous but ciliate at apex; outer phyllaries green, ovate to lanceolate, longest 2–2.5 mm, margin thin and scarious, apex obtuse to acute; inner phyllaries 8, apex acute. Florets pale purplish red. Corolla 1.1–1.4 cm. Anther tube 3–4 mm. Achene yellowish brown, slenderly columnar to fusiform, 4–6 mm, apex only slightly attenuate. Pappus 5–6 mm. Fl. and fr. Jun–Aug.

Gravelly areas on floodplains; 3100–4000 m. Xinjiang, Xizang [Tajikistan].

4. Askellia pygmaea (Ledebour) Sennikov, Komarovia 5: 86. 2008.

矮小假苦菜 ai xiao jia ku cai

Prenanthes pygmaea Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 553. 1815; *Askellia nana* (Richardson) W. A. Weber; *Barkhausia nana* (Richardson) Candolle; *Crepis humilis* Fischer ex Herder; *C. nana* Richardson; *Hieracioides nana* (Richardson) Kuntze; *P. polymorpha* Ledebour var. *flaccida* Ledebour; *P. polymorpha* subvar. *integrifolia* Ledebour; *P. polymorpha* var. *lyrata* Ledebour; *P. polymorpha* var. *pygmaea* (Ledebour) Ledebour; *Youngia pygmaea* (Ledebour) Ledebour; *Y. pygmaea* var. *flaccida* (Ledebour) Ledebour; *Y. pygmaea* var. *lyrata* (Ledebour) Ledebour; *Y. pygmaea* var. *nana* (Richardson) Ledebour.

Herbs 2–4 cm tall, perennial, glabrous, glaucescent. Roots shoot-bearing; subterranean shoots slender, often branched. Stem delicate, branched from base, leafy. Basal and stem leaves with a 4–14 mm petiole; leaf blade ovate, orbicular, or elliptic, 1–2.6[–3.5] × 0.4–1[–1.7] cm, base cuneate, margin entire, apex rounded to acute. Synflorescence tufted-corymbiform, with few to many capitula. Capitula with 9–11 florets; peduncle filiform, most shorter than involucre. Involucre narrowly cylindric, 9–10 × 2–3 mm. Phyllaries green, abaxially glabrous, margin scarious; outer phyllaries ovate to lanceolate, longest 2–3 mm, apex acute; inner phyllaries 8, apex ± acute. Florets yellow. Corolla 7–9 mm. Anther tube 2–2.5 mm. Achene pale yellowish, columnar to fusiform, ca. 5 mm, apically more strongly attenuate. Pappus 4–5 mm. Fl. and fr. Jun–Sep. $2n = 14$.

Gravelly areas on floodplains and bases of slopes, stream banks; 4600–4700 m. Xinjiang, Xizang [Kazakhstan, Mongolia, E Russia; North America].

5. Askellia pseudonaniformis (C. Shih) Sennikov, Komarovia 5: 89. 2008.

长苞假苦菜 chang bao jia ku cai

Crepis pseudonaniformis C. Shih, Acta Phytotax. Sin. 33: 190. 1995.

Herbs to 17 cm tall, perennial, glabrous. Stem erect, branched apically, base with residue of old petioles. Lower and middle stem leaves elliptic to oblanceolate, 5–9 × 0.5–1.1 cm including a 3–5.5 cm petiole, base narrowly cuneate, margin sinuate-dentate, apex rounded. Upper stem leaves sessile, linear to lanceolate, base cuneate, margin entire or subentire; uppermost leaves bractlike. Synflorescence corymbiform, with 8–12 capitula. Capitula with ca. 11 florets; peduncle shorter than involucre. Involucre narrowly cylindric, ca. 1.1 cm. Phyllaries abaxially glabrous; outer phyllaries narrowly ovate to lanceolate, longest ca. 2 mm, apex acute; inner phyllaries with a scarious margin, apex obtuse to acute. Florets yellow. Corolla 1–1.4 cm. Anther tube 3–4 mm. Achene brown, fusiform, ca. 6 mm. Pappus ca. 7 mm. Fl. and fr. Aug.

• Mountain slopes; ca. 2500 m. NW Xinjiang (Zhaosu).

This species is only known from the type collection.

6. Askellia flexuosa (Ledebour) W. A. Weber, Phytologia 55: 6. 1984.

弯茎假苦菜 wan jing jia ku cai

Prenanthes polymorpha Ledebour var. *flexuosa* Ledebour, Fl. Altaic. 4: 145. 1833; ?*Askellia melanthera* (C. H. An) Tzvelev; *Barkhausia flexuosa* (Ledebour) Candolle; *B. flexuosa* var. *lyrata* Schrenk; *Crepis flexuosa* (Ledebour) C. B. Clarke; ?*C. melanthera* C. H. An; *Hieracioides flexuosa* (Ledebour) Kuntze; *Youngia flexuosa* (Ledebour) Ledebour; *Y. flexuosa* var. *gigantea* C. Winkler ex O. Fedtschenko; *Y. glauca* Edgeworth.

Herbs 3–30 cm tall, perennial, glaucescent, glabrous. Roots and subterranean shoots often branched and slender. Caudex sometimes branched in older plants, with rosette leaves often well developed. Stem repeatedly divaricately and often intricately branched from base; branches few to numerous, usually rather delicate, ascending. Basal and lower stem leaves extremely variable, oblanceolate, ovate, elliptic, lanceolate, or more rarely linear, 2–8 × 0.2–2 cm, shallowly pinnatifid to pinnatisect or more rarely undivided, base attenuate into a 0.5–1.5 cm petiole-like portion, margin entire to sinuate-dentate, apex acute to rounded; lateral lobes (if present) (1–)3–5-paired, opposite or alternate, elliptic, linear, or toothlike, rarely pinnately divided. Middle and upper stem leaves similar to lower stem leaves but sessile or shortly petiolate and linear-lanceolate to narrowly linear, upward on stem gradually smaller. Synflorescence of each branch corymbiform and sometimes very densely so, with few to several capitula. Capitula with 9–13 florets; peduncle filiform, extremely variable in length and ranging from much longer than involucre to almost absent. Involucre narrowly cylindric, 6–10 × 2–3 mm. Phyllaries green, abaxially glabrous; outer phyllaries ovate to ovate-lanceolate, longest usually ca. 2 mm, apex acute to obtuse; inner phyllaries 8, margin narrow and scarious, apex acute to obtuse. Florets yellow. Corolla 0.9–1.1 cm. Anther tube 3–4 mm. Achene pale yellow, fusiform, 4–6 mm, apex attenuate. Pappus 4–6 mm. Fl. and fr. Jun–Oct. $2n = 14$*.

Stream banks, lake margins, marshes and floodplains, sandy areas, gravel and loess areas, rather sparsely covered mountain slopes, rocky outcrops, alpine meadows; 800–5100 m. Gansu, Nei Mongol, Ningxia,

Qinghai, Shanxi, Xinjiang, Xizang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, SC Russia, Tajikistan; SW Asia].

Askellia flexuosa is the most widespread and frequent species of the genus in China, with a considerable ecological amplitude. The species is superficially similar to *Crepidiastrum akagii*, but the latter differs by its blackish achene, with acute antrorse papillae and less attenuate apex, and its somewhat thicker involucre, with outer phyllaries somewhat longer.

Askellia melanthera (= *Crepis melanthera*), only known from the type (not seen) collected in a schoolyard of the city of Ürümqi, Xinjiang, poorly described and diagnosed by blackish anthers and style branches, may perhaps otherwise match *A. flexuosa* and is tentatively included here.

73. IXERIDIUM (A. Gray) Tzvelev, Fl. URSS 29: 388. 1964.

小苦荬属 xiao ku mai shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Ixeris [unranked] *Ixeridium* A. Gray, Mem. Amer. Acad. Arts, n.s., 6: 397. 1858.

Herbs, perennial, often rosulate. Stem ascending-erect to erect, branched from base or higher up. Synflorescence usually corymbiform or paniculately corymbiform, with few to many capitula. Capitula with 5–11(–18?) florets. Involucre narrowly cylindric. Phyllaries in few series, margin narrow and scarious; outer phyllaries few, very short (at most ca. 2 mm, usually less), ± unequal; inner phyllaries 5 or (7 or)8, linear-lanceolate, equal. Receptacle naked. Florets some shade of yellow [or rarely white]. Achene pale brown to brown, usually ± subfusiform, subcompressed, with 5 slender main ribs alternating usually with 1 (only exceptionally with 0 or 2) narrower to subequal secondary ribs, space between ribs widely U-shaped, apically often with antrorse acute papillae, apex attenuate into a short slender beak. Pappus yellowish to straw-colored or rarely ?white, of scabrid bristles.

About 15 species: E and SE Asia; eight species (three endemic) in China.

The revised circumscription of *Ixeridium* employed here basically follows the treatment by Pak and Kawano (Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 29–61. 1992), based on carpological and karyological investigations, which has been corroborated recently in molecular phylogenetic analyses of subtribe Crepidinae by J. W. Zhang et al. (in prep.). The placement of the two little-known species with a white pappus is, however, tentative; otherwise, the genus only comprises species with a yellowish or straw-colored pappus. Its basic chromosome number is $x = 7$.

1a. Pappus white.
2a. Rosette leaves oblanceolate, lyrately lobed; leaf blade attenuate into a petiole much shorter than blade; stems and branches very sparsely white echinulate ..... 7. *I. aculeolatum*
2b. Rosette leaves triangular or pentagonal, pinnately lobed; leaf blade contracted into a winged petiole longer than blade; stems and branches glabrous and smooth ..... 8. *I. sagittarioides*
1b. Pappus yellowish or straw-colored.
3a. Inner phyllaries (7 or)8; florets 8–11.
4a. Basal leaves narrowly spatulate to almost linear, undivided, margin entire ..... 1. *I. gracile*
4b. Basal leaves narrowly elliptic to linear-elliptic, undivided or more rarely pinnatipartite, margin denticulate, sinuate-dentate, or more rarely entire ..... 2. *I. laevigatum*
3b. Inner phyllaries 5; florets 5–8.
5a. Involucre 4.5–6.5 mm.
6a. Plants 20–80 cm tall; basal leaves crowded, 5–17 cm; pappus 2.5–3 mm ..... 3. *I. beauverdianum*
6b. Plants only to 15 cm tall; basal leaves in a rosette, 2–4 cm; pappus ca. 4 mm ..... 4. *I. yunnanense*
5b. Involucre 7–8 mm.
7a. Herbs 20–50 cm tall; stems slender; basal leaves oblanceolate to elliptic, 1–3 cm wide; stem leaves lanceolate, basally widened, usually clasping ..... 5. *I. dentatum*
7b. Herbs 10–20 cm tall; stems delicate; basal leaves narrowly elliptic to linear-elliptic, less than 1 cm wide; stem leaves (if any) linear-elliptic, basally attenuate, never clasping ..... 6. *I. transnokoense*

1. Ixeridium gracile (Candolle) Pak & Kawano, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 45. 1992.

细叶小苦荬 xi ye xiao ku mai

Lactuca gracilis Candolle, Prodr. 7: 140. 1838; *Ixeris gracilis* (Candolle) Stebbins.

Herbs 10–50 cm tall, perennial. Stem erect to ascending erect, weakly to moderately branched from basal third or higher up, glabrous, distantly leafy. Basal leaves narrowly spatulate, narrowly elliptic, or almost linear, 4–15 × 0.4–1 cm, basally attenuate, margin entire, apex acute. Stem leaves narrowly lanceolate to linear-lanceolate, base semiamplexicaul but never clasping. Synflorescence corymbiform to paniculiform-corymbiform, with some to many capitula. Capitula with 8–11 florets; peduncle capillaceous. Involucre narrowly cylindric, 7–8 mm. Phyllaries abaxially glabrous; outer phyllaries 4–6, ovate, less than ca. 1 mm, apex acute; inner phyllaries 7 or 8. Florets yellow. Anther tube and style greenish to blackish upon drying. Achene brown, subfusiform, 4.5–5.5 mm, apex attenuate into a slender 1–1.5 mm beak. Pappus pale yellow, ca. 3 mm. Fl. and fr. May–Jul.

Forests, forest margins; 1400–?2700 m. Xizang, Yunnan [Bhutan, NE India, Nepal].

Starting with J. D. Hooker (Fl. Brit. India 3: 410–411. 1881; see also FRPS 80(1): 257. 1997) and X. Zhuang (Fl. Yunnan. 13: 723. 2004), *Ixeridium gracile* has long been confused with the widespread *I. beauverdianum* (= *I. makinoanum*), see below, which has smaller involucres with only 5 inner phyllaries. Actually, *I. gracile* has a very restricted distribution and is a rather rare species. However, it is quite similar to *I. laevigatum*, and the delimitation between the two species should be reassessed.

2. Ixeridium laevigatum (Blume) Pak & Kawano, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 45. 1992.

褐冠小苦荬 he guan xiao ku mai

Prenanthes laevigata Blume, Bijdr. 886. 1826; *Crepis laevigata* (Blume) Zollinger; *Ixeridium oldhamii* (Maximowicz) Sennikov; *Ixeris laevigata* (Blume) Engler & Maximowicz; *I. laevigata* var. *oldhamii* (Maximowicz) Kitamura; *I. oldhamii* (Maximowicz) Kitamura; *Lactuca laevigata* (Blume) Candolle; *L. luzonica* S. Vidal; *L. oldhamii* Maximowicz; *L. stenophylla* Makino.

Herbs 10–90 cm tall, perennial, with short oblique ?rhizome and fibrous roots. Stems solitary or few, erect, branched from above middle or less frequently from further below, distantly leafy. Basal leaves crowded, usually present at anthesis, elliptic, narrowly elliptic, or linear-elliptic, 5–32 × 0.3–3.5 cm, undivided or more rarely pinnatipartite, basally attenuate and sometimes with an unwinged petiole-like portion, margin denticulate, sinuate-dentate, or more rarely entire, apex rounded to acute and often mucronate; lateral lobes (if present) 2–5 pairs, semiorbicular, triangular-ovate, or lanceolate. Stem leaves broadly elliptic, oblanceolate, lanceolate, or linear-lanceolate, base attenuate, semiamplexicaul, undivided, margin entire to sinuate-dentate, apex acute. Synflorescence corymbiform, with some to many capitula. Capitula with 8–11 florets; peduncle capillaceous. Involucre cylindric, (5–)6–7(–8) mm. Phyllaries abaxially glabrous; outer phyllaries ovate-lanceolate, longest to 1.5 mm, apex acute; inner phyllaries 8, apex acute. Florets yellow. Anther tube and style greenish to blackish upon drying. Achene brown, subfusiform, 4–5 mm, apex attenuate into a slender 1–2 mm beak. Pappus straw-colored, 3–4 mm. Fl. and fr. Feb–Oct. $2n = 14$*.

Forests, forest margins, densely grassy areas, riverbanks, cliffs, roadsides; near sea level to 2300 m. Fujian, Guangdong, ?Guangxi, Hainan, Taiwan, Zhejiang [Cambodia, Indonesia, S Japan, Laos, New Guinea, Philippines, Vietnam].

3. Ixeridium beauverdianum (H. Léveillé) Springate, Edinburgh J. Bot. 57: 402. 2000.

狭叶小苦荬 xia ye xiao ku mai

Lactuca beauverdiana H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 450. 1910; *Ixeridium makinoanum* (Kitamura) Pak & Kawano; *Ixeris dentata* (Thunberg) Nakai var. *angustifolia* (Makino) Nakai; *I. makinoana* (Kitamura) Kitamura; *L. makinoana* Kitamura; *L. thunbergii* Maximowicz var. *angustifolia* Makino.

Herbs 20–80 cm, perennial, with fibrous ?and shoot-bearing roots. Stems solitary or few, erect, branched from above middle or less frequently from further below, glabrous, distantly leafy. Basal leaves crowded, usually present at anthesis, narrowly elliptic to linear-elliptic, 5–17 × 0.3–1 cm, undivided, basally attenuate, sometimes with an unwinged petiole-like portion, and semiamplexicaul, margin entire or with a few very slender linear teeth in lower third, apex acute and often mucronate. Stem leaves linear-lanceolate, smaller than basal leaves, base weakly narrowed and semiamplexicaul, otherwise similar to basal leaves. Synflorescence corymbiform to paniculiform-corymbiform, with numerous capitula. Capitula with 5 or 6 florets; peduncle capillaceous. Involucre narrowly cylindric, 4.5–6.5 mm. Phyllaries abaxially glabrous; outer phyllaries 3 or 4, ovate, less than ca. 1 mm, apex acute; inner phyllaries 5. Florets (?pale) yellow, slightly exceeding involucre. Anther tube and style greenish to blackish upon drying. Achene pale brown, subfusiform, 3–3.5 mm, attenuate into a slender 0.5–1 mm beak. Pappus yellowish, 3–4 mm. Fl. and fr. May–Sep. $2n = 14$.

Forests, forest margins, fields, wastelands, meadows; 300–3000 m. Chongqing, Fujian, ?Gansu, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, ?Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, Japan, Nepal, Thailand, Vietnam].

Ixeridium beauverdianum has long been confused in continental Asia with *I. gracile* (see there), while it was recognized as a separate species (under the names *Ixeris makinoana* and *Ixeridium maktnoanum*) in Japan since the 1930s.

4. Ixeridium yunnanense C. Shih, Acta Phytotax. Sin. 31: 539. 1993.

云南小苦荬 yun nan xiao ku mai

Herbs 8–15 cm tall, perennial, rosulate. Stems solitary or few, ascending-erect to erect, branched already from base, glabrous. Rosette leaves elliptic, lanceolate, or oblanceolate, 2–4 × 0.2–0.5 cm, base attenuate into an unwinged petiole-like portion, margin entire or weakly sinuate-dentate, apex acute to rounded and mucronulate. Stem leaves few, concentrated in basal portion, similar to rosette leaves but smaller. Synflorescence laxly corymbose, with few to several capitula. Capitula with 5–8 florets; peduncle capillaceous, 3–10 mm. Involucre narrowly cylindric, 5–6 mm. Phyllaries abaxially glabrous; outer phyllaries ca. 3, ovate, longest ca. 1 mm, apex acute; inner phyllaries 5, apex acute. Florets yellow. Achene yellowish brown, subfusiform, ca. 4 mm, apex attenuate into a slender 0.5–1 mm beak. Pappus straw-colored, ca. 4 mm. Fl. and fr. Jun.

• Grasslands on mountain slopes; 1700–3600 m. Yunnan.

The pappus color in the original description of *Ixeridium yunnanense* is erroneously given as white.

5. Ixeridium dentatum (Thunberg) Tzvelev, Fl. URSS 29: 392. 1964.

小苦荬 xiao ku mai

Prenanthes dentata Thunberg in Murray, Syst. Veg., ed. 14, 715. 1784; *Ixeris dentata* (Thunberg) Nakai; *I. thunbergii* A. Gray; *Lactuca dentata* (Thunberg) C. B. Robinson; *L. thunbergii* (A. Gray) Maximowicz; *Youngia dentata* (Thunberg) Candolle.

Herbs 20–50 cm tall, perennial. Rhizomes shortly oblique,

with fibrous roots. Stems solitary or few, slender, erect, branched from base or higher up, glabrous, sparsely leafy. Basal leaves crowded, usually present at anthesis, narrowly oblanceolate, narrowly elliptic, or elliptic, 4–15 × 1–3 cm, undivided or pinnatipartite, base attenuate into a winged or unwinged petiole-like portion, margin entire or with slender or very fine teeth especially in basal half, apex acute to obtuse and mucronate; lateral lobes (if present) 1–3 pairs, on basal half of leaf, narrowly triangular. Stem leaves ± lanceolate, undivided, base usually expanded and amplexicaul or auriculately clasping, margin entire or with slender or very fine teeth especially in basal half. Synflorescence corymbiform, with some to many capitula. Capitula with 5–7[–11] florets; peduncle capillaceous. Involucre cylindric, 7–8 mm. Phyllaries abaxially glabrous; outer phyllaries broadly ovate, ca. 1.5 × 1 mm; inner phyllaries 5[–8], apex acute. Florets yellow [or rarely white]. Anther tube and style greenish to blackish upon drying. Achene brown, fusiform, 3–3.5 mm, apex attenuate into a slender ca. 1 mm beak. Pappus straw-colored, 4–5 mm. Fl. and fr. Apr–Aug. $2n = 14$, 21, 28.

Forests on mountain slopes, moist places, fields; 300–1100 m. Anhui, Fujian, ?Guangdong, ?Hebei, ?Heilongjiang, Hubei, Jiangsu, Jiangxi, ?Jilin, ?Liaoning, Shandong, Zhejiang [Japan, Korea, E Russia].

Ixeridium dentatum forms a polyploid complex, and several subspecies have been described to classify the diversity within this complex (Pak & Kawano, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 42–45. 1992; Yahara in Iwatsuki et al., Fl. Japan 3b: 18–19. 1995, under *Ixeris*). In China only *Ixeridium dentatum* subsp. *dentatum* occurs; its distributional range has not been fully established yet. It has sometimes been confused with *I. laevigatum*, which is, however, clearly distinguished from *I. dentatum* subsp. *dentatum* through the involucres with 8 (instead of 5) inner phyllaries, 8–11 (instead of 5–7) florets per capitulum, and never (instead of usually) clasping stem leaves.

6. Ixeridium transnokoense (Sasaki) Pak & Kawano, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 49. 1992.

能高小苦荬 neng gao xiao ku mai

Lactuca transnokoensis Sasaki, Trans. Nat. Hist. Soc. Formosa 21: 223. 1931; *Ixeris transnokoensis* (Sasaki) Kitamura.

Herbs 10–20 cm, perennial, with fibrous and spreading shoot-bearing roots. Stems solitary or few, delicate, erect or ascending, often branched already from lower half, ± glabrous, not or very sparsely leafy. Basal leaves crowded, usually present at anthesis, ± narrowly elliptic to linear-elliptic, 2–9 × 0.3–0.8 cm, undivided, base attenuate into an often unwinged petiole-like portion and semiamplexicaul, margin entire or with a few slender or fine teeth or shallowly and remotely sinuate-dentate, apex acute and often mucronate. Stem leaves 1–3, linear-elliptic, smaller than basal leaves, otherwise similar but upward on stem soon reduced to bracts. Synflorescence loosely corymbiform, with few to several capitula. Capitula with 5 or 6 florets; peduncle capillaceous. Involucre narrowly cylindric, 7–8 mm. Phyllaries abaxially glabrous; outer phyllaries 4 or 5, ovate, less than ca. 1 mm, apex acute; inner phyllaries 5. Florets yellow, much exceeding involucre. Anther tube and style greenish to blackish upon drying. Achene pale brown, subfusiform, 4–5 mm, apex attenuate into a slender 1–1.5 mm beak. Pappus yellowish, 4–5 mm. Fl. and fr. Jun–Jul. $2n = 14$*.

• Alpine grassy slopes; 2600–3300 m. Taiwan.

7. Ixeridium aculeolatum C. Shih, Acta Phytotax. Sin. 31: 544. 1993.

刺株小苦荬 ci zhu xiao ku mai

Herbs to 40 cm tall, perennial, rosulate, with shoot-bearing lateral roots. Stem solitary, grayish green, erect, ± branched from middle, very sparsely white echinulate. Rosette leaves oblanceolate, 3.5–5.5 × 1–1.5 cm, lyrately pinnatifid, abaxially very sparsely white echinulate on midvein, adaxially glabrous, base attenuate into a winged petiole-like portion, margin entire to sinuate; lateral lobes 2 or 3 pairs, ovate to suborbicular; terminal lobe ovate to orbicular, much larger than lateral ones. Stem leaves 2, similar to basal leaves but smaller. Synflorescence laxly paniculiform to corymbiform, with some capitula. Capitula with ca. 10 florets; peduncle wiry, ca. 1.5 cm to several cm, sparsely white echinulate. Involucre cylindric, ca. 8 mm. Outer phyllaries lanceolate, longest ca. 2 mm, apex acute; inner phyllaries abaxially very sparsely echinulate on midvein, apex acute to obtuse. Florets yellow. Achene pale brown, fusiform, ca. 4 mm, apex attenuate into a slender ca. 2 mm beak. Pappus white, ca. 6 mm. Fl. and fr. Sep.

• Mountain slopes; ca. 4000 m. SE Xizang (Mainling).

Only known from the type and of unclear relationship, this taxon is probably not a member of *Ixeridium* in its revised circumscription.

8. Ixeridium sagittarioides (C. B. Clarke) Pak & Kawano, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 48. 1992.

戟叶小苦荬 ji ye xiao ku mai

Lactuca sagittarioides C. B. Clarke, Compos. Ind. 265. 1876; *Ixeris sagittarioides* (C. B. Clarke) Stebbins; *Mycelis sagittarioides* (C. B. Clarke) Sennikov.

Herbs 15–35[–55] cm tall, perennial, rosulate. Stem solitary, erect, branched from basal half or higher up, sparsely hairy. Rosette leaves petiolate; petiole 3–10[–30] cm, narrowly winged, margin entire or sinuate-dentate; leaf blade pentagonal or triangular, 2–8 × 1.5–6 cm, pinnately lobed, margin sinuate-dentate; lateral and terminal lobes triangular with an acute apex. Stem leaves none or few, similar to basal leaves but smaller and less incised or undivided. Synflorescence corymbiform, with some to many capitula. Capitula with 8–16 florets; peduncle wiry. Involucre narrowly cylindric, 7–8 mm. Outer phyllaries ovate to lanceolate, apex acute; inner phyllaries ca. 8[–12], apex acute. Florets yellow. Achene brown [or dark purple, 3–4 mm], narrowly ovoid, apex attenuate into a slender 0.5–1 mm beak. Pappus white, 3–4 mm. Fl. Mar.

Grasslands on mountain slopes; 1900–2000 m. Yunnan [Bhutan, N India, N Myanmar, Nepal, N Thailand].

Insufficiently known and of unclear relationship, this taxon is probably not a member of *Ixeridium* and perhaps not even of subtribe Crepidinae but of subtribe Lactucinae.

74. IXERIS (Cassini) Cassini in F. Cuvier, Dict. Sci. Nat. 25: 62. 1822.

苦荬菜属 ku mai cai shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Taraxacum subg. *Ixeris* Cassini, Bull. Sci. Soc. Philom. Paris 1821: 173. 1821; *Chorisis* Candolle; *Chorisma* D. Don (1829), not Lindley ex Sweet (1821).

Herbs, annual or perennial, often rosulate. Stems ± erect, sometimes also long creeping and with erect flowering branches. Synflorescence usually corymbiform. Capitula with (12–)15–25(–40) florets. Involucre cylindric to narrowly campanulate. Phyllaries in several series, glabrous; outer phyllaries several, longest 1/4–1/2 as long as inner ones; inner phyllaries usually 8, linear-lanceolate to lanceolate, equal in length, glabrous, margin usually scarious. Receptacle naked. Florets yellow, rarely whitish or purplish. Achene brown, ± fusiform, not compressed, with 10 (5 main ribs alternating with 5 ± equal secondary ribs) very prominent ± winglike ribs, space between ribs narrowly V- or U-shaped, apex contracted or attenuate into a filiform or slender beak. Pappus white, bristles scabrid.

About eight species: E and S Asia; six species in China.

The revised circumscription of *Ixeris* employed here follows the treatment by Pak and Kawano (Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 15: 29–61. 1992), based on carpological and karyological investigations, which also includes the former monotypic *Chorisis* accommodating *I. repens*. Pak and Kawano's concept of the genus has been corroborated recently in molecular phylogenetic analyses of subtribe Crepidinae by J. W. Zhang et al. (in prep.). Its basic chromosome number is $x = 8$.

1a. Plants with (above or below ground) long creeping stems.
2a. Leaves palmately 3(–5)-lobed ..... 3. *I. repens*
2b. Leaves undivided or pinnately lobed.
3a. Leaf blade spatulate, elliptic, or almost linear, 3–25(–35) cm; involucre (0.8–)1–1.4 cm ..... 2. *I. japonica*
3b. Leaf blade orbicular, broadly elliptic, ovate, or obovate, ≤ ca. 3 cm; involucre ≤ 1 cm ..... 4. *I. stolonifera*
1b. Plants without creeping stems.
4a. Stem leaves with sagittately clasping base with basal lobes distinctly directed backward; involucre 5–6 mm ..... 1. *I. polycephala*
4b. Stem leaves usually with narrowed semiamplexicaul base or exceptionally clasping with almost rectangularly sideward directed basal lobes; involucre 6–11 mm.
5a. Longest outer phyllary 1–1.5 mm; capitula with 15–25 florets ..... 5. *I. chinensis*
5b. Longest outer phyllary ca. 3 mm; capitula with 25–40 florets ..... 6. *I. tamagawaensis*

1. Ixeris polycephala Cassini ex Candolle, Prodr. 7: 151. 1838.

苦荬菜 ku mai cai

Crepis bonii Gagnepain; *Ixeris dissecta* (Makino) C. Shih; *I. fontinalis* Candolle; *I. matsumurae* (Makino) Nakai; *I. polycephala* f. *dissecta* (Makino) Ohwi; *I. polycephala* var. *dissecta* (Makino) Nakai; *Lactuca biauriculata* Vaniot & H. Léveillé; *L. matsumurae* Makino; *L. matsumurae* var. *dissecta* Makino; *L. polycephala* (Cassini) Bentham.

Herbs 10–50 cm tall, annual. Stem solitary, erect, branched already in lower half or higher up, glabrous, leafy. Basal leaves present at anthesis, narrowly oblanceolate, lanceolate, linear-lanceolate, or linear, 6–22 × 0.3–1.5 cm, undivided or pinnatipartite to pinnatisect or runcinately so, base attenuate into a well-developed petiole-like portion and ± semiamplexicaul, margin entire or dentate, apex acute; lateral lobes (if present) 2–5 pairs, on leaf blade basal 1/2–2/3. Stem leaves lanceolate to linear-lanceolate, smaller, rather undivided, base strongly sagittately clasping, margin mostly entire, otherwise similar to basal leaves. Synflorescence corymbiform, with few to some capitula. Capitula with 20–25 florets; peduncle capillaceous. Involucre cylindric and 5–6 × 2–3 mm at anthesis, broadly campanulate and 7–8 × 4–5 mm in fruit. Phyllaries abaxially glabrous; outer phyllaries 4–6, ovate, longest less than 1 mm, apex acute; inner phyllaries 8, apex acute to obtuse. Florets yellow or rarely white. Anther tube and style greenish to blackish upon drying. Achene brown to reddish brown, ellipsoid, ca. 4 mm, apex contracted into a slender 1–1.5 mm beak. Pappus ca. 4 mm. Fl. and fr. Feb–Oct. $2n = 16$.

Forest margins, thickets, grasslands, along rivers and streams, by fields, open areas; 100–2000 m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, ?Henan, ?Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Afghanistan, Bhutan, Cambodia, N India, Japan, Kashmir, Laos, Myanmar, Nepal, Vietnam].

The leaves of the species, as in other species of the genus, are very variable with respect to their division, ranging from entire to strongly dissected.

The entire plant is used medicinally. The many uses include detoxifying, stopping bleeding, promoting tissue regeneration, removing necrotic tissue, decreasing inflammation of soft tissues, and stopping uterine bleeding, but the main use is for treating furuncles.

2. Ixeris japonica (N. L. Burman) Nakai, Bot. Mag. (Tokyo) 40: 575. 1926.

剪刀股 jian dao gu

Lapsana japonica N. L. Burman, Fl. Indica, 174. 1768; *Barkhausia repens* (Loureiro) Sprengel; *Chondrilla debilis*

(Thunberg) Poiret; *Ixeris debilis* (Thunberg) A. Gray; *I. debilis* f. *sinuata* Franchet & Savatier; *I. japonica* f. *dissecta* Nakai; *I. japonica* f. *integra* (Kuntze) Nakai; *I. japonica* subsp. *litoralis* Kitamura; *I. japonica* var. *litoralis* (Kitamura) H. L. Li; *I. japonica* subsp. *salsuginosa* (Kitagawa) Kitagawa; *I. japonica* var. *salsuginosa* Kitagawa; *Lactuca debilis* (Thunberg) Bentham ex Maximowicz; *L. debilis* var. *integra* Kuntze; *Picris repens* Loureiro; *Prenanthes debilis* Thunberg; *Youngia debilis* (Thunberg) Candolle.

Herbs 15–35 cm tall, perennial, glabrous, rosulate. Taproot with lateral shoot-bearing roots producing secondary leaf rosettes. Stems several, flagelliform, long creeping above ground; nodes 1 to several cm apart, most with adventitious roots and a single leaf. Flowering stems from rosettes and leaf axils of creeping stems, erect, to 35 cm, with 0 or 1 leaf. Basal leaves present at anthesis, spatulate, elliptic, or almost linear, 3–25(–35) × 0.5–2(–3) cm, undivided or pinnatifid to pinnatipartite and sometimes lyrately so, base attenuate into a petiole-like portion, margin entire or sinuate-dentate, apex obtuse to acute and mucronulate; lateral lobes (if present) 1 to few pairs, triangular to elliptic, apex acute to obtuse. Stem leaves (if any) similar to basal leaves but smaller. Synflorescence laxly and weakly corymbiform, with 1–6 capitula. Capitula with 20–25 florets; peduncle wiry, 1–20 cm. Involucre cylindric to campanulate, (8–)10–12 × 4–5 mm at anthesis, to 1.4 cm in fruit. Phyllaries abaxially glabrous; outer phyllaries ovate to lanceolate, longest to 4 mm, apex acute; inner phyllaries 8, apex acute. Florets yellow, anther tube and style greenish to blackish upon drying. Achene brown, fusiform, 6–8 mm, apex attenuate into a filiform 2–3 mm beak. Pappus 6–8 mm. Fl. and fr. Mar–May. $2n = 48$.

Sandy seashores, open, disturbed places in lowlands, along roads, fields; sea level to 500 m. ?Anhui, Fujian, Guangdong, Guangxi, ?Henan, Liaoning, Taiwan, Zhejiang [Japan, Korea].

In absence of any evidence that the holotype of the name *Lapsana japonica* was to be excluded from this taxon, *japonica* is used as the oldest epithet. The two sheets of the holotype, collected in Japan by C. Kleynhoff and preserved at G-Burman (G 00302006, digital images seen), carry material at early anthesis. Its involucres measure 8.5 mm at anthesis and are thus rather small, but similar small involucres have been seen occasionally also in material from China; otherwise the type material matches well the taxon. The name *Ixeris debilis* (based on *Prenanthes debilis*) has been used instead in works on the flora of Japan since the 1950s, while the basionym *L. japonica* has been omitted entirely.

3. Ixeris repens (Linnaeus) A. Gray, Mem. Amer. Acad. Arts, n.s., 6: 397. 1858.

沙苦荬菜 sha ku mai cai

Prenanthes repens Linnaeus, Sp. Pl. 2: 798. 1753; *Chondrilla repens* (Linnaeus) Lamarck; *Chorisis repens* (Linnaeus) Candolle; *Ixeris brachyrhyncha* Nemoto; *Lactuca brachyrhyncha* Hayata (1919), not *L. brachyrrhyncha* Greenman (1899); *L. repens* (Linnaeus) Bentham ex Maximowicz; *Nabalus repens* (Linnaeus) Ledebour.

Herbs to 10 cm tall, perennial, glabrous. Stems several, flagelliform, creeping to 2 m, ± buried; nodes 2–7 cm apart, each with adventitious roots and mostly a single leaf. Leaves erect; petiole 1.5–9 cm; leaf blade broadly ovate, 1.5–3 × 1.5–5.5 cm, ± fleshy, palmatilobate, palmatipartite, or palmatisect, base attenuate, truncate, or cordate; lobes 3(–5), sessile or with a winged or unwinged petiolule to 1(–1.5) cm, elliptic to ± orbicular, base narrowed, margin mucronulately sinuate-dentate to ± entire, apex rounded to obtuse. Flowering branches from leaf axils, erect, to 10 cm, with 0 or 1 leaf similar to those of main axis but smaller, or reduced. Synflorescence laxly corymbiform, with 2–8 capitula. Capitula with 12–20 florets; peduncle wiry, 0.5–3 cm, with ovate bracts. Involucre cylindric, 10–12 × 4–5 mm at anthesis, to 1.4 cm in fruit. Phyllaries abaxially glabrous; outer phyllaries ovate to lanceolate, longest 4–6 mm, apex acute; inner phyllaries 8, apex acute. Florets yellow. Anther tube and style greenish to blackish upon drying. Achene brown, fusiform to subfusiform, 5–7 mm, apex attenuate into a moderately slender 0.5–2 mm beak. Pappus 5–6 mm. Fl. and fr. Apr–Oct. $2n = 16$*.

Open sandy beaches; near sea level. Fujian, Guangdong, ?Hainan, Hebei, Jiangsu, Liaoning, Shandong, Taiwan, Zhejiang [Japan, Korea, E Russia, ?Vietnam].

4. Ixeris stolonifera A. Gray, Mem. Amer. Acad. Arts, n.s., 6: 396. 1858.

圆叶苦荬菜 yuan ye ku mai cai

Ixeris capillaris Nakai; *I. stolonifera* subsp. *capillaris* (Nakai) Kitamura; *I. stolonifera* var. *sinuata* (Makino) Takeda; *Lactuca nummulariifolia* H. Léveillé & Vaniot; *L. stolonifera* (A. Gray) Bentham ex Maximowicz; *L. stolonifera* var. *sinuata* Makino.

Herbs 10–15 cm tall, perennial, rosulate, glabrous. Taproot with lateral shoot-bearing roots, producing secondary leaf rosettes. Stems several, flagelliform, long creeping above ground; nodes 1–7 cm apart, most with adventitious roots and a single leaf. Flowering stems from rosettes and leaf axils of creeping stems, erect, to 15 cm, leafless. Leaves present at anthesis; petiole 1–4 cm; leaf blade orbicular, broadly elliptic, ovate, or obovate, 1–3 × 0.8–1.5 cm, undivided or weakly pinnatifid, base rounded, cuneate, or truncate, margin entire, apex obtuse, rounded, or emarginate and often mucronulate; lateral lobes (if present) 1(or 2) pair(s), on basal half of leaf blade, triangular, small. Synflorescence laxly and weakly corymbiform, with 1–6 capitula. Capitula with 15–25 florets; peduncle capillaceous, to 10 cm. Involucre narrowly cylindric, 7–8 × 3–4 mm at anthesis, to 10 mm in fruit. Phyllaries abaxially glabrous; outer phyllaries ovate to lanceolate, longest to 2(–3) mm, apex acute; inner phyllaries 8, apex acute to obtuse. Florets yellow. Anther tube and style greenish to blackish upon drying. Achene brown, fusiform, 4–6 mm, apex attenuate into a filiform 1.5–3 mm beak. Pappus 4–5 mm. Fl. and fr. May–Oct. $2n = 16$*.

Moist areas on gravelly mountain slopes; 1500–2000 m. ?Anhui, Jiangsu, Jiangxi, Taiwan, Zhejiang [Japan, Korea; introduced to E North America].

5. Ixeris chinensis (Thunberg) Kitagawa, Bot. Mag. (Tokyo) 48: 113. 1934.

中华苦荬菜 zhong hua ku mai cai

Herbs 5–50 cm tall, perennial, rosulate, glabrous. Taproot, often with shoot-bearing lateral roots. Stems usually few to several, rarely solitary, ascending-erect to erect, branched from base or higher up. Rosette leaves oblanceolate, elliptic, narrowly elliptic, or ± linear, 6–24 × 1–2 cm, undivided or pinnatifid to pinnatipartite, basally attenuate, margin entire or sinuate-dentate, apex obtuse, acute, or attenuate; lateral lobes 2–7 pairs, narrowly triangular, linear-triangular, or linear. Stem leaves (0 or)1–4, narrowly lanceolate to linear-lanceolate, mostly undivided or more rarely pinnatifid, base semiamplexicaul and usually not or rarely with a basal pair of sideward directed clasping lobes, margin entire, apex acuminate. Synflorescence laxly corymbiform, with few to many capitula. Capitula with 15–25 florets; peduncle wiry, ca. 1 to several cm. Involucre cylindric, 6–11 mm. Phyllaries abaxially glabrous, apex acute; outer phyllaries ± ovate, longest 1–1.5 mm; inner phyllaries 8. Florets bright yellow, pale yellow, white, or purplish. Anther tube and style greenish to blackish upon drying. Achene brown, subfusiform, 4–6 mm, apex attenuate into a slender 2.5–3 mm beak. Pappus ca. 5 mm. Fl. and fr. Jun–Oct.

Grasslands on mountain slopes, forests, forest margins, along rivers, ravines, open areas, degraded shrublands, thickets, riverbanks, rock crevices, sandy soil areas, fields, field margins, wastelands, roadsides; below 100–4000 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [?Cambodia, Japan, Korea, Laos, Mongolia, E Russia, ?Thailand, Vietnam].

Ixeris chinensis includes diploid, triploid, and tetraploid cytotypes. Pak et al. (Acta Phytotax. Geobot. 48: 187–196. 1997) have shown that all three cytotype are present in mainland Asia, while in Taiwan only the diploid cytotype and in Japan only the triploid and tetraploid cytotypes occur. Otherwise, all three cytotypes frequently seem to occur sympatrically. The triploid and tetraploid cytotypes have been identified with *I. chinensis* subsp. *strigosa* (see Kitamura, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 23: 112–116. 1956), which has long involucres (9–10 mm) and achenes as well as whitish or pale purplish florets. The diploid cytotype has been identified with *I. chinensis* subsp. *chinensis*, which has involucres of 6–8 mm and yellow florets. The third subspecies recognized by Kitamura, *I. chinensis* subsp. *versicolor* (sometimes even treated as two separate species, *I. graminea* and *I. graminifolia*, see, e.g., under *Ixeridium*, in Tzvelev, Fl. URSS 29: 388–392. 1964; Rast. Tsentral. Azii 14b: 62–65. 2008) appears rather to include forms intermediate between the former two at least with respect to involucre length (8–9 mm) and floret color (variably yellow, white, or purplish). It was not included in the analysis by Pak et al. (loc. cit.) and is little understood, even with respect to its actual delimitation from *I. chinensis* subsp. *strigosa*. Until further studies, such as started by Pak et al. (loc. cit.), are available that also include *I. chinensis* subsp. *versicolor*, the taxonomy of *I. chinensis* remains unsatisfactory. For the time being, it appears appropriate basically to maintain the classification of Kitamura (loc. cit. 1956) with three subspecies, the delimitation between them, however, not being clear-cut, and especially between *I. chinensis* subsp. *versicolor* and *I. chinensis* subsp. *strigosa* often questionable in material from China. The distribution ranges given below should therefore be taken with great caution. Leaf shape is very variable in *I. chinensis*; this variation, however, follows patterns not unusual in the genus and the tribe and is taxonomically of no value.

1a. Involucre 6–8 mm; florets bright or pale yellow; stem leaves usually 2–4 ..... 5a. subsp. *chinensis*

1b. Involucre 8–11 mm; florets white, pale yellow, purplish, or rarely bright yellow; stem leaves usually 1 or 2.

2a. Involucre 9–11 mm; florets white to pale purplish; plants 25–50 cm tall ..... 5b. subsp. *strigosa*

2b. Involucre 8–9 mm; florets variable within a population and white, purplish, pale yellow, or rarely also bright yellow; plants usually 10–20 cm tall ..... 5c. subsp. *versicolor*

5a. Ixeris chinensis subsp. **chinensis**

中华苦荬菜(原亚种) zhong hua ku mai cai (yuan ya zhong)

Prenanthes chinensis Thunberg in Murray, Syst. Veg., ed. 14, 714. 1784; *Barkhausia tenella* Bentham; *Chondrilla chinensis* (Thunberg) Poiret; *Ixeridium chinense* (Thunberg) Tzvelev; *Ixeris chinensis* var. *saxatilis* (Kitamura) Kitamura; *I. lacerrima* (Hayata) Kitagawa; *Lactuca chinensis* (Thunberg) Nakai; *L. flavissima* Hayata; *L. lacerrima* Hayata; *L. lacerrima* var. *saxatilis* Kitamura; *L. taitoensis* Hayata; *Paraixeris chinensis* (Thunberg) H. S. Pak; *Youngia chinensis* (Thunberg) Candolle.

Herbs 20–35 cm tall. Stems usually several, ascending-erect to erect. Rosette leaves to 15 cm. Stems leaves usually 2–4. Capitula with 20–25 florets. Involucre 6–8 mm. Florets pale to bright yellow. Achene 4–6 mm. Fl. and fr. May–Oct. $2n$ = 16*.

Grasslands on mountain slopes, open areas, degraded shrublands, thickets, riverbanks, rock crevices, fields, field margins, roadsides; below 100–4000 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, ?Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, ?Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [?Cambodia, Korea, Laos, E Russia, ?Thailand, Vietnam].

5b. Ixeris chinensis subsp. **strigosa** (H. Léveillé & Vaniot) Kitamura, Bot. Mag. (Tokyo) 49: 283. 1935.

光滑苦荬 guang hua ku mai

Lactuca strigosa H. Léveillé & Vaniot, Bull. Acad. Int. Géogr. Bot. 20: 144. 1909; *Ixeridium strigosum* (H. Léveillé & Vaniot) Tzvelev; *Ixeris chinensis* var. *strigosa* (H. Léveillé & Vaniot) Ohwi; *I. strigosa* (H. Léveillé & Vaniot) Pak & Kawano; *Paraixeris strigosa* (H. Léveillé & Vaniot) H. S. Pak.

Herbs 25–50 cm tall. Stems solitary or few, erect. Rosette leaves to 24 cm. Stem leaves 1, 2, or rarely more. Capitula with 20–25 florets. Involucre 9–11 mm. Florets white to pale purplish. Achene 5–6 mm. Fl. and fr. Apr–Jul. $2n$ = 24, 32*.

Grasslands on mountain slopes, open areas; 500–1500 m. ?Anhui, Hebei, Heilongjiang, ?Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, ?Shandong, ?Shanxi [Japan, Korea, ?Mongolia, E Russia].

Delimitation of *Ixeris chinensis* subsp. *strigosa* from *I. chinensis* subsp. *versicolor* needs thorough evaluation, and the present delimitation may perhaps be artificial. The distribution ranges of these two subspecies are therefore questionable.

5c. Ixeris chinensis subsp. **versicolor** (Fischer ex Link) Kitamura, Bot. Mag. (Tokyo) 49: 283. 1935.

多色苦荬 duo se ku mai

Lagoseris versicolor Fischer ex Link, Enum. Hort. Berol. Alt. 2: 289. 1822; *Barkhausia versicolor* (Fischer ex Link) Sprengel; *Chondrilla versicolor* (Fischer ex Link) Schultz Bipontinus; *Crepis graminifolia* Ledebour; *C. vaniotii* H. Léveillé; *Ixeridium biparum* C. Shih; *I. chinense* subsp. *graminifolium* (Ledebour) Tzvelev; *I. chinense* subsp. *versicolor* (Fischer ex Link) Tzvelev; *I. gramineum* (Fischer) Tzvelev; *I. graminifolium* (Ledebour) Tzvelev; *Ixeris chinensis* subsp. *graminifolia* (Ledebour) Kitagawa; *I. chinensis* var. *graminifolia* (Ledebour) H. C. Fu; *I. chinensis* subsp. *hallaisanensis* (H. Léveillé) Kitagawa; *I. chinensis* var. *intermedia* Kitagawa; *I. graminea* (Fischer) Nakai; *I. graminifolia* (Ledebour) Kitagawa; *I. lanceolata* C. C. Chang (1932), not (Houttuyn) Stebbins (1937); *I. scaposa* Freyn; *I. versicolor* (Fischer ex Link) Candolle; *Lactuca fischeriana* Candolle; *L. hallaisanensis* H. Léveillé; *L. rubrolutea* Vaniot; *L. versicolor* (Fischer ex Link) Schultz Bipontinus; *Paraixeris graminea* (Fischer) H. S. Pak; *Prenanthes graminea* Fischer; *P. versicolor* (Fischer ex Link) Bunge.

Herbs usually 10–20 cm tall. Stems several, ascending-erect. Rosette leaves to 17 cm. Stem leaves usually (0 or)1 or 2. Capitula with 15–25 florets. Involucre 8–9 mm. Floret color variable within a population, white, purplish, pale yellow, or rarely also bright yellow. Achene 4–6 mm. Fl. and fr. Mar–Sep.

Grasslands on mountain slopes, forests, forest margins, along rivers, ravines, wastelands, sandy soil areas; 100–4000 m. ?Anhui, ?Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, ?Jiangxi, Jilin, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, ?Zhejiang [Korea, Mongolia, E Russia].

See note under the previous subspecies.

6. Ixeris tamagawaensis (Makino) Kitamura, Acta Phytotax. Geobot. 9: 115. 1940.

泽苦荬 ze ku mai

Lactuca tamagawaensis Makino, Bot. Mag. (Tokyo) 17: 90. 1903; *Ixeris chinensis* (Thunberg) Kitagawa subsp. *arenicola* (Makino) Kitamura; *Lactuca versicolor* (Fischer ex Link) Schultz Bipontinus var. *arenicola* Makino.

Herbs 15–30 cm tall, perennial, rosulate, glabrous, with a taproot. Stems solitary or few, ± erect, branched mainly apically, distantly leafy. Rosette leaves linear-lanceolate to linear, 6–15 × 0.2–1 cm, undivided, basally attenuate, margin entire or rarely very weakly sinuate-dentate, apex acute. Stem leaves 1–3, similar to rosette leaves but smaller, base semiamplexicaul. Synflorescence laxly corymbiform, with several to some capitula. Capitula with 25–40 florets. Involucre narrowly cylindric, 7–9 mm. Phyllaries abaxially glabrous; outer phyllaries ovate to lanceolate, longest ca. 3 mm, apex acute; inner phyllaries ca. 8, apex ± acute. Florets yellow. Anther tube and style greenish to blackish upon drying. Achene brown, fusiform, 5–6 mm, apex attenuate into a slender ca. 3 mm beak. Pappus ca. 5 mm. Fl. and fr. May–Aug. $2n = 16$.

Open gravelly or rocky riverbanks. E Taiwan [Japan, Korea].

75. SONCHELLA Sennikov, Bot. Zhurn. 92: 1753. 2007.

小苦苣菜属 xiao ku ju cai shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, perennial, of ± saline habitats. Stem erect, ± leafy. Synflorescence narrowly racemiform or paniculiform. Capitula with ca. 10 florets. Involucre cylindric. Outer phyllaries imbricate, gradually longer centripetally with longest ca. 1/3 of inner ones, glabrous; inner phyllaries linear-lanceolate, equal in length, margin scarious. Receptacle naked. Florets yellow. Achene cylindric to fusiform, subcompressed, with 5 main ribs alternating with (1 or)2 slender secondary ribs, apex truncate. Pappus white, caducous.

Two species: N China, Mongolia, E Russia; two species in China.

Sonchella unites *Youngia stenoma*, the single species of Babcock and Stebbins's (not validly published) *"Y.* sect. *Stenophytum"* (Publ. Carnegie Inst. Washington 484: 42. 1937), and a species formerly treated as *Prenanthes angustifolia* or *Crepis pratensis*. They are strikingly similar to each other except for their different synflorescence shape. *Sonchella* has been confirmed in the molecular phylogenetic analyses of subtribe Crepidinae by J. W. Zhang et al. (in prep.) as being rather distant from *Youngia*.

1a. Synflorescence racemiform, branches 1–3(–5) cm, appressed, upper secondary branches not exceeding main axis and primary branches; midvein of inner phyllaries subapically often conspicuously crested or carinate ..... 1. *S. stenoma*

1b. Synflorescence paniculiform, branches 3–10 cm, arcuate-spreading, upper secondary branches exceeding main axis and primary branches; midvein of inner phyllaries subapically inconspicuously crested or plane ..... 2. *S. dentata*

1. Sonchella stenoma (Turczaninow ex Candolle) Sennikov, Bot. Zhurn. 92: 1753. 2007.

碱小苦苣菜 jian xiao ku ju cai

Crepis stenoma Turczaninow ex Candolle, Prodr. 7: 164. 1838; *Hieracioides stenoma* (Turczaninow ex Candolle) Kuntze; *Ixeris stenoma* (Turczaninow ex Candolle) Kitagawa; *Youngia stenoma* (Turczaninow ex Candolle) Ledebour.

Herbs 10–50 cm tall, perennial, with a taproot ?and shoot-bearing lateral roots. Caudex with residues of old leaf bases. Stem solitary, erect, mostly unbranched below synflorescence, glabrous, leafy. Basal and lower stem leaves narrowly lanceolate, narrowly elliptic, or narrowly oblanceolate, 3–12[–20] × 0.3–1 cm, often somewhat fleshy, glaucescent, glabrous, base attenuate into a petiole-like portion and semiamplexicaul, margin entire or sinuate-dentate, apex ± acute. Middle and upper

stem similar to lower ones but gradually smaller and narrower toward stem apex, margin rather entire. Synflorescence narrowly racemiform, with many capitula. Peduncle wiry, 0.5–2 cm. Involucre brownish green, narrowly cylindric, 8–9 mm. Phyllaries abaxially glabrous; outer phyllaries ovate to lanceolate, longest 2.5–3 mm, apex acute; inner phyllaries ca. 8, midvein subapically often crested, apex acute and ± ciliate. Achene greenish brown, fusiform, 4.5–6.5 mm, apex truncate. Pappus ca. 6 mm. Fl. and fr. Jul–Sep. $2n = 16$.

Sandy soil in steppes, alkaline areas; 900–1500 m. Gansu, Nei Mongol [Mongolia, E Russia].

All parts of this herb are used medicinally, in particular for treating serious cases of furuncles.

2. Sonchella dentata (Ledebour) Sennikov, Komarovia 5: 106. 2008.

草甸小苦苣菜 cao dian xiao ku ju cai

Sonchus dentatus Ledebour, Icon. Pl. 1: 21. 1829; *Crepis pratensis* C. Shih; *Prenanthes angustifolia* Boulos; *Sonchella dentata* var. *tibetica* (Ostenfeld) Sennikov; *S. pratensis* (C. Shih) Tzvelev; *S. tibetica* (Ostenfeld) Tzvelev; *Sonchus dentatus* var. *tibeticus* Ostenfeld.

Herbs 15–50 cm tall, perennial, with a taproot ?and shoot-bearing lateral roots. Caudex with residues of old leaf bases. Stem solitary, erect, mostly unbranched below synflorescence, ± glabrous, leafy. Basal and lower stem leaves narrowly spatulate, 3–11 × 0.7–1.5 cm, often somewhat fleshy, glabrous, base attenuate into a petiole-like portion and semiamplexicaul, margin entire or sinuate-dentate, apex obtuse to acute. Middle and upper stem leaves few, lanceolate, similar to lower ones but gradually smaller and narrower toward stem apex, margin rather entire. Synflorescence paniculiform, with many capitula. Peduncle wiry, usually shorter than involucre. Involucre dark green, narrowly cylindric, 8–10 mm. Phyllaries abaxially ± glabrous [to setose along midvein]; outer phyllaries ovate to lanceolate, longest 2.5–3 mm, apex acute; inner phyllaries 8, midvein subapically usually plane, apex ± acute. Achene brown, fusiform, ca. 5 mm, apex truncate. Pappus ca. 7 mm. Fl. and fr. Jun–Sep.

Marshes and saline meadows by lakes and streams; 2500–3700 m. Qinghai [Mongolia, E Russia].

76. DUBYAEA Candolle, Prodr. 7: 247. 1838.

厚喙菊属 hou hui ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, perennial, often rosulate, caulescent or rarely acaulescent with 1 or few scapes. Stems leafy or leafless, with ± stiff, yellowish brown, reddish to purplish brown, or blackish mostly glandular hairs, rarely glabrous. Synflorescence of a solitary capitulum or corymbiform, rarely umbelliform with few to several or rarely to 20 capitula. Capitula declined, pendent, or erect, with several (ca. 7) to numerous (ca. 70) florets. Involucre cylindric, broadly campanulate, or almost hemispheric. Phyllaries in several series, often dark green to purplish or blackish when dry, glabrous or with brownish, purplish, or blackish stiff often glandular hairs along midvein; outer phyllaries imbricate, centripetally longer, longest 1/3–4/5 as long as inner ones; inner phyllaries ca. 8 to many, linear-lanceolate to lanceolate, ± equal to somewhat unequal in length. Florets yellow or of some shade of purple (pale, bluish, reddish, or brownish), or blue. Receptacle naked. Achene ± fusiform, weakly ± compressed, with 5 usually prominent main ribs alternating with 1 or 2 more slender secondary ribs, apex truncate or attenuate. Pappus yellowish, brownish, brown, or rarely ?whitish, bristles scabrid.

About 15 species: Bhutan, SW China, N India, N Myanmar, Nepal; 12 species (eight endemic) in China.

Dubyaea forrestii Mamgain & R. R. Rao (Edinburgh J. Bot. 65: 1. 2008) was described from rocky alpine slopes in Gaoligong Shan in NE Myanmar, close to the border with China or possibly inside Yunnan ("[F]lank of the N'Maikha–Salwin [Nu Jiang] divide, lat. 26°30′N, alt. 11,000′ [3700 m]"). It was described as being similar to *D. atropurpurea* and is known only from the type, *G. Forrest 29660* (holotype, BM; isotype, E), collected in 1931.

1a. Florets yellow.
2a. Stems, branches, and phyllaries glabrous; leaves undivided and entire or very scarcely and shallowly dentate, mostly rosulate and stem with bracts only ..... 5. *D. tsarongensis*
2b. Stems, branches, and phyllaries with stiff yellowish brown, reddish, purplish brown, or blackish mostly glandular hairs; leaves dentate to pinnately lobed, sometimes basally crowded but usually cauline.
3a. Stem with yellowish brown stiff hairs ..... 4. *D. emeiensis*
3b. Stem with brown, reddish brown, purplish, or blackish stiff long glandular or non-glandular hairs.
4a. Capitula with 40–50 florets; involucre broadly campanulate ..... 1. *D. hispida*
4b. Capitula with less than 15 florets; involucre cylindric or narrowly cylindric.
5a. Involucre ca. 1.5 cm; capitula with ca. 7 florets; achene ca. 7 mm ..... 2. *D. jinyangensis*
5b. Involucre 1–1.1 cm; capitula with 9–13 florets; achene 4.5–5.5 mm ..... 3. *D. blinii*
1b. Florets of some shade of purple (pale, bluish, reddish, or brownish) or blue.
6a. Plants rosulate, acaulescent; capitula on 1–7 scapes, less than 10 cm.
7a. Rosettes with 3–7 scapes; plants with long stiff glandular hairs especially on scapes ..... 10. *D. amoena*
7b. Rosettes with a solitary scape; plants glabrous ..... 11. *D. gombalana*

6b. Plants rosulate or not, caulescent with branched leafy or more rarely leafless but branched stem (15–)30–100 cm tall.
8a. Capitula erect; pappus ?whitish ..... 7. *D. cymiformis*
8b. Capitula nodding; pappus yellowish to brown.
9a. Lower and middle stem leaves at most tapering toward base but not contracted into a petiole-like rachis; stems, branches, and phyllaries glabrous ..... 9. *D. glaucescens*
9b. At least lower and middle stem leaves contracted into a petiole-like unwinged or winged rachis; long stiff blackish hairs present at least in apical portion of stem.
10a. Phyllaries glabrous except for a ciliate margin ..... 12. *D. stebbinsii*
10b. Phyllaries on abaxial midvein with long stiff brown to blackish glandular hairs.
11a. Involucre broadly campanulate, 1.8–2.2 × 2–2.5 cm ..... 6. *D. atropurpurea*
11b. Involucre campanulate, 1.5–1.7 × 1–1.5 cm ..... 8. *D. rubra*

1. Dubyaea hispida Candolle, Prodr. 7: 247. 1838.

厚喙菊 hou hui ju

Hieracium hispidum D. Don, Prodr. Fl. Nepal. 165. 1825, not Forsskål (1775); *Crepis bhotanica* Hutchinson; *C. dubyaea* (C. B. Clarke) C. Marquand & Airy Shaw; *Dubyaea bhotanica* (Hutchinson) C. Shih; *D. lanceolata* C. Shih; *D. pteropoda* C. Shih; *Lactuca dubyaea* C. B. Clarke.

Herbs 20–60 cm tall, perennial, with creeping ?rhizomes. Stem erect, branched from below middle or higher up, leafy, with long blackish stiff glandular hairs and pale curly weak hairs. Basal and lower stem leaves sessile or base attenuate into a long petiole-like portion, oblanceolate, elliptic, or narrowly elliptic, 5–18 × 1.5–6 cm, sinuate-dentate to shallowly lyrately pinnatifid, both faces with hairs or mainly abaxially, base narrow to widened and ± clasping, margin mucronulately dentate, apex acute to acuminate. Middle and upper stem leaves similar to lower stem leaves but ± lanceolate, smaller, base auriculately clasping; uppermost stem leaves linear-lanceolate, reduced in size. Synflorescence corymbiform, with 2–7 capitula. Capitula nodding, with 40–50 florets; peduncle blackish pilose. Involucre campanulate, 1.8–2 × 1–1.5 cm. Phyllaries with long dark brown to blackish stiff glandular hairs on midvein except on innermost ones; outer phyllaries rather few, narrowly lanceolate to linear, closely approaching inner ones in length, apex acute to acuminate; inner phyllaries many, lanceolate, margin apically often ± brownish ciliate to fringed. Florets yellow. Achene brown, 7–9 mm, with several ribs, apex long attenuate and paler. Pappus yellowish, 0.8–1.2 cm. Fl. and fr. Jul–Nov. $2n = 16$.

Forests, forest margins, meadows, thickets; 2700–4500 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), N Myanmar, Nepal].

Dubyaea hispida is here considered in the wider sense established by Stebbins (Mem. Torrey Bot. Club 19(3): 19. 1940) and taken up by X. Zhuang (Fl. Yunnan. 13: 704. 2004), who consequently included also the segregates *D. lanceolata* and *D. pteropoda*, distinguished only by minor differences in leaf shape. The underground parts are usually described as creeping rhizomes from which the stems arise; no specimen, however, has been seen where a true rhizome is preserved. The underground parts preserved in the material seen could also be interpreted as root-borne shoots.

2. Dubyaea jinyangensis C. Shih, Acta Phytotax. Sin. 31: 441. 1993.

金阳厚喙菊 jin yang hou hui ju

Herbs to 15 cm tall, perennial, with taproot. Stem solitary, erect, apically branched and with lanceolate bracts, with long stiff blackish hairs. Leaves sessile, narrowly elliptic, isomorphic, 7–8 × ca. 2 cm, abaxially with long reddish brown to brown hairs on veins, base auriculate and semiamplexicaul, margin coarsely dentate to ± lobed, apex acuminate. Synflorescence corymbiform, with ca. 9 capitula. Capitula erect, with ca. 7 florets. Involucre narrowly cylindric, ca. 1.5 × 0.5 cm. Phyllaries dark green, abaxially with long stiff blackish hairs on midvein; outer phyllaries rather few, ovate to lanceolate, 2–5 × ca. 1 mm, apex acute to obtuse; inner phyllaries lanceolate, apex acute to obtuse. Florets yellow. Achene brown, ca. 7 mm, with 8 unequal ribs, apex truncate. Pappus brownish, ca. 7 mm. Fl. and fr. Sep.

• Mountain slopes; ca. 3400 m. S Sichuan (Jinyang).

3. Dubyaea blinii (H. Léveillé) N. Kilian, **comb. nov.**

刚毛厚喙菊 gang mao hou hui ju

Basionym: *Crepis blinii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 345. 1914; *C. setigera* J. Scott; *Faberia blinii* (H. Léveillé) H. Léveillé; *Youngia blinii* (H. Léveillé) Lauener; *Y. setigera* (J. Scott) Babcock & Stebbins.

Herbs 15–35 cm tall, perennial, ± rosulate. Caudex strong, with residues of old leaf bases, brown lanate in leaf axils. Stem erect or curved-erect, usually branched apically, densely setose with brownish to purplish spreading hairs, moderately leafy. Rosette leaves (present or not at anthesis) and lower stem leaves oblanceolate to elliptic, 7–18 × 1.5–4 cm, undivided and coarsely sinuate-dentate or runcinate-dentate to pinnatifid, abaxially densely and adaxially sparsely setose with brownish to purplish spreading hairs, base attenuate into a cuneately winged petiole-like portion and semiamplexicaul, margin sinuate-dentate, apex acute to acuminate; lateral lobes triangular, ± retrorse, apex acute. Middle and upper stem leaves similar to lower leaves but smaller, base without a petiole-like portion but semiamplexicaul. Synflorescence densely corymbiform, with 10–20 capitula. Capitula erect, with 9–13 florets; peduncle 2–8 mm, densely setose with brownish to purplish spreading hairs. Involucre cylindric, 1–1.1 cm. Phyllaries abaxially brownish to purplish setose along midvein; outer phyllaries triangular to lanceolate, longest 2.5–3 mm, apex acute; inner phyllaries ca. 8, with thin scarious margin, apex acute. Florets yellow. Achene pale brown, 4.5–5.5 mm, with ca. 12 unequal ribs, glabrous, apex truncate. Pappus pale brown, 5–7 mm. Fl and fr. Jul–Oct.

• Mountain pastures, open grassy slopes; ca. 2600 m. W Sichuan, SW Yunnan.

Dubyaea blinii has been considered as a species of *Youngia* since its inclusion by Babcock and Stebbins (Univ. Calif. Publ. Bot. 18: 227–229. 1943, as *Y. setigera*) in that genus. Examination of the type material, however, revealed that it is grossly misplaced in *Youngia*, from which it differs by the indumentum of leaves, stems, and phyllaries, and its achene and pappus features, but conveniently fits into *Dubyaea*, where it may perhaps be more closely related to *D. jinyangensis*.

4. Dubyaea emeiensis C. Shih, Acta Phytotax. Sin. 33: 191. 1995.

峨眉厚喙菊 e mei hou hui ju

Herbs to 13 cm tall, perennial. Stem erect, apically branched, purplish red and glabrous below middle, pale green and densely hispid with stiff yellowish brown hairs above middle, leafy. Lower and middle stem leaves oblanceolate to elliptic, 5–9 × 2–3 cm, thick, glabrous, abaxially dark purple, base cuneate-attenuate and tapering into a narrow or petiole-like portion, margin dentate, apex acute to acuminate. Upper stem leaves subopposite, sessile, lanceolate, 5–6 × 2–3 cm, base rounded to cuneate, otherwise like middle stem leaves; uppermost leaves reduced in size to broadly linear acuminate bracts. Synflorescence umbelliform, with ca. 7 capitula each with a peduncle of equal length. Capitula with 20–25 florets; peduncle ± thickened, with stiff brown hispid hairs. Involucre narrowly campanulate, 1.3–1.5 × ca. 0.8 cm. Phyllaries abaxially blackish green and with stiff brown hairs on midvein; outer phyllaries triangular to lanceolate, longest ca. 4.5 × 1.2 mm, apex acute; inner phyllaries with apex obtuse to rounded. Florets yellow. Achene brown, ca. 5 mm, with ca. 14 unequal ribs. Pappus yellowish, ca. 7 mm. Fl. and fr. Jul.

● Forests; ca. 2500 m. Sichuan (Emei Shan).

Dubyaea emeiensis is a poorly known species only known from the type collection from Emei Shan.

5. Dubyaea tsarongensis (W. W. Smith) Stebbins, J. Bot. 75: 17. 1937.

察隅厚喙菊 cha yu hou hui ju

Lactuca tsarongensis W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 211. 1920; *Crepis tsarongensis* (W. W. Smith) J. Anthony.

Herbs 6–30 cm tall, perennial, usually rosulate, with a taproot and a short ± subterranean caudex. Stem slender, usually unbranched or rarely 1-branched, glabrous, leafless and with only a few linear bracts or more rarely with a few leaves in basal portion. Rosette leaves oblanceolate to elliptic, 3–11 × 0.5–1.5 cm, glabrous, base usually ± attenuate into a petiole-like portion, margin entire or sparsely mucronulate-dentate, apex rounded and mucronulate. Stem leaves (if present) 1–3, oblanceolate to lanceolate, smaller than rosette leaves, base attenuate to ± auriculately clasping, otherwise similar to rosette leaves. Capitulum solitary or more rarely a pair, pendent, with 15–25 florets. Involucre narrowly campanulate, 1.2–1.6 cm. Phyllaries abaxially ± uniformly dark green, glabrous, apex acute; outer phyllaries ovate to broadly lanceolate, approaching inner ones in length; inner phyllaries ca. 8. Florets yellow. Achene not seen when mature, ca. 5 mm, apex truncate. Pappus yellowish, 6–8 mm. Fl. and fr. Aug–Oct.

Scree slopes, alpine meadows; 2500–4100 m. Yunnan [N Myanmar].

Dubyaea chimiliensis (W. W. Smith) Stebbins, formerly considered as conspecific with *D. tsarongensis* and distinguished only at infraspecific rank, is actually a markedly distinct species with a localized distribution in N Myanmar, as was first recognized by Stebbins (Mem. Torrey Bot. Club 19(3): 22–24. 1940). *Dubyaea tsarongensis* appears actually more closely related to *D. gombalana*.

6. Dubyaea atropurpurea Stebbins, J. Bot. 75: 51. 1937.

紫花厚喙菊 zi hua hou hui ju

Lactuca atropurpurea Franchet, J. Bot. (Morot) 9: 294. Aug 1895, not Franchet (Jul 1895); *Dubyaea panduriformis* C. Shih.

Herbs 30–80(–120) cm tall, perennial, with a stout taproot. Stem stout, erect, branched from middle or higher up, with long stiff dark brown to blackish glandular hairs, leafy. Basal and lower stem leaves hairy or sometimes glabrescent, base narrowed and sometimes ± expanded and clasping, margin mucronulately sinuate-dentate; terminal lobe triangular-ovate, to 20 × 20 cm, basally cordate to sagittate then contracted into a at least distally winged petiole-like rachis to 50 cm with 0–3 pairs of small somewhat distant broadly triangular lateral lobes in apical portion, apex obtuse, acute, or rounded. Middle and upper stem leaves similar to lower stem leaves but (much) smaller; leaf blade lanceolate, oblanceolate, or elliptic, less or not divided and sinuate-dentate, proximally much less narrowed and base distinctly clasping; uppermost stem leaves ± elliptic, with a narrow base. Synflorescence corymbiform, with 3–8 capitula. Capitula nodding, with 60–70 florets; peduncle usually long, blackish pilose. Involucre broadly campanulate, 1.8–2.2 × 2–2.5 cm. Phyllaries dark green to blackish, with stiff long blackish glandular hairs along midvein except for innermost ones; outer phyllaries few, narrowly lanceolate, approaching inner in length; inner phyllaries many, broadly lanceolate, 4–6 mm wide, margin apically brownish ciliate to fringed, apex acute to acuminate. Florets dark purplish. Achene brown, 6–8 mm, with several strong ribs. Pappus dirty yellowish to pale brownish, 7–10 mm. Fl. and fr. Jul–Oct.

Picea forest margins, alpine meadows, thickets; 3000–4100 m. Sichuan, Yunnan [NE Myanmar].

The basionym *Lactuca atropurpurea* is illegitimate as a later homonym; thus, according to Art. 58.1 of the *Vienna Code*, the combination *Dubyaea atropurpurea* is treated as a replacement name.

Following X. Zhuang (Fl. Yunnan. 13: 705. 2004), *Dubyaea panduriformis*, distinguished from *D. atropurpurea* by minor leaf features only, is considered as conspecific.

7. Dubyaea cymiformis C. Shih, Acta Phytotax. Sin. 31: 439. 1993.

伞房厚喙菊 san fang hou hui ju

Herbs to 45 cm tall, perennial. Stem erect, basally and middle tinged with purplish red, branched from basal portion, leafy; branches ascending, densely covered with dark brown to blackish long stiff glandular hairs. Basal and lower stem leaves oblanceolate to elliptic, ca. 18 × 4 cm, lyrately pinnatipartite,

basally attenuate, margin mucronulately dentate; lateral lobes 4 or 5 pairs, elliptic to obliquely ovate; terminal lobe broadly elliptic to oblanceolate. Middle stem leaves similar to lower stem leaves but base ± auriculately clasping; uppermost stem leaves linear to lanceolate, undivided or almost so, apex acute to rounded. Synflorescence corymbiform, with ca. 15 capitula. Capitula erect, with numerous florets. Involucre broadly campanulate, ca. 1 × 2 cm. Phyllaries dark green, apex acute to acuminate; outer phyllaries rather few, narrowly lanceolate, with long brown stiff glandular hairs and weak curly pale uniseriate hairs on midvein and along margin; inner phyllaries except innermost ones with long, brown stiff glandular hairs along midvein. Florets purplish. Achene not seen when mature. Pappus ?whitish, ca. 1 cm. Fl. Jul.

• Mountain slopes; ca. 3200 m. S Xizang (Yadong).

Known only from the type, this species is probably related to *Dubyaea oligocephala* (Schultz Bipontinus) Stebbins from the W Himalaya and *D. hispida*.

8. Dubyaea rubra Stebbins, Mem. Torrey Bot. Club 19(3): 17. 1940.

长柄厚喙菊 chang bing hou hui ju

Dubyaea muliensis C. Shih.

Herbs 30–60 cm tall, perennial. Stem erect, branched apically or rarely from basal portion, basally and middle usually purplish red, with long blackish stiff glandular hairs and pale curly weak hairs, leafy. Basal and lower stem leaves hairy particularly abaxially, margin mucronulately sinuate-dentate; terminal lobe triangular to triangular-ovate, 3.5–8 × 2.5–6 cm, basally cordate, truncate, or shortly cuneate and contracted into an unwinged or at least apically winged petiole-like rachis of 4–10 cm with 0–3 pairs of small sometimes indistinct triangular to ovate lateral lobes in upper portion, apex acute. Middle and upper stem leaves similar to lower stem leaves but without or with a short winged petiole-like rachis, lanceolate to ovate-lanceolate, small, base narrow to somewhat auriculately clasping. Synflorescence sparsely and ± distantly corymbiform, with 3–6 capitula. Capitula nodding, with 50–60 florets; peduncle usually long blackish pilose. Involucre campanulate, 1.5–1.7 × 1–1.5 cm. Phyllaries dark green to blackish, with long blackish stiff glandular hairs along midvein except in innermost ones and all ± with weak curly pale multicellular uniseriate hairs especially along margin and apically, apex acute; outer phyllaries rather few, linear-lanceolate, approaching inner ones in length; inner phyllaries many. Florets pale purple. Achene brown, ca. 8 mm, with several ribs, apex long attenuate and paler than remainder. Pappus yellowish, ca. 8 mm. Fl. and fr. Aug–Sep.

• Forest margins; 3200–4500 m. SW Sichuan (Daocheng, Muli).

Dubyaea rubra, which is apparently related to *D. hispida*, has a localized distribution in SW Sichuan. *Dubyaea muliensis*, distinguished by minor features of the leaf shape, is considered as conspecific.

9. Dubyaea glaucescens Stebbins, Mem. Torrey Bot. Club 19(3): 16. 1940.

光滑厚喙菊 guang hua hou hui ju

Dubyaea grandis Handel-Mazzetti.

Herbs 40–60 cm tall, perennial, with a taproot. Stem erect, glabrous, apically sparsely branched, leafy. Leaves glabrous. Basal and lower stem leaves oblanceolate to obovate, 20–24 × 6–8 cm, sinuate-dentate to pinnatipartite with triangular lobes, glabrous, basally attenuate to an auriculately clasping base, margin sparsely mucronulate-dentate, apex acute to acuminate. Middle stem leaves similar to lower stem leaves but smaller and rather more sinuate-dentate than shallowly pinnatifid, less attenuate toward base and broadly auriculately clasping. Synflorescence very laxly corymbiform, with 2–4 capitula. Capitula nodding, with numerous florets; peduncle 7–22 cm, stout. Involucre broadly campanulate, 1.8–2 × 1.5–2 cm. Phyllaries abaxially dark green and glabrous, apex acute; outer phyllaries ovate to triangular-ovate, largest 4–6 × 2–3 mm; inner phyllaries with margin and apex shortly brownish fimbriate. Florets blue to purple. Achene brownish, ca. 3.5 mm, apex truncate. Pappus yellowish to pale brownish, 9–10 mm. Fl. Jun–Jul.

• Forest margins; 900–1300 m. Sichuan.

10. Dubyaea amoena (Handel-Mazzetti) Stebbins, J. Bot. 75: 17. 1937.

棕毛厚喙菊 zong mao hou hui ju

Lactuca amoena Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 23. 1924.

Herbs to 7 cm tall, perennial, rosulate, acaulescent, with a taproot. Caudex short, ± subterranean, with 3–7 scapes. Rosette leaves oblanceolate to narrowly elliptic, 4–10(–12) × 1–3 cm, sinuate-dentate or lyrately pinnatifid to subpinnatisect; lateral lobes elliptic to triangular, gradually smaller toward leaf base, abaxially with dark brown multicellular uniseriate hairs on veins, adaxially glabrous, margin entire or very scarcely and shallowly mucronulate-dentate; terminal lobe ovate to triangular, apex rounded, acute, or shortly acuminate. Scapes sometimes with 1 or 2 linear bracts, with dense long dark brown stiff glandular hairs. Capitula erect, with 10–16 florets. Involucre narrowly campanulate, 1.5–1.8 × 0.7–1 cm. Phyllaries abaxially brownish purple and with deep brown long stiff glandular hairs on midvein; outer phyllaries narrowly triangular to linear-lanceolate, approaching inner ones closely in length, apex acute to obtuse; inner phyllaries 8–10. Florets blue to bluish purple. Achene brown to dark brown, 4.5–6.5 mm, with 5 main ribs, apex truncate. Pappus brown, 1–1.2 cm. Fl. and fr. Jul–Sep.

• Alpine meadows; 3500–4400 m. Yunnan.

11. Dubyaea gombalana (Handel-Mazzetti) Stebbins, J. Bot. 75: 17. 1937.

矮小厚喙菊 ai xiao hou hui ju

Lactuca gombalana Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 23. 1924.

Herbs to 10 cm tall, perennial, rosulate, acaulescent, with a taproot. Caudex short, sometimes branched, ± subterranean, glabrous, with 1 scape and sometimes with 1 lanceolate bract. Rosette leaves narrowly elliptic to oblanceolate, 3–9 × 0.5–0.7 cm, glabrous, base attenuate into a petiole-like portion, margin

entire, apex acute to shortly acuminate. Capitula erect (to declined?), with 12–16 florets. Involucre narrowly campanulate, 1.5–1.8(–2.4) cm at anthesis but unknown in fruit. Phyllaries abaxially brownish purple, glabrous; outer phyllaries triangular-ovate to lanceolate, approaching inner ones closely in length; inner phyllaries ca. 8. Florets blue to bluish purple. Achene not seen when mature. Pappus brownish, 1.3–1.5 cm. Fl. Jul–Aug.

• Ravines on mountain slopes, forests, alpine meadows; 3200–3900 m. Xizang, Yunnan.

12. Dubyaea stebbinsii Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 74. 1956.

朗县厚喙菊 lang xian hou hui ju

Herbs, perennial. Caudex subglobose. Stem to 1 m tall, glabrous or apically sparsely hairy. Basal leaves unknown. Lower and middle stem leaves with margin coarsely mucronulately sinuate-dentate; terminal lobe to 15 × 12 cm, basally cordate to shortly cuneate then contracted into an unwinged petiole-like rachis to 7 cm with apically 1 or 2 pairs of elliptic to obovate lateral lobes 1–3 × 0.5–2 cm, apex acute. Upper stem leaves similar to middle stem leaves but gradually smaller and without lateral lobes. Synflorescence corymbiform, with 1–4 capitula. Capitula nodding, with numerous florets; peduncle 12–22 cm, apically pubescent. Involucre campanulate, 1.3–1.5 × 1–1.5 cm. Phyllaries blackish green, with a ciliate margin especially apically otherwise glabrous; outer phyllaries ovate to lanceolate, largest 8–10 × 3–4 mm; inner phyllaries many, 3–5 mm wide, apex acute to obtuse. Florets reddish mauve to bluish purple. Achene not seen when mature, glabrous, with ca. 8 ribs, apex truncate. Pappus brownish, 8–10 mm.

Grassy slopes, [woodlands]; [3500–]3700–3800 m. SE Xizang (Nangxian) [Bhutan].

77. SYNCALATHIUM Lipschitz in Sočava, Akad. Sukačevu 75-letiju So Dnja Rozhd. 358. 1956.

合头菊属 he tou ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, annual or perennial, acaulescent and rosulate, or, exceptionally, caulescent with thick and hollow, densely leafy stem, sometimes from thin, vertical, subterranean shoot with scaly leaves. Rosette shoot inflated at apex to a flat, convex, hollow receptacle, carrying usually some to numerous, densely crowded sessile or subsessile capitula, often with a reduced, linear subtending leaf. Capitula with 3 or 5 florets. Involucre narrowly cylindric. Phyllaries in 1 row; outer phyllaries absent; inner phyllaries 3 or 5, ± lanceolate, subequal in length, connate in basal part, hardened at maturity. Receptacle naked. Florets yellow or pale to medium purplish. Achene obconical, compressed, with 5 ribs, apex truncate. Pappus of grayish white, with scabrid bristles, usually caducous.

• Five species: China.

The species formerly treated as *Syncalathium souliei* (incl. *S. orbiculariforme*) is not a congener and is not even part of subtribe Crepidinae; it is a member of subtribe Lactucinae and included in the genus *Melanoseris* (see *M. souliei*, p. 225).

1a. Capitula with 5 florets; phyllaries 5; florets yellow.
2a. Leaf blade narrowly obovate to narrowly oblanceolate; florets with ligule ca. 3 mm ..... 1. *S. disciforme*
2b. Leaf blade orbicular or ovate; florets with ligule 8–9 mm ..... 2. *S. chrysocephalum*
1b. Capitula with 3 florets; phyllaries 3 or 4; florets purplish.
3a. Leaf blade 3–8 cm; florets very pale rose ..... 5. *S. roseum*
3b. Leaf blade ≤ 3 cm; florets purple.
4a. Involucre 1.1–1.3 cm; anthers 5–6 mm; pappus 10–12 mm ..... 3. *S. porphyreum*
4b. Involucre 0.7–0.9 cm; anthers 2.5–4 mm; pappus 6–8 mm ..... 4. *S. kawaguchii*

1. Syncalathium disciforme (Mattfeld) Y. Ling, Acta Phytotax. Sin. 10: 286. 1965.

盘状合头菊 pan zhuang he tou ju

Crepis disciformis Mattfeld, Notizbl. Bot. Gart. Berlin-Dahlem 12: 685. 1935; *Lactuca disciformis* (Mattfeld) Stebbins; *Soroseris qinghaiensis* C. Shih; *Syncalathium qinghaiense* (C. Shih) C. Shih.

Herbs 2–5 cm tall, perennial, rosulate, acaulescent. Taproot slender. Rosette leaves narrowly obovate to oblanceolate, 2–5 × 0.4–1.5 cm, green or particularly on rachis tinged purplish red, sinuate-dentate to pinnately lobed with toothlike lobes, ± pilose, base attenuate into a basally widened petiole-like portion. Synflorescence flat conical, 2–7 cm in diam., with some to numerous capitula. Capitula with 5 florets. Involucre narrowly cylindric, 10–12 × ca. 3 mm. Phyllaries 5, lanceolate, abaxially sparsely pilose on midvein, apex rounded to obtuse. Florets yellow, ligule ca. 3 mm. Achene brown, obconical, 3–4 mm, compressed, apex truncate. Pappus 6–8 mm. Fl. and fr. Sep–Oct. $2n = 16$*.

• Alpine meadows, scree slopes, mountain slopes, gravelly areas; 3900–4800 m. Gansu, Qinghai, Sichuan.

Led astray by the collector's note, Mattfeld described the species as having purple florets, although he stated that the corolla appears yellow in the type material. The erroneous color designation has since been repeated in the literature, but it is clear that the species in fact has yellow florets. Leaf incision varies even within a population from weakly sinuate-dentate to pinnately lobed. Therefore, no differences exist with

Syncalathium qinghaiense; following S. W. Liu (Fl. Qinghai. 3: 497. 1996), the two species are considered as conspecific.

2. Syncalathium chrysocephalum (C. Shih) S. W. Liu, Fl. Qinghai. 3: 498. 1996.

黄花合头菊 huang hua he tou ju

Soroseris chrysocephala C. Shih, Acta Phytotax. Sin. 31: 449. 1993.

Herbs 3–5 cm tall, perennial, rosulate, acaulescent. Taproot slender. Rosette leaves ovate to ovate-orbicular, 2–8 × 0.8–1.5 cm, green or tinged purplish red, glabrous or ± villous, base abruptly contracted into a basally widened winged or unwinged petiole-like portion with or without a few pairs of small lateral lobes, margin dentate, apex obtuse, acute, or rounded. Synflorescence flat conical, 2–3 cm in diam., with few to some capitula. Capitula with 5 florets. Involucre narrowly cylindric, 10–12 × ca. 3 mm. Phyllaries 5, lanceolate, abaxially sparsely pilose, apex rounded. Florets yellow, ligule 8–9 mm. Achene brown, obconical, ca. 3 mm, compressed. Pappus 6–7 mm. Fl. Jul. $2n = 16$*.

• Scree slopes; 4100–4700 m. Qinghai, E Xizang (Qamdo).

3. Syncalathium porphyreum (C. Marquand & Airy Shaw) Y. Ling, Acta Phytotax. Sin. 10: 287. 1965.

紫花合头菊 zi hua he tou ju

Crepis glomerata Decaisne var. *porphyrea* C. Marquand & Airy Shaw, J. Linn. Soc., Bot. 48: 194. 1929; *Lactuca porphyrea* (C. Marquand & Airy Shaw) Stebbins.

Herbs 2–5 cm tall, perennial, rosulate, acaulescent. Taproot slender. Rosette leaves green to tinged purplish red, with an unwinged basally widened petiole-like portion to 2.5 cm and apically pubescent; leaf blade elliptic, obovate, or spatulate, 1–2 × 0.7–1 cm, abaxially glabrous, adaxially sparsely white pubescent, base broadly cuneate, margin with small irregular sharp teeth, apex obtuse. Synflorescence flat conical, with numerous capitula. Capitula with 3 florets. Involucre narrowly cylindric, 11–13 × 2–3 mm. Phyllaries 3 or 4, lanceolate, apically pubescent. Florets purple, ligule 7–9 mm. Anthers 5–6 mm. Achene obconical, compressed. Pappus 1–1.1 cm. Fl. and fr. Aug.

• Mountain slopes; ca. 4500 m. Qinghai, Xizang.

4. Syncalathium kawaguchii (Kitamura) Y. Ling, Acta Phytotax. Sin. 10: 287. 1965.

合头菊 he tou ju

Lactuca kawaguchii Kitamura, Acta Phytotax. Geobot. 15: 72. 1953; *Syncalathium pilosum* (Y. Ling) C. Shih; *S. sukaczevii* Lipschitz; *S. sukaczevii* var. *pilosum* Y. Ling.

Herbs 1–5 cm tall, rosulate, acaulescent to subacaulescent. Taproot slender. Rosette leaves petiolate; petiole 2–3 cm, wings sometimes dentate; leaf blade often dark purple, ovate, oblanceolate, or elliptic, 1.5–3 × 0.5–2 cm, undivided to basally lyrately pinnate, glabrous to white villous, base cuneate, margin shallowly to coarsely dentate, apex rounded to obtuse. Synflorescence flat conical, 2–6 cm in diam., with some to numerous capitula. Capitula with 3 florets. Involucre narrowly cylindric, 7–9 × 2–3 mm. Phyllaries 3 or 4, lanceolate, abaxially glabrous or white villous, apex obtuse. Florets purple, ligule 5–7 mm. Anthers 2.5–4 mm. Achene brown, obconical, ca. 3 mm, compressed, apex truncate. Pappus 6–8 mm. Fl. and fr. Jun–Oct. $2n = 16$*.

• Alpine steppes, scree slopes, gravelly areas in dry river valleys; 3800–5400 m. Qinghai, Xizang.

Syncalathium kawaguchii is certainly closely related to *S. porphyreum*, which, as the holotype shows, also has 3 florets and 3 or 4 phyllaries, and their delimitation should be reassessed on the basis of more material. Leaf shape is variable even within the same population from undivided to pinnately lobed.

5. Syncalathium roseum Y. Ling, Acta Phytotax. Sin. 10: 287. 1965.

红花合头菊 hong hua he tou ju

Herbs, perennial, rosulate and acaulescent or exceptionally caulescent with a thick hollow densely leafy stem to 20 cm tall. Taproot slender. Leaves glabrous; petiole to 1 cm, broadly winged; leaf blade obovate, elliptic, or ovate, 3–8 × 0.5–2.2 cm, base cuneate, margin coarsely dentate, apex rounded to obtuse. Leaves immediately below synflorescence somewhat smaller. Synflorescence flat conical, 5–6 cm in diam., with numerous capitula. Capitula with 3 florets. Involucre narrowly cylindric, 10–13 × ca. 3 mm. Phyllaries 3(or 4), lanceolate, abaxially glabrous, apex obtuse to rounded. Florets pale rose. Achene not seen when mature, brown, obconical, compressed, apex truncate. Pappus 8–9 mm. Fl. and fr. Aug.

• Sandy riverbanks; 3700–3800 m. SC Xizang (Zhanang).

The elevation of "3100 m" given in the original description of *Syncalathium roseum* is probably erroneous. Recently, it has been found in the area of the type locality along the Yarlung Zangbo Jiang only at the higher elevation given above (J. W. Zhang, per. comm.).

78. HOLOLEION Kitamura, Acta Phytotax. Geobot. 10: 301. 1941.

全光菊属 quan guang ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, perennial, ± glabrous, with rhizomes. Stems well developed, erect, leafy. Basal and stem leaves linear-lanceolate, grasslike. Synflorescence laxly paniculiform to corymbiform, with few to many capitula. Capitula erect; peduncle wiry, few to some cm. Involucre cylindric. Phyllaries glabrous; outer phyllaries in several series, gradually longer centripetally, longest ca. 1/2 as long as inner ones; inner phyllaries ± linear-lanceolate, ± equal in length. Receptacle naked. Florets yellow. Achene blackish brown and straw-colored mottled, subcylindric to weakly angular, with 5 weak main ribs, secondary ribs indistinct, base attenuate, apex truncate. Pappus straw-colored, of scabrid brittle bristles.

About three species: E Asia; one species in China.

1. Hololeion maximowiczii Kitamura, Acta Phytotax. Geobot. 10: 303. 1941.

全光菊 quan guang ju

Hieracium hololeion Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 182. 1859; *H. sparsum* Frivaldszky subsp. *hololeion* (Maximowicz) Zahn.

Herbs, perennial, rhizomatous. Stem 60–100 cm tall, erect, branched in upper half, leafy. Basal leaves few, present or absent at anthesis. Basal and lower stem leaves linear-lanceolate, usually 15–40 × 0.5–2(–3) cm, base ± expanded and semiamplexicaul, margin entire, apex acute to acuminate. Middle and upper stem leaves similar to basal leaves but gradually smaller upward on stem; uppermost stem leaves linear-subulate, reduced in size. Synflorescence paniculiform to paniculiform-corymbiform, usually with 10–25 capitula. Capitula with 20–25 florets; peduncle wiry, usually 0.5–3 cm. Involucre cylindric, 1–1.3 cm. Phyllaries with an obtuse apex; outer phyllaries ovate to broadly lanceolate, longest 5–6 mm; inner phyllaries 12–14, apically ciliate. Florets pale yellow. Achene ca. 6 mm. Pappus ca. 7 mm, ± caducous. Fl. and fr. Jul–Sep.

Meadows, marshy meadows, damp places near small streams; 700–2200 m. Heilongjiang, Jiangsu, Jilin, ?Liaoning, Nei Mongol, ?Shandong, Zhejiang [Japan, Korea, SE Russia].

79. NABALUS Cassini in F. Cuvier, Dict. Sci. Nat. 34: 94. 1825.

耳菊属 er ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Herbs, perennial. Stem erect, leafy. Synflorescence paniculiform, with many capitula. Capitula often nodding, with 5–25 florets. Involucre narrowly cylindric to narrowly campanulate. Phyllaries in few series; outer phyllaries gradually longer centripetally, to 1/2 as long as inner ones; inner phyllaries ± equal in length. Receptacle naked. Florets yellow, pale purplish, whitish, or greenish. Achene columnar to narrowly fusiform, with 5 weaker or stronger main ribs alternating with 2–4 ± conspicuous secondary ribs, apex truncate. Pappus brownish, of scabrid brittle bristles.

About 15 species: E Asia, North America; two species in China.

The presence of *Nabalus acerifolius* Maximowicz in China, given by W. Wang and C. Y. Li (Fl. Pl. Herb. Chin. Bor.-Orient. 9: 419. 2004) under the name *Prenanthes acerifolia* (Maximowicz) Matsumura, appears most unlikely. The bluish white flowered species with palmately 3–7-lobed, long petiolate, mostly basal leaves, is otherwise considered as endemic to Japan.

1a. Capitula with 20–25 florets; florets yellow; achene 7–8 mm ..... 1. *N. ochroleucus*
1b. Capitula with 5 florets; florets pale purplish, or whitish, or greenish; achene 3.5–4.5 mm ..... 2. *N. tatarinowii*

1. Nabalus ochroleucus Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 15: 376. 1871.

耳菊 er ju

Lactuca blinii H. Léveillé; *L. ochroleuca* (Maximowicz) Franchet; *Prenanthes blinii* (H. Léveillé) Kitagawa; *P. maximowiczii* Kirpicznikov, nom. illeg. superfl.; *P. ochroleuca* (Maximowicz) Hemsley.

Herbs to 90 cm tall, perennial, with thick rhizomes. Stem solitary, erect, branched in apical portion, with scaly dark brown and crisped hairs or glabrous. Lower and middle stem leaves petiolate; petiole to 26 cm, basally expanded and semiamplexicaul, wing sinuate-dentate; leaf blade lyrately pinnatisect, adaxially usually with multicellular brown hairs, margin irregularly coarsely sinuate-dentate; lateral lobes 1 or 2 pairs, elliptic, rhombic, or irregularly rhombic, 5.5–7 × ca. 4 cm, basal ones smaller; terminal lobe broadly triangular to irregularly orbicular, 6–9 × 5–9 cm. Upper stem leaves with petiole to 4.5 cm; leaf blade triangular, smaller, undivided, otherwise similar to middle stem leaves; uppermost stem leaves sessile, lanceolate, with an expanded amplexicaul base. Synflorescence paniculiform with virgate racemiform branches, with numerous capitula, axes densely covered with multicellular crisped hairs. Capitula with 20–25[–30] florets. Involucre narrowly campanulate, 13–15 × ca. 7 mm. Phyllaries dark green when dry, abaxially with scaly hairs or glabrous, apex acute; outer phyllaries linear-lanceolate, longest ca. 1/2 as long as inner ones; inner phyllaries 10–12, linear-lanceolate. Florets pale yellow. Achene brown, ± columnar, 7–8 mm, somewhat compressed, apex truncate. Pappus brownish, 6–7 mm. Fl. and fr. Aug–Sep. $2n = 16$.

Moist areas in forests; 100–200 m. Jilin [Korea, SE Russia].

2. Nabalus tatarinowii (Maximowicz) Nakai, Fl. Sylv. Kor. 14: 116. 1923.

盘果菊 pan guo ju

Herbs 0.5–2 mm tall, perennial. Stem solitary, erect, virgately branched usually in upper half, glabrous or subglabrous. Lower and middle stem leaves sparsely pilose with fine multicellular hairs and hispidulous with stiff subulate hairs; petiole 7–17 cm. Leaf blade of lower and middle stem leaves for subsp. *tatarinowii* either ovate to triangular-ovate, 5–15 × 6–15 cm, undivided, base cordate, hastate, truncate, or cuneate, margin subentire to sinuate-dentate with mucronate teeth, and apex acute to acuminate or leaf blade additionally with 1 pair of elliptic to obliquely ovate lateral lobes 0.6–5.5 × 0.4–4.5 cm. Leaf blade of lower and middle stem leaves for subsp. *macrantha* to 29 × 22 cm and divided; lateral lobes 1–3 pairs, elliptic, ovate, or lanceolate, much smaller than terminal lobe, margin subentire to coarsely sinuate-dentate with mucronate teeth, apex acute; terminal lobe broadly triangular-ovate, suborbicular, or broadly lanceolate in outline, pinnatipartite to pinnatisect with segments lanceolate, elliptic, or oblanceolate, base cordate to cuneate, margin coarsely sinuate-dentate with mucro-

nate teeth, apex acute to acuminate. Upper and uppermost stem leaves similar to middle stem leaves in division but smaller and broadly triangular-ovate, linear-lanceolate, subrhombic, broadly ovate, or ovate, base truncate to cuneate, apex shortly to long acuminate. Synflorescence paniculiform, with some to many capitula. Capitula pendent at anthesis, erect in fruit, with ca. 5 florets; peduncle capillaceous, shorter than involucre, often densely pilose with multicellular hairs. Involucre narrowly cylindric, 10–13 × 1.5–2.5 mm. Outer phyllaries few, ovate to triangular-ovate, longest 2–3 mm, apex acute to obtuse; inner phyllaries 5, linear-lanceolate to linear, ± with scarious margin abaxially often sparsely pilose, apex obtuse to rounded. Florets pale purple, pink, whitish, or greenish. Anther tube brownish purple. Achene brown, 3.5–4.5 mm, apex truncate. Pappus brown to brick-colored, 6–8 mm.

Mountain slopes, forests in mountain valleys, forest margins, forests, grasslands, moist places by water, moist places with thick grass; 500–3000 m. Gansu, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan [Korea, SE Russia].

Plants with ± deeply dissected terminal leaf lobe apparently occur in the central part of the distribution range of *Nabalus tatarinowii*, and they have been treated as a variety (*N. tatarinowii* var. *divisa*), subspecies (*Prenanthes tatarinowii* subsp. *macrantha*), or separate species (*P. macrophylla*). Stebbins (Contr. U.S. Natl. Herb. 28: 672. 1941) stated a correspondence of the pinnately lobed terminal leaf lobe with longer involucres (presumed to represent a tetraploid cytotype as inferred from pollen size). However, involucres to 1.3 cm also occur in plants with undivided terminal leaf lobes, and this corroborates Stebbins's summarizing statement that the species "consists of a complex of closely interrelated diploid and polyploid forms" (loc. cit.). Today, still little is known about geographical and altitudinal distribution, ecology, and infrapopulational and interpopulational variation in this complex. For the time being, therefore, two entities are distinguished tentatively delimited by their conspicuous leaf features and, following Stebbins (loc. cit.), treated at the rank of subspecies. *Prenanthes angustiloba* and *P. leptantha*, each described on the basis of a single specimen from Sichuan with dissected leaves and delimited from this species by minor features of the leaf lobes, appear to fall within the range of variation of *N. tatarinowii* subsp. *macrantha*.

1a. Leaf blade or terminal leaf lobe of lower, middle, upper, and uppermost stem leaves undivided and at most shallowly sinuate-dentate ..... 2a. subsp. *tatarinowii*

1b. Leaf blade or terminal leaf lobes of lower, middle, and upper stem leaves deeply pinnately or palmately lobed, uppermost stem leaves often at least coarsely and deeply sinuate-dentate or more rarely subentire ..... 2b. subsp. *macrantha*

2a. Nabalus tatarinowii subsp. **tatarinowii**

盘果菊(原亚种) pan guo ju (yuan ya zhong)

Prenanthes tatarinowii Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 474. 1859; *Lactuca tatarinowii* (Maximowicz) Franchet; *Nabalus pyramidalis* (C. Shih) Sennikov; *N. racemiformis* (C. Shih) Sennikov; *P. pyramidalis* C. Shih; *P. racemiformis* C. Shih.

Lower and middle stem leaves with leaf blade either ovate to triangular-ovate, 5–15 × 6–15 cm, undivided, base cordate, hastate, truncate, or cuneate, margin subentire to sinuate-dentate with mucronate teeth, and apex acute to acuminate or leaf blade additionally with 1 pair of elliptic to obliquely ovate lateral lobes 0.6–5.5 × 0.4–4.5 cm. Upper and uppermost stem leaves with leaf blade broadly triangular-ovate, linear-lanceolate, subrhombic, broadly ovate, or ovate, similar to middle stem leaves but smaller and more frequently not divided, base truncate to cuneate, apex shortly to long acuminate. Fl. and fr. Aug–Oct. $2n = 16$*.

Mountain slopes, forest margins, forests, grasslands, moist places by water; 500–3000 m. Gansu, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan [Korea, SE Russia].

2b. Nabalus tatarinowii subsp. **macrantha** (Stebbins) N. Kilian, **comb. nov.**

多裂耳菊 duo lie er ju

Basionym: *Prenanthes tatarinowii* subsp. *macrantha* Stebbins, Contr. U.S. Natl. Herb. 28: 672. 1941; *Nabalus angustilobus* (C. Shih) Sennikov; *N. leptanthus* (C. Shih) Sennikov; *N. tatarinowii* var. *divisa* Nakai & Kitagawa; *P. angustiloba* C. Shih; *P. leptantha* C. Shih; *P. macrophylla* Franchet; *P. tatarinowii* var. *divisa* (Nakai & Kitagawa) Kitagawa.

Lower and middle stem leaves with leaf blade to 29 × 22 cm and divided; lateral lobes 1–3 pairs, elliptic, ovate, or lanceolate, much smaller than terminal lobe, margin subentire to coarsely sinuate-dentate with mucronate teeth, apex acute; terminal lobe broadly triangular-ovate, suborbicular, or broadly lanceolate in outline, pinnatipartite to pinnatisect with segments lanceolate, elliptic, or oblanceolate, base cordate to cuneate, margin coarsely sinuate-dentate with mucronate teeth, apex acute to acuminate. Upper stem leaves similar to middle stem leaves but smaller and less divided; uppermost stem leaves elliptic, rhombic, or lanceolate, pinnatipartite or coarsely sinuate-dentate to entire, base cuneate, apex shortly acuminate to long acuminate. Fl. and fr. Jul–Oct.

• Mountain slopes, forests in mountain valleys, moist places with thick grass; 1100–2700 m. Gansu, Hebei, Henan, Shaanxi, Shanxi, Sichuan.

80. SOROSERIS Stebbins, Mem. Torrey Bot. Club 19(3): 27. 1940.

绢毛菊属 juan mao ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Stebbinsia Lipschitz; *Tibetoseris* Sennikov.

Herbs, perennial, rosulate, often acaulescent, sometimes from a stout vertical subterranean rosette shoot with scalelike leaves

(cataphylls) below leaf rosette or caulescent with a thick hollow stem. Leaves rosulate or along stem. Rosette shoot inflated at apex to a convex, hollow receptacle or rarely elongated to a hollow cylindric axis, carrying usually numerous, densely crowded capitula. Capitula with 4(or 5) or 15–30 florets; peduncle mostly shorter to rarely longer than involucre. Involucre narrowly cylindric or rarely campanulate. Phyllaries in few series; outer phyllaries mostly 2, linear, similar to uppermost leaves; inner phyllaries 4–15, ± lanceolate, subequal in length, connate or distinct in basal part, herbaceous at maturity. Receptacle naked. Florets yellow, sometimes basally blackish, more rarely white. Achene subcylindric, subfusiform, obcolumnar, or narrowly obconical, subcompressed, with 5 mostly rather slender and sometimes weak main ribs and 1–3(or 4) secondary often ± subequal ribs in between but otherwise smooth, inconspicuously or rarely apically conspicuously acutely papillate, apex ± truncate or rarely shortly beaked. Pappus whitish to straw-colored, often apically grayish, bristles stiff, coarse, scabrid, and usually ± caducous.

About seven species: Bhutan, W China, N India, Kashmir, Nepal, Pakistan; seven species in China.

Cytological and molecular work by J. W. Zhang et al. (Bot. J. Linn. Soc. 154: 79–87. 2007; Taxon 60: 15–26. 2011) confirmed the very close relationship between the monotypic genus *Stebbinsia* (accommodating *S. umbrella*) and *Soroseris*, and supports its unification with the latter. Further evidence comes from the molecular phylogenetic analysis of subtribe Crepidinae by J. W. Zhang et al. (in prep.) revealing that *Youngia depressa*, recently separated for convincing morphological reasons from *Youngia* (see also there, p. 252) in a new genus *Tibetoseris* (Sennikov & I. D. Illarionova, Komarovia 5: 96. 2008), which subsequently was, similarly convincingly, most recently recircumscribed to become a monotypic genus for *Y. depressa* by D. Maity & Maiti (Compositae Newslett. 48: 22–42. 2010), actually is also nested in the clade of *Soroseris*. *Soroseris depressa*, in fact, well agrees morphologically; it strongly resembles *S. umbrella* in leaf shape and habit, while in the number of phyllaries it is intermediate between *S. umbrella* and the remainder of *Soroseris*. We therefore understand *Soroseris* in this wider sense, including both *Stebbinsia* and *Tibetoseris* s.s. As has been shown by J. W. Zhang et al. (Taxon 60: 15–26. 2011), speciation in *Soroseris* is rather recent, their relationship being not resolved in their molecular analyses. Also morphologically, distinction is not always easy, especially between *S. glomerata* and *S. hookeriana*, and more studies are needed.

1a. Rosette leaves orbicular to ovate and abruptly contracted into an unwinged petiole-like basal portion; involucre with 8–15 inner phyllaries; capitula with 15–30 florets.
2a. Rosette leaves mostly < 3 cm wide; involucre with 10–15 inner phyllaries; florets white; achene apex truncate ..... 1. *S. umbrella*
2b. Rosette leaves mostly > 3 cm wide; involucre with ca. 8 inner phyllaries; florets yellow; achene apex shortly beaked ..... 2. *S. depressa*
1b. Rosette leaves and lower stem leaves (if any) spatulate, elliptic, or lanceolate and very gradually attenuate toward base; involucre with 4 or 5 inner phyllaries; capitula with 4 or 5 florets.
3a. Synflorescence elongate and cylindric ..... 7. *S. teres*
3b. Synflorescence hemispheric.
4a. Leaves pinnatifid to pinnatisect (rarely mostly entire and only few of them pinnately lobed); leaf rosette present; achene usually with an attenuate apex; pappus (0.7–)0.9–1.5 cm ..... 6. *S. hookeriana*
4b. Leaves undivided and entire to coarsely dentate; leaf rosette present or not; achene usually with a truncate apex; pappus 0.7–1.1 cm.
5a. Scalelike leaves (cataphylls) in basal portion below well-developed leaves missing or very few; well-developed leaves usually along an aerial stem (to 30 cm tall); leaf margin entire and flat or undulate ..... 5. *S. erysimoides*
5b. Scalelike leaves (cataphylls) in subterranean or basal portion below leaf rosette usually some to many; well-developed leaves usually rosulate; leaf margin entire to remotely dentate or coarsely dentate.
6a. Leaf margin entire or remotely denticulate; involucre 1–1.5 cm ..... 3. *S. glomerata*
6b. Leaf margin coarsely dentate; involucre 0.7–0.9 cm ..... 4. *S. pumila*

1. Soroseris umbrella (Franchet) Stebbins, Mem. Torrey Bot. Club 19(3): 33. 1940.

肉菊 rou ju

Crepis umbrella Franchet, J. Bot. (Morot) 9: 255. 1895; *Stebbinsia umbrella* (Franchet) Lipschitz.

Herbs 3–15 cm tall, perennial, rosulate. Taproot ramose or simple. Rosette shoot with conspicuous subterranean portion with cataphylls. Cataphylls below rosette leaves numerous, ovate to lanceolate but higher up also linear, 1–3 × 0.3–1 cm, apex acute. Above-ground leaves in a ± dense leaf rosette, often purplish red; petiole-like basal portion 4–18 cm, sometimes winged and apically pinnately lobed, sparsely brownish yellow pilose; bladelike portion orbicular, ovate, or ovate-elliptic, 2–15 × (1.5–)3–11 cm, glabrous to ± pilose, base shallowly cordate to cuneate, margin mucronulately dentate and sinuate-dentate, apex rounded. Synflorescence umbelliform to corymbiform, with some to many capitula. Capitula with 15–30 florets; peduncle of 1.5–8 cm, thick, ± pilose. Involucre campanulate, 1.4–2 × 0.8–1.5 cm. Phyllaries dark green to blackish; outer phyllaries few, linear, approaching inner ones in length, mostly pilose; inner phyllaries 10–15, abaxially or on midvein pilose, apex acute to obtuse. Florets white. Achene some shade of brown, columnar to obcolumnar, 4–6 mm, weakly ribbed, between main ribs usually with ca. 3 often inconspicuous secondary ribs, apex truncate. Pappus whitish, ca. 1 cm. Fl. and fr. Jul–Sep. $2n$ = 16*.

Alpine meadows, scree slopes; 2600–4600 m. Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim)].

2. Soroseris depressa (J. D. Hooker & Thomson) J. W. Zhang, N. Kilian & H. Sun, **comb. nov.**

矮生绢毛菊 ai sheng juan mao ju

Basionym: *Crepis depressa* J. D. Hooker & Thomson, Fl. Brit. India 3: 397. 1881; *Lactuca cooperi* J. Anthony; *L. pseudoumbrella* D. Maity & Maiti; *Tibetoseris depressa* (J. D. Hooker & Thomson) Sennikov; *Youngia depressa* (J. D. Hooker & Thomson) Babcock & Stebbins.

Herbs 2–3 cm tall, perennial, rosulate, acaulescent, with a taproot. Caudex woody. Rosette leaves with a basally gradually widened petiole as long as or longer than blade; leaf blade orbicular, broadly ovate, or deltoid, 1.5–4 × 1–3.5 cm, adaxially puberulent, base broadly cuneate to rounded, margin subentire to sinuate-dentate, apex obtuse, rounded, or acute. Synflorescence subumbellate to ± hemispheric, 3–5 cm in diam., with some to many closely crowded capitula. Capitula with 15–20 florets; peduncle usually 0.5–2 cm. Involucre green or purplish red, cylindric, 1.3–1.6 cm. Phyllaries ± setose along midvein; outer phyllaries several, linear-lanceolate, 3–4 mm, almost equal in length, apex acute; inner phyllaries ca. 8, midvein subapically often faintly crested, margin ± scarious, apex obtuse to acute. Florets yellow. Anther tube greenish. Style blackish upon drying. Achene dark brown mottled with yellow, subfusiform to columnar, 6–7 mm, main ribs rather strong and alternating with usually a single somewhat more slender secondary rib, apically acutely papillate, apex attenuate into a yellowish ca. 1 mm beak. Pappus white, 9–10 mm. Fl. and fr. Aug–Sep. $2n = 16$.

Grasslands on mountain slopes, alpine meadows; 3200–4500 m. Xizang [Bhutan, India (Sikkim), Nepal].

A subspecies with pinnatisect leaves and shorter achene and pappus described from India (Sikkim) and Nepal (as *Tibetoseris depressa* subsp. *gauri* D. Maity, Candollea 65: 213. 2010) is so far not known to occur in China.

3. Soroseris glomerata (Decaisne) Stebbins, Mem. Torrey Bot. Club 19(3): 33. 1940.

绢毛菊 juan mao ju

Prenanthes glomerata Decaisne in Jacquemont, Voy. Inde 4(Bot.): 99. 1843; *Crepis gillii* S. Moore var. *bellidifolia* Handel-Mazzetti; *C. glomerata* (Decaisne) Bentham & J. D. Hooker; *C. rosularis* Diels; *C. sorocephala* Hemsley; *Lactuca deasyi* S. Moore; *Soroseris bellidifolia* (Handel-Mazzetti) Stebbins; *S. deasyi* (S. Moore) Stebbins; *S. rosularis* (Diels) Stebbins.

Herbs, perennial, rosulate. Taproot ramose or not ramose. Rosette shoot with conspicuous subterranean portion with cataphylls. Cataphylls below leaf rosette numerous, ovate, long ovate, or narrowly lanceolate, 7–15 × 3–5 mm, apex acute. Above-ground leaves in a dense to loose rosette, with ± winged petiole-like 1.5–6 cm base; bladelike portion spatulate, broadly elliptic, or obovate, 2–3.5 × 0.4–1 cm, white villous or glabrous, base cuneate, margin entire or weakly dentate. Synflorescence flat to ± hemispheric, 3–5 cm in diam., with numerous closely crowded capitula. Capitula with 4 or 5 florets; peduncle 2–15 mm. Involucre narrowly cylindric, 10–15 × 2–3 mm. Outer phyllaries linear, shorter or longer than inner ones, ca. 1 mm wide, pilose; inner phyllaries 4 or 5, pilose or rarely glabrous, apex obtuse, acute, or rounded. Florets yellow or rarely white. Anther tube yellowish, reddish, or blackish. Style yellowish, greenish, or blackish. Achene brown, narrowly obconical, 5–8 mm, subequally ribbed and between main ribs usually with 3 or 4 secondary ribs, apex ± truncate. Pappus whitish or straw-colored and grayish apically, 7–11 mm. Fl. and fr. May–Sep. $2n = 16^*, 32^*$.

Meadows, scree slopes; 3200–5600 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang, Yunnan [N India, Kashmir, Nepal, Pakistan].

Soroseris glomerata is here treated in a wider sense, rather representing a complex, and including three little-known entities, *Soroseris bellidifolia*, *S. deasyi*, and *S. rosularis*. Variation, distribution, and delimitation of taxa (probably most appropriately on subspecies rank) in this complex are insufficiently known at present and in need of revision.

4. Soroseris pumila Stebbins, Mem. Torrey Bot. Club 19(3): 38. 1940.

矮小绢毛菊 ai xiao juan mao ju

Herbs, perennial, rosulate, with a taproot. Rosette shoot with conspicuous subterranean portion with cataphylls. Cataphylls below rosette leaves several to many, ovate to narrowly lanceolate and higher up linear, apex acute. Above-ground leaves in a dense rosette, often abaxially purplish, with a 1–5 cm petiole; leaf blade spatulate, 0.5–2.5 × 0.3–1 cm, ± pilose, base cuneate, margin coarsely dentate to shallowly pinnatifid, apex obtuse. Synflorescence flat to ± hemispheric, with numerous closely crowded capitula. Capitula with 4 florets; peduncle 2–10 mm. Involucre narrowly cylindric, 7–9 × 3–4 mm. Outer phyllaries ca. 2, linear, slightly longer than inner ones, pilose; inner phyllaries 4, apex obtuse to subacute. Florets yellow. Anther tube and style blackish. Achene brown, subfusiform, 3.5–4.5 mm. Pappus whitish to straw-colored and grayish apically, 8–10 mm.

Scree slopes; 4300–4900 m. S Xizang (Yadong) [Bhutan, India (Sikkim)].

5. Soroseris erysimoides (Handel-Mazzetti) C. Shih, Acta Phytotax. Sin. 31: 444. 1993.

空桶参 kong tong shen

Crepis gillii S. Moore var. *erysimoides* Handel-Mazzetti, Acta Horti Gothob. 12: 355. 1938; *Soroseris hookeriana* Stebbins subsp. *erysimoides* (Handel-Mazzetti) Stebbins.

Herbs, perennial, usually conspicuously caulescent, usually without scalelike leaves above root. Taproot long. Stem solitary, 5–30 cm tall, 1–2 cm in diam., erect, hollow, leafy. Leaves oblanceolate, lanceolate, elliptic, or linear, 2–11 × 0.2–1.5 cm, base long attenuate, margin entire and flat or undulate, apex obtuse to rounded; upper leaves on stem similar but gradually smaller, glabrous or ± pilose; uppermost leaves on stem subtending capitula and on peduncles reduced in size, almost linear, 15–20 × < 1 mm, glabrous to pilose. Synflorescence ± hemispheric, with numerous closely crowded capitula. Capitula with 4 florets; peduncle usually shorter than capitulum. Involucre narrowly cylindric, 7–12 × 2–3 mm. Phyllaries olive to dark green, glabrous or sparsely pilose; outer phyllaries ca. 2, similar to uppermost reduced leaves, mostly ± as long as to longer than inner ones; inner phyllaries 4. Florets yellow. Anther tube and style blackish. Achene brown, subfusiform to obcolumnar, 4–6 mm, subequally ribbed and between main ribs

usually with 2 or 3 secondary ribs. Pappus whitish to straw-colored and grayish apically, 7–11 mm. Fl. and fr. Jun–Oct. $2n = 16$*.

Alpine thickets, meadows, scree slopes; 3000–3500 m. Gansu, Qinghai, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India (Sikkim), Nepal].

The entire plant is used medicinally mainly for treating fractures.

Soroseris erysimoides is the most widespread and common species of the genus in China. It shares the conspicuously developed leafy stem with the following two species.

6. Soroseris hookeriana Stebbins, Mem. Torrey Bot. Club 19(3): 45. 1940.

皱叶绢毛菊 zhou ye juan mao ju

Crepis hookĕriana C. B. Clarke, Compos. Ind. 255. 1876, not Ball (1873); *C. gillii* S. Moore; *C. gillii* var. *hirsuta* J. Anthony; *C. trichocarpa* Franchet; *Soroseris gillii* (S. Moore) Stebbins; *S. gillii* subsp. *handelii* Stebbins; *S. gillii* subsp. *occidentalis* Stebbins; *S. hirsuta* (J. Anthony) C. Shih; *S. occidentalis* (Stebbins) Tzvelev; *S. trichocarpa* (Franchet) C. Shih.

Herbs, perennial, with a long taproot, usually without cataphylls above root, acaulescent and rosulate to conspicuously caulescent with a solitary stem. Stem (if present) to 10(–20) cm tall, erect, hollow, distally glabrous or white to brownish pilose, leafy. Leaves lanceolate to oblanceolate, 2–9 × 0.3–2 cm, shallowly pinnatifid to runcinately pinnatisect or very rarely most leaves undivided, glabrous to pilose, base long attenuate into a ± winged or unwinged petiole-like portion, margin flat or undulate, apex acute; lobes ± triangular, margin entire or sparsely dentate, apex acute; upper leaves on stem gradually smaller, mostly ± pilose; uppermost leaves on stem subtending capitula and on peduncles reduced, linear, pilose or more rarely glabrous, margin entire. Synflorescence ± hemispheric, with numerous closely crowded capitula. Capitula with 4 florets. Peduncle usually shorter than capitulum. Involucre narrowly cylindric, (8–)10–15(–17) × 2–3 mm. Phyllaries usually dark green, mostly pilose; outer phyllaries ca. 2, similar to uppermost reduced leaves, mostly ± as long as to longer than inner phyllaries; inner phyllaries 4, glabrous or abaxially pilose along midvein. Florets yellow, sometimes with blackish corolla tube and ligule base. Anther tube and style blackish. Achene brown, subfusiform to very narrowly obconic, 4–5 mm, subequally ribbed, between main ribs usually with 1 or 2(or 3) secondary ribs, often shortly acutely papillose, base attenuate, apex shorter or longer attenuate. Pappus whitish to straw-colored and mostly ± grayish apically, (0.7–)0.9–1.5 cm. Fl. and fr. Jul–Aug. $2n = 16$*.

Alpine meadows, scree slopes, rocky slopes, alpine thickets, rock crevices in glacial streams; 2800–5500 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal].

Stebbins (Mem. Torrey Bot. Club 19(3): 41. 1940) has already stated that delimitation between *Soroseris hookeriana* and *S. gillii* is problematic and may need reconsideration. It still can be agreed with Stebbins that delimitation of his former *S. hookeriana* subsp. *erysimoides* (now treated as a separate species *S. erysimoides*) from both the typical subspecies and *S. gillii* appears sound. On the basis of the richer material meanwhile available, Stebbins's delimitation of *S. gillii* (the correct name of which would actually be *S. trichocarpa*) from *S. hookeriana* subsp. *hookeriana*, however, fails, as does his infraspecific classification of the variation, mainly in the size of the involucres and in the indumentum, within *S. gillii*. Actually *S. gillii* and *S. hookeriana* belong to the same complex, widespread in W China, the subdivision of which (probably most appropriately at subspecies level) is in need of revision. Also included is *S. hirsuta*, based on *Crepis gillii* var. *hirsuta*, which separates the pilose plants of this complex and seems particularly artificial. For the time being, it appears at least a pragmatic solution to treat this complex as a single species.

7. Soroseris teres C. Shih, Acta Phytotax. Sin. 31: 447. 1993.

柱序绢毛菊 zhu xu juan mao ju

Herbs, perennial, conspicuously caulescent, without cataphylls above root. Taproot long. Stem solitary, 10–33 cm tall, 1–2 cm in diam., erect, hollow, leafy. Leaves narrowly elliptic, 4–13 × 1.5–3.5 cm, pinnatipartite to pinnatisect, glabrous or sparsely pilose, lobes ± triangular; upper stem leaves similar but gradually smaller and densely pilose. Synflorescence cylindric, elongate, to 13 cm, with numerous densely crowded capitula. Capitula with 4 florets. Peduncle < 10 mm. Involucre narrowly cylindric, 10–11 × 2–3 mm. Phyllaries dark green, densely pilose; outer phyllaries 2, linear, ca. 10 × 0.5 mm, yellow pilose; inner phyllaries 4, brown villous, apex obtuse. Florets yellow. Anther tube and style blackish. Achene cylindric to subfusiform, ca. 5 mm, subequally ribbed and between main ribs usually with 3 or 4 secondary ribs, apex truncate. Pappus whitish but grayish apically, 0.9–1.1 cm. Fl. and fr. Jul–Sep. $2n = 16$*.

Alpine meadows, thickets; 3900–4300 m. S Xizang (Yadong) [Bhutan].

81. HYPOCHAERIS Linnaeus, Sp. Pl. 2: 810. 1753.

猫儿菊属 mao er ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Achyrophorus Scopoli; *Trommsdorffia* Bernhardi.

Herbs, perennial or rarely annual, often rosulate, usually with rigid simple hairs. Stems solitary to few [or sometimes acaulescent], usually sparsely branched or more rarely simple, leafless or sparsely leafy. Synflorescence single-headed or weakly corymbiform with few to several capitula. Heads with ca. 20 to many florets. Involucre cylindric, narrowly campanulate, or broadly hemispheric. Phyllaries ± glabrous or hispid; outer phyllaries in several series, gradually longer centripetally, ± imbricate, often ca. 3/4 or more as long as inner ones; inner phyllaries ± linear-lanceolate to linear, ± equal in length. Receptacle with linear scarious scales ± as long as involucre and enclosing base of florets. Florets yellow or white. Achene mostly rather long, homomorphic or dimorphic; body cylindric to fusiform, with 5 muricate main ribs, with or without secondary ribs, with or more rarely without a

slender to capillaceous beak often longer than body. Pappus white or dirty white, with all bristles stiffly fimbriately plumose or inner ones plumose and outer ones scabrid.

About 60 species: Asia, Mediterranean region, South America; six species (four introduced) in China.

1a. Pappus of two series of bristles with inner ones plumose and outer ones scabrid.
2a. Florets slightly exceeding involucre; inner achenes beaked, marginal ones not beaked ..... 3. *H. glabra*
2b. Florets much exceeding involucre; both inner and marginal achenes beaked ..... 4. *H. radicata*
1b. Pappus of one series of plumose bristles.
3a. Florets slightly exceeding involucre; involucre cylindric to narrowly campanulate.
4a. Florets white; involucre glabrous; base of stem leaves not clasping ..... 5. *H. albiflora*
4b. Florets yellow; involucre ± hirsute; base of stem leaves ± clasping ..... 6. *H. chillensis*
3b. Florets much exceeding involucre; involucre broadly campanulate.
5a. Stem usually leafless except for 1–3 smaller leaves, simple or sparingly branched; capitula 1–3; outer phyllaries linear-lanceolate; achene long beaked ..... 1. *H. maculata*
5b. Stem regularly leafy, simple; capitulum always 1; outer phyllaries ovate to broadly lanceolate; achene beakless ..... 2. *H. ciliata*

1. Hypochaeris maculata Linnaeus, Sp. Pl. 2: 810. 1753.

新疆猫儿菊 xin jiang mao er ju

Achyrophorus maculata (Linnaeus) Scopoli; *Trommsdorffia maculata* (Linnaeus) Bernhardi.

Herbs 30–120 cm tall, perennial, rosulate, with a taproot. Stem erect, simple or sparingly branched, hirsute, leafless or with 1(–3) leaves, base with dark brown residues of old leaf bases. Rosette leaves subovate, lanceolate, elliptic, or oblanceolate, 6–15 × 2–4 cm, often with reddish brownish blotches, hispidulous, basally ± attenuate, margin sinuate-dentate to subentire, apex obtusely rounded to acute. Stem leaf or leaves if any narrowly lanceolate to lanceolate, smaller than rosette leaves otherwise similar. Capitula 1–3, terminal, long pedunculate, with many florets. Involucre broadly campanulate to hemispheric, 1.5–2 × 1–2.5 cm. Outer phyllaries linear-lanceolate, hirsute, apex acute; inner phyllaries lanceolate, abaxially glabrous, apex acuminate. Florets yellow. Achene to 2 cm; body pale brown, ± fusiform, with 5 ribs, rugose, apically attenuate into a slender beak as long as or slightly longer than body. Pappus 7–12 mm, all bristles plumose. Fl. and fr. Jun–Aug. $2n$ = 10, 20.

Grassy slopes in mountainous regions, river valleys, forests, forest margins; above 1000 m. Xinjiang [Russia; Europe].

2. Hypochaeris ciliata (Thunberg) Makino, Bot. Mag. (Tokyo) 22: 37. 1908.

猫儿菊 mao er ju

Arnica ciliata Thunberg in Murray, Syst. Veg., ed. 14, 768. 1784; *Achyrophorus aurantiacus* Candolle; *A. ciliatus* (Thunberg) Schultz Bipontinus; *A. grandiflorus* (Ledebour) Ledebour; *Hypochaeris grandiflora* Ledebour; *Trommsdorffia ciliata* (Thunberg) Soják.

Herbs 20–60 cm tall, perennial, with a taproot. Stem erect, simple, glabrous or entirely or only basal half covered with rigid bristles, leafy, base with dark brown residue of old leaf bases. Basal leaves rosulate, elliptic, narrowly elliptic, or oblanceolate, 9–20 × 2–2.5 cm, scabrid, attenuate into winged petiole-like basal portion of 2–5 cm, margin ± sharply dentate, apex acute to rounded. Lower stem leaves similar to basal leaves; middle and upper stem leaves sessile, elliptic to ovate, smaller, ± sparsely arachnoid hairy, basally ± truncate and ± auriculately clasping, margin finely dentate, otherwise similar to lower leaves. Capitulum solitary, terminal on stem, with many florets. Involucre broadly campanulate to hemispheric, 1.5–2.5 × 1.5–2.5 cm. Phyllaries with ciliate margin and sparsely arachnoid hairy; outer phyllaries ovate to broadly lanceolate, conspicuously imbricate; inner phyllaries lanceolate. Florets golden yellow. Achene pale brown, cylindric, ca. 8 mm, with 15 ribs, apex slightly attenuate and truncate. Pappus ca. 1.5 cm, all bristles plumose. Fl. and fr. Jun–Sep. $2n$ = 10.

Grasslands on mountain slopes, forest margins, trailsides, thickets; 800–1200 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shanxi [Korea, Mongolia, E Russia].

3. Hypochaeris glabra Linnaeus, Sp. Pl. 2: 811. 1753.

光猫儿菊 guang mao er ju

Herbs 10–30 cm tall, annual, rosulate. Stems 1 or few, ascending to erect, simple or apically sparsely branched, glabrous, leafless or with few triangular-ovate bracts. Rosette leaves obovate to oblanceolate, 3–5 × 0.5–1.5 cm, subglabrous to hispidulous, base narrowed, margin sinuate-dentate, apex rounded to subacute. Synflorescence single-headed or weakly corymbiform with few to several capitula. Capitulum with usually 20–40 florets; peduncle long. Involucre cylindric to narrowly campanulate, 7–10 × 3–4 mm at anthesis, 1.3–1.5 mm in fruit. Phyllaries ± glabrous; outer phyllaries lanceolate; inner phyllaries linear-lanceolate. Florets yellow, slightly longer than involucre. Achene brown, dimorphic; outer achenes cylindric, 3–4 mm, ribbed, muricate, truncate; inner achenes with fusiform body, 3–4 mm, ribbed, muricate, beak capillaceous and as long as or longer than body. Pappus 7–8 mm, inner bristles plumose, outer bristles scabrid and shorter. Fl and fr. Mar–Apr. $2n$ = 10.

Roadsides, waste places; near sea level to 100 m. Naturalized in W Taiwan [native to N Africa and Europe].

Hypochaeris glabra has also been introduced to E and S Africa, S and SW Asia, Australia, Japan, North and South America, and Pacific islands (New Zealand).

The species was first collected in Taiwan in 2007 (M. J. Jung et al., Taiwania 53: 230. 2008). No material has been seen from Taiwan by the present authors. The description is based on the publication by the above authors and material from outside the area.

4. Hypochaeris radicata Linnaeus, Sp. Pl. 2: 811. 1753.

假蒲公英猫儿菊 jia pu gong ying mao er ju

Herbs 15–60 cm tall, perennial, rosulate, with a taproot. Stems few to several, ascending to erect, simple or apically branched, leafless except for few to several bracts. Rosette leaves oblanceolate, (4–)8–15(–30) × 1–3(–7.5) cm, undivided or pinnatifid, base narrowed, margin sinuate-dentate, apex rounded to subacute. Synflorescence sparsely corymbiform, with few to several capitula. Capitula with rather many florets; peduncle long. Involucre cylindric to narrowly campanulate, 1–1.5 × 0.4–0.6 cm at anthesis, to 2 cm in fruit. Phyllaries minutely ciliolate at apex and ± hispid on midrib or glabrous; outer phyllaries lanceolate, bluntly tipped; inner phyllaries linear-lanceolate. Florets bright yellow, much exceeding involucre. Achene brown; body cylindric, 3–7 mm, ribbed, muricate; beak capillaceous, 7–10 mm but outer ones sometimes with a shorter beak. Pappus 0.9–1.3 cm, inner bristles plumose, outer bristles ± scabrid and shorter. Fl and fr. Aug–Oct. $2n = 8$*.

Meadows, trailsides, around mountain farms; 1700–3300 m. Naturalized in Taiwan and also present in Yunnan (Kunming, ?ephemeral) [native to N Africa and Europe].

Hypochaeris radicata has also been introduced to S and SE Africa, S and SE Asia, Australia, N India, Japan, North and South America, and Pacific islands (New Zealand).

This species was first recorded from Taiwan in 1974 (C. I Peng, Bot. Bull. Acad. Sin. 19: 84. 1978). In Yunnan, it was collected in Kunming in 2009 (*J. W. Zhang 1001*!); its status there is unknown. The description is based essentially on Fl. Taiwan (ed. 2, 4: 991. 1998).

5. Hypochaeris albiflora (Kuntze) Azevêdo-Gonçalves & Matzenbacher, Compositae Newslett. 42: 3. 2005.

白花猫儿菊 bai hua mao er ju

Hypochaeris brasiliensis (Lessing) Bentham & J. D. Hooker ex Grisebach var. *albiflora* Kuntze, Revis. Gen. Pl. 3(3): 159. 1898; *H. microcephala* (Schultz Bipontinus) Cabrera var. *albiflora* (Kuntze) Cabrera.

Herbs 20–50 cm tall, perennial, rosulate, with a taproot. Stem erect, apically sparsely branched, glabrous or sparsely hirsute, leafy. Rosette leaves narrowly elliptic to oblanceolate, 4–10 × 1–5 cm, undivided with sinuate-dentate margin to pinnatisect with entire margin, both surfaces glabrous to sparsely villous, base narrow, apex obtuse to acute; lateral and terminal lobes linear-lanceolate if present. Stem leaves few, smaller, pinnatisect with few lobes or undivided and linear-lanceolate, otherwise similar to rosette leaves. Synflorescence corymbiform, with few to several capitula. Capitula with usually 20–40 florets; peduncle long. Involucre cylindric to narrowly campanulate, 0.8–1.2 × 0.3–0.4 cm at anthesis, 1.5–1.8 cm in fruit. Phyllaries glabrous; outer phyllaries lanceolate; inner phyllaries linear-lanceolate. Florets white, slightly longer than involucre. Achene brown; body fusiform, ca. 4 mm, ribbed and muricate; beak capillaceous, 4–5 mm. Pappus 7–8 mm, all bristles plumose. Fl and fr. Apr–May. $2n = 8$.

Grassy areas of parks and urban areas, roadsides; near sea level to 200 m. Naturalized in N Taiwan [native to SE South America].

Hypochaeris albiflora has also been introduced to S Africa, E Australia, and SE North America.

This species was first recorded in 2005 and has spread since (M. J. Jung et al., Taiwania 54: 391–398. 2009, as *Hypochaeris microcephala* var. *albiflora*). No material has been seen from Taiwan by the present authors. The description is based on the publication by the above authors and supplemented with material from outside the area.

6. Hypochaeris chillensis (Kunth) Britton, Bull. Torrey Bot. Club 19: 371. 1892.

智利猫儿菊 zhi li mao er ju

Apargia chillensis Kunth in Humboldt et al., Nov. Gen. Sp. 4, ed. f°: 2. 1818; *Achyrophorus brasiliensis* (Lessing) Schultz Bipontinus; *A. chillensis* (Kunth) Schultz Bipontinus; *Hypochaeris brasiliensis* (Lessing) Bentham & J. D. Hooker ex Grisebach; *Porcellites brasiliensis* Lessing.

Herbs 20–50(–?) cm tall, perennial, rosulate, with a taproot. Stem erect, apically sparsely branched, glabrous or hirsute basally, leafy. Rosette leaves narrowly elliptic, lanceolate, or oblanceolate, 5–10(–?) × 1–2(–?) cm, undivided and margin coarsely sinuate-dentate and ciliate or pinnatifid with triangular to lanceolate lobes, abaxially sparsely pubescent on midrib, adaxially glabrous, base narrow, apex acute to acuminate. Stem leaves few, smaller, narrower, undivided, base ± clasping, otherwise similar to rosette leaves. Synflorescence corymbiform, with few to several capitula. Capitula with many (> 50) florets; peduncle long. Involucre cylindric to narrowly campanulate, 0.9–1.2 × 0.4–0.6 cm at anthesis, 1.5–1.8 cm in fruit. Phyllaries hirsute; outer phyllaries lanceolate to linear-lanceolate; inner phyllaries linear-lanceolate. Florets yellow, slightly longer than involucre. Achene brown; body fusiform, 4–5 mm, ribbed and muricate; beak capillaceous, 4–5 mm. Pappus 4–7 mm, all bristles plumose. Fl and fr. Jun–Jul. $2n = 8$.

Roadsides; 500–600 m. Naturalized in N Taiwan [native to SE South America].

Hypochaeris chillensis has also been introduced to S Africa and SE North America.

This species was first recorded in 2009 (M. J. Jung et al., Taiwania 55: 412–416. 2010). No material has been seen from Taiwan by the present authors. The description is based on the publication by the above authors and supplemented with material from outside the area.

82. PICRIS Linnaeus, Sp. Pl. 2: 792. 1753.

毛连菜属 mao lian cai shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Deckera Schultz Bipontinus; *Hagioseris* Boissier; *Medicusia* Moench; *Spitzelia* Schultz Bipontinus.

Herbs, annual or perennial, rosulate or not, with rigid 2[–4]-hooked or more rarely simple hairs. Stem solitary, usually branched,

rarely stems few, low, and weak. Synflorescence corymbiform but sometimes weakly so. Capitula with usually 20–50 florets. Involucre campanulate to urceolate. Phyllaries ± glabrous or hispid; outer phyllaries in several series, gradually longer centripetally, ± imbricate, mostly 1/2–2/3 as long as inner ones; inner phyllaries ± linear-lanceolate to linear, ± equal in length. Receptacle naked. Florets yellow. Achene ± homomorphic; body fusiform to narrowly ellipsoid, often somewhat curved, with 5 faintly secondarily ribbed main ribs, transversely wrinkled, apically truncate or contracted into a short beak sculptured as body (= cuspis). Pappus white or dirty white, of stiffly fimbriately plumose bristles, often outermost bristles shorter and ± scabrid [in marginal achene sometimes reduced to a minute crownlike structure].

About 50 species: Africa, Asia, Australia, Europe; seven species (four endemic) in China.

Picris has a primary center of diversity including SW Asia and the Mediterranean region and a secondary center in Australia (S. Holzapfel, Willdenowia 24: 97–218. 1994). In C, E, and S Asia the genus is in urgent need of a modern revision, especially with respect to the complex of *P. hieracioides*, which poses particular problems because of it being anthropogenically spread. For the time being, *P. hieracioides* is treated here, in contrast to S. Kitamura (Acta Phytotax. Geobot. 8: 123–127. 1939; Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 22: 90–98. 1955) and, e.g., Fl. Taiwan (ed. 2, 4: 1032. 1998), in a narrow sense, with *P. japonica* as well as the two taxa endemic to Taiwan kept as separate species. This solution has been chosen for the sake of consistency, because including the Taiwan endemics as subspecies in *P. hieracioides* while keeping *P. japonica* separate, as in FRPS (80(1): 54–55. 1997), would imply an unintended taxonomic decision on the relationships of the Taiwan endemics. Moreover, the actual presence of *P. hieracioides* s.s. in E and S Asia and the delimitation between *P. japonica* and *P. hieracioides* need thorough reassessment, and the currently available distributional data are to be taken with caution.

1a. Leaves all basal or subbasal and usually rosulate; plants branched from base, without dominant main stem.
2a. Involucre 1.5–1.7 cm; stems with yellowish green 2-hooked hairs; achene apex contracted into a cusp of ca. 1 mm ..... 4. *P. ohwiana*
2b. Involucre ca. 1 cm; stems with white 2-hooked hairs; achene apex truncate ..... 5. *P. divaricata*
1b. Leaves both basally rosulate and on stem; plants usually with a solitary stem, branched mostly higher up.
3a. Stem especially basally covered with reddish to blackish purplish long mostly simple and few 2-hooked hairs; involucre 1.5–1.7 cm ..... 7. *P. junnanensis*
3b. Stem covered with mostly 2-hooked hairs; involucre to 1.5 cm.
4a. Stem covered with dark green or blackish 2-hooked hairs ..... 1. *P. japonica*
4b. Stem covered with whitish 2-hooked hairs.
5a. Achene apex truncate ..... 2. *P. hieracioides*
5b. Achene apex contracted into a 0.3–0.5 mm cusp.
6a. Lower leaves linear-lanceolate, 0.5–0.8(–1.1) cm wide ..... 3. *P. morrisonensis*
6b. Lower leaves narrowly oblong-elliptic to lanceolate, 1.5–2 cm wide ..... 6. *P. nuristanica*

1. Picris japonica Thunberg in Murray, Syst. Veg., ed. 14, 711. 1784.

日本毛连菜 ri ben mao lian cai

Aster esquirolii H. Léveillé; *Picris davurica* Fischer ex Hornemann; *P. davurica* var. *koreana* (Kitamura) Kitagawa ex Kitamura; *P. hieracioides* Linnaeus subsp. *japonica* (Thunberg) Krylov; *P. hieracioides* subsp. *koreana* (Kitamura) Voroschilov; *P. japonica* var. *koreana* Kitamura; *P. koreana* (Kitamura) Voroschilov; *P. mairei* H. Léveillé.

Herbs 30–120 cm tall, short-lived perennial, with a taproot. Stem erect, branched mostly apically, hirsute with dark green to blackish rigid 2-hooked hairs, leafy. Basal leaves (withered at anthesis) and lower stem leaves oblanceolate, elliptic-lanceolate, or elliptic-oblanceolate, 12–20 × 1–3 cm, both surfaces with rigid 2-hooked hairs, basally attenuate into a petiole-like portion, margin sharply dentate to sinuate-dentate, apex acute to acuminate. Middle stem leaves sessile, lanceolate, base semiamplexicaul, smaller but otherwise like lower stem leaves. Upper stem leaves linear-lanceolate. Synflorescence corymbiform to paniculately corymbiform, with many capitula. Peduncle slender, hirsute like stem and branches. Involucre cylindric-campanulate to ovoid, 1–1.2 cm. Phyllaries green to blackish green, abaxially darkish to dark hirsute with 2-hooked hairs mainly along midrib, apex acute to acuminate; outer and inner phyllaries linear-lanceolate. Florets yellow. Achene reddish brown, fusiform, 3–5 mm, apex truncate. Pappus ca. 7 mm, caducous. $2n = 10$*.

Grasslands on mountain slopes, forests, open places in forests, waste places in forests, by fields, river margins, alpine meadows; 600–3700 m. Anhui, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang [Japan, Kazakhstan, Mongolia, E Russia].

According to V. N. Vassiljev (Fl. URSS 29: 221–222. 1964), *Picris japonica* can, moreover, be distinguished from *P. hieracioides* by the ligule of the corolla being less than 2 × as long as the tube, whereas it is 2–3 × as long as the tube in the latter species.

2. Picris hieracioides Linnaeus, Sp. Pl. 2: 792. 1753.

毛连菜 mao lian cai

Hedypnois hieracioides (Linnaeus) Hudson; *Picris hieracioides* subsp. *tsekouensis* Kitamura.

Herbs 16–120 cm tall, annual or short-lived perennial. Taproot stout. Stem erect, branched especially in apical third, hirsute with spreading rigid 2-hooked hairs, leafy. Basal leaves (withered before flowering) and lower stem leaves narrowly elliptic to broadly lanceolate, 8–20 × 2–4 cm, adaxially and especially on veins with spreading rigid 2-hooked hairs, base attenuate into a winged petiole-like portion, margin entire to coarsely and sharply dentate, apex acuminate, acute, or obtuse. Middle and upper stem leaves sessile, lanceolate to linear,

smaller, base semiamplexicaul to clasping, margin less dentate or entire, otherwise similar to lower stem leaves. Synflorescence corymbiform to corymbosely paniculiform, with some to many capitula. Peduncle slender. Involucre cylindric-campanulate to ovoid, 0.9–1.2 cm. Phyllaries abaxially with whitish rigid 2-hooked hairs along midrib; outer and inner phyllaries ± linear-lanceolate, apex acute to acuminate. Florets yellow. Achene brown, fusiform, 3–5 mm, apex truncate. Pappus 5–6 mm, caducous. Fl. and fr. Jun–Oct. $2n = 10$.

Grasslands, mountain slopes, forests, along ditches, fields, wastelands, sandy soils; 200–3600 m. Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jilin, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan [Bhutan, N India, Kashmir, Kazakhstan, W Russia, Vietnam; SW Asia, Europe, Mediterranean region].

Picris hieracioides has also been introduced to SE Africa and North America.

Delimitation between *Picris hieracioides*, *P. japonica*, and other Asian species of the genus needs urgent revision, even with respect to the actual presence of this species in China; see also note to the genus, above. Hence, the above data are to be taken with caution. See also the note under *P. japonica*. Presence in China and the status of *P. hieracioides* subsp. *kaimaensis* Kitamura, said to occur in the Himalaya as well as in NE Asia (Korea, Mongolia), need evaluation in the context of a revision of the *P. hieracioides* complex in E Asia.

3. Picris morrisonensis Hayata, Icon. Pl. Formosan. 8: 72. 1919.

台湾毛连菜 tai wan mao lian cai

Picris hieracioides Linnaeus subsp. *morrisonensis* (Hayata) Kitamura.

Herbs 20–70 cm tall, perennial, erect, with a taproot. Stem mostly solitary, erect, branched especially apically, hirsute with spreading rigid 2-hooked hairs, leafy. Basal and lower stem leaves narrowly elliptic to narrowly lanceolate, 6–16 × 0.5–0.8(–1.1) cm, hirsute with spreading rigid 2-hooked hairs, base attenuate, margin coarsely to shallowly sinuate-dentate, apex acuminate. Middle and upper stem leaves smaller than lower and basal stem leaves, otherwise similar, narrowly lanceolate to linear-lanceolate, base truncate, apex obtuse to acuminate. Synflorescence loosely corymbiform, with several to many capitula. Peduncle usually 3–7 cm, slender, hirsute as stem and branches. Involucre cylindric-campanulate to ovoid, 0.9–1.2 cm. Phyllaries with spreading rigid 2-hooked hairs along midrib, apex acute to acuminate; outer and inner phyllaries linear-lanceolate. Florets yellow. Achene reddish brown, fusiform, 4–5 mm, apex contracted into a ca. 0.5 mm cusp. Pappus 5–7 mm. Apr–Nov. $2n = 10$*.

• Mountain meadows, open sites in mountains; 1400–3500 m. Taiwan.

4. Picris ohwiana Kitamura, Acta Phytotax. Geobot. 3: 136. 1934.

黄毛毛连菜 huang mao mao lian cai

Picris hieracioides Linnaeus subsp. *ohwiana* (Kitamura) Kitamura.

Herbs 7–20 cm tall, perennial, rosulate, with a taproot. Stem divaricately branched from base, hirsute with yellowish green rigid 2-hooked hairs, leafless to sparsely leafy. Rosette leaves lanceolate to oblanceolate, 3–9 × 0.5–2 cm, both surfaces hirsute, basally attenuate into a winged petiole-like portion, margin irregularly sinuate-dentate, apex obtuse to acute. Stem leaves similar to rosette leaves but somewhat smaller and basally truncate; upper stem leaves reduced to linear-lanceolate bracts. Synflorescence loosely corymbiform, with few to several capitula. Peduncle usually 3–6 cm, slender, hirsute as stem and branches. Involucre cylindric-campanulate to ovoid, 1.5–1.7 cm. Phyllaries abaxially with yellowish green rigid 2-hooked hairs along midrib; outer phyllaries blackish green, linear-lanceolate, unequal, apex acute to acuminate; inner phyllaries green, linear-lanceolate, apex acute to acuminate. Florets yellow. Achene reddish brown, fusiform, 5–6 mm, apex contracted into a ca. 0.5 mm cusp. Pappus 7–8 mm, caducous. Apr–Sep. $2n = 10$*.

• Subalpine open stony or rocky places; above 3400 m. Taiwan (Daguan Shan, Nanhu Dashan).

5. Picris divaricata Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 28. 1903.

滇苦菜 dian ku cai

Hypochaeris mairei H. Léveillé.

Herbs 10–40 cm tall, short-lived perennial. Stems few to several, weak, erect, divaricately branched from base, with whitish rigid small 2-hooked hairs, glabrescent or glabrous toward apex. Basal leaves oblanceolate-elliptic, narrowly elliptic, or linear-elliptic, 3–10 × 0.5–2 cm, with short rigid simple and hooked rigid hairs especially on midvein, basally attenuate into a winged petiole-like portion, base cuneate-attenuate, margin sinuate-dentate or entire, apex acute, obtuse, or rounded. Stem leaves few, subbasal, sessile, broadly linear to narrowly elliptic-oblanceolate, small, with sparse simple rigid hairs especially on abaxial midvein, base semiamplexicaul, otherwise like basal leaves. Capitula 1 or 2 per stem. Involucre cylindric to narrowly campanulate, 9–10 mm. Phyllaries arachnoid hairy and with sparse rigid hooked hairs on midvein; outer phyllaries narrowly triangular to lanceolate, apex acute; inner phyllaries linear-lanceolate, apex acute. Florets yellow. Achene reddish brown, narrowly ellipsoid, 4–5 mm, apex contracted into a tiny cuspis. Pappus 6–7 mm. Fl. and fr. Apr–Nov.

• Grasslands on mountain slopes, forest margins, thickets; 1400–3200 m. Xizang, Yunnan.

6. Picris nuristanica Bornmüller, Repert. Spec. Nov. Regni Veg. Beih. 108: 68. 1938.

新疆毛连菜 xin jiang mao lian cai

Picris afghanica K. H. Rechinger & Köie; *P. hieracioides* Linnaeus var. *indica* Candolle; *P. hieracioides* subsp. *nuristanica* (Bornmüller) Kitamura; *P. nuristanica* var. *indica* (Candolle) Tzvelev; *P. similis* V. N. Vassiljev.

Herbs (10–)30–100 cm tall, annual or short-lived perennial. Stem erect, branched especially in apical portion, leafy; branches spreading-erect, ± densely covered with whitish 2-hooked hairs. Basal leaves narrowly oblong-elliptic to lanceolate, 8–12 × 1.5–2 cm, both surfaces with whitish rigid 2-hooked hairs, basally attenuate into a winged petiole-like portion, margin entire or sinuate-dentate, apex acuminate. Lower

stem leaves sessile, otherwise similar to basal leaves; middle and upper stem leaves linear-lanceolate, margin ± entire. Synflorescence sparsely corymbiform, with few to some capitula. Involucre cylindric to narrowly campanulate, 1–1.5 cm. Phyllaries dark green, arachnoid hairy and with whitish rigid 2-hooked hairs; outer phyllaries small; inner phyllaries linear-lanceolate, margin membranous. Florets yellow. Achene fusiform, 5–6(–7) mm, apex contracted into a ca. 0.3 mm cuspis. Pappus ca. 6 mm, caducous. Fl. and fr. Jun–Sep. $2n = 10$.

Rocky mountain slopes, sandy areas on floodplains; 1600–1700 m. Xinjiang [Afghanistan, Kashmir, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan].

7. Picris junnanensis V. N. Vassiljev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 457. 1955.

云南毛连菜 yun nan mao lian cai

Picris hieracioides Linnaeus subsp. *fuscipilosa* Handel-Mazzetti.

Herbs 30–60(or more?) cm tall, annual or biennial. Stem erect, branched apically, densely covered with reddish to blackish purplish long rigid mostly simple partly 2-hooked hairs, leafy. Basal and lower stem leaves few, linear-lanceolate to linear, abaxially with simple rigid hairs, basally attenuate, margin sparsely dentate to sinuate-dentate. Middle and upper stem leaves similar to basal and lower stem leaves but smaller, lanceolate, basally truncate, wider, and clasping. Synflorescence sparsely corymbiform, with few to some capitula. Peduncle slender with dark long rigid simple hairs. Involucre 1.5–1.7 cm. Phyllaries blackish green, with dark long simple hairs, margin cartilaginous; outer phyllaries linear to linear-lanceolate; inner phyllaries linear-lanceolate. Florets yellow. Achene fusiform, 4–5 mm, apex truncate. Pappus ca. 5 mm. Fl. and fr. Jun–Sep.

• Grasslands, mountain slopes, forests; 2900–3500 m. Xizang, Yunnan.

83. CICHORIUM Linnaeus, Sp. Pl. 2: 813. 1753.

菊苣属 ju ju shu

Shi Zhu (石铸 Shih Chu); Norbert Kilian

Acanthophyton Lessing.

Herbs, perennial, [biennial or annual]. Stem usually solitary, branched in lower half. Involucre cylindric, hardened in fruit. Phyllaries in several series; outer phyllaries centripetally longer, imbricate; inner phyllaries in one row, equal in length. Receptacle naked. Florets bright blue. Achene subcylindric to obovoid, ± 3–5-angular, apex truncate. Pappus white, a tiny crown of fimbriate scales.

About seven species: N Africa, SW Asia, S Europe; one species (introduced) in China.

Two species, *Cichorium endivia* Linnaeus and *C. intybus*, are widely cultivated as a leafy vegetable in China; the latter is also widespread in China as a ruderal weed and in other temperate and semiarid regions of the world.

1. Cichorium intybus Linnaeus, Sp. Pl. 2: 813. 1753.

菊苣 ju ju

Herbs 40–110 cm tall, perennial, with a strong taproot. Stem usually solitary, erect; branches spreading-ascending, subglabrous. Basal leaves rosulate, obovate to oblanceolate, 15–34 × 2–4 cm, attenuate into a petiole-like basal portion, undivided to usually runcinately pinnatipartite, sparsely covered with long multicellular hairs, base attenuate, margin dentate; lateral lobes 3–6 pairs, triangular; terminal lobe distinctly larger than lateral ones, apex rounded to acute. Stem leaves similar to basal leaves but smaller and less divided, gradually reduced toward stem apex, base clasping, apex acute. Synflorescence of main axis and larger branches spiciform-paniculiform. Capitula axillary and terminal, solitary or in clusters of a few, sessile or on a several cm long, thick, and apically slightly inflated peduncle, with usually 15–20 florets. Involucre cylindric, 0.9–1.4 cm. Phyllaries abaxially sparsely with glandular or simple hairs, apex ± acute; outer phyllaries lanceolate, longest > 1/2 as long as to approaching inner ones in length, spreading-erect, margin ciliate; inner phyllaries linear-lanceolate. Florets blue or exceptionally pink or bluish white. Achene brown, subcylindric to obovoid, 2–3 mm, stout, rugulose, apex truncate. Pappus (0.1–)0.2–0.3 mm. Fl. May–Oct. $2n = 18$.

By rivers, wastelands along seashores, slopes, by ditches; low elevations. ?Gansu, Hebei, Heilongjiang, Henan, ?Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang [N Africa, C and SW Asia, Europe].

Escaped as a ruderal weed in many parts of the world, this species was formerly cultivated as a medicinal plant but more recently is grown as an ornamental and coffee substitute.

A second species, *Cichorium pumilum* Jacquin (as *C. glandulosum* Boissier & A. Huet) was reported for Xinjiang (Y. P. Gu & Y. S. Chen, Fl. Tsinling. 1(5): 391. 1985; C. H. An, Fl. Xinjiang. 5: 386. 1999). The presence of this Mediterranean–SW Asian species is highly unlikely, and, as also concluded by Tzvelev (Rast. Tsentral. Azii 14b: 14. 2008), the description ("pappus scales ca. 0.1 mm") refers to populations within the range of variation of *C. intybus* (including *C. glaucum* Hoffmannsegg & Link; see also A. M. Kiers, Gorteria, Suppl. 5. 2000).

84. HIERACIUM Linnaeus, Sp. Pl. 2: 799. 1753.

山柳菊属 shan liu ju shu

Shi Zhu (石铸 Shih Chu); Günter Gottschlich

Herbs, perennial. Stem solitary to few fascicled, branched or unbranched. Leaves petiolate or sessile, margin entire, deeply

toothed, or rarely lobed. Basal leaves rosulate, withered at anthesis, or absent. Stem leaves few to numerous [or 1 or reduced and bractlike or absent]. Synflorescence corymbiform, paniculiform, racemiform, or pseudocymiform, sometimes capitulum solitary. Capitula with numerous florets. Involucre campanulate, or basally turbinate, (0.8–)0.9–1.2[–2] cm. Phyllaries in several irregularly or regularly imbricate rows, linear-lanceolate. Florets yellow [or rarely white]. Achene cylindric, ellipsoid, or narrowly obconic, 2.5–5 mm, with 8–10[–14] equal ribs apically confluent in an obscure ring, apex truncate. Pappus white, dirty white, dirty yellow, or pale yellowish brown, of scabrid bristles.

About 800 species (broad species concept) with over 5,000 apomictic taxa (described as microspecies or subspecies): N Africa, Asia, Europe, North and South America; six species (one endemic) in China.

Hieracium hololeion has been shown by molecular phylogenetic analyses (see N. Kilian et al. in V. A. Funk et al., Syst. Evol. Biogeogr. Compositae, 352–353. 2009) to be a member of subtribe Crepidinae (see there under *Hololeion*). Also *Hieracium coreanum*, as was first stated by H. S. Pak (Fl. Coreana 7: 378. 1999) and Sennikov and I. D. Illarionova (Bot. Zhurn. 86(3): 37–59. 2001), is actually a member of subtribe Crepidinae, belonging to *Crepis*.

1a. Basal and lower stem leaves absent at anthesis.
2a. Middle stem leaves lanceolate to narrowly linear, 0.5–2 cm wide, base cuneate ..... 1. *H. umbellatum*
2b. Middle stem leaves mainly ovate, 1.5–5 cm wide, base rounded or cordate and amplexicaul.
3a. Base of stem leaves cordate and amplexicaul; leaves often with rigid simple hairs on margin ..... 2. *H. virosum*
3b. Base of stem leaves rounded; leaves glabrous or with few rigid simple hairs on margin ..... 3. *H. robustum*
1b. Basal leaves withered at anthesis or present in fruit.
4a. Basal leaves withered at anthesis; phyllaries abaxially with capitate stipitate glandular hairs ..... 6. *H. regelianum*
4b. Basal leaves present in fruit; phyllaries abaxially without or with capitate stipitate glandular hairs.
5a. Phyllaries abaxially with sparse stellate hairs to 0.3 mm and with moderate simple hairs ..... 4. *H. korshinskyi*
5b. Phyllaries abaxially with dense capitate stipitate glandular hairs to 1 mm but simple hairs lacking ..... 5. *H. morii*

1. Hieracium umbellatum Linnaeus, Sp. Pl. 2: 804. 1753.

山柳菊 shan liu ju

Hieracium coronopifolium Bernhardi ex Hornemann; *H. sinense* Vaniot; *H. umbellatum* subsp. *coronopifolium* (Bernhardi ex Hornemann) Fries; *H. umbellatum* var. *coronopifolium* (Bernhardi ex Hornemann) Komarov; *H. umbellatum* var. *mongolicum* Fries; *H. umbellatum* f. *scabrum* Komarov.

Herbs, perennial, 30–100 cm tall. Stem solitary to few fascicled, basally pale purple, branched apically, glabrous, scabrid, or very sparsely and minutely echinulate and with white minutely stellate hairs, rarely with long simple hairs, under capitula with minute stellate and somewhat rigid short simple hairs. Basal and lower stem leaves absent at anthesis. Middle and upper stem leaves sessile, lanceolate, 3–10 × 0.4–2 cm, glabrous or abaxially hispidulous on veins and adaxially with sparse arachnoid hairs, base narrowly cuneate, margin entire, subentire, or with sparse and sharp teeth, apex acute to shortly acuminate. Upper stem leaves similar to middle stem leaves but gradually smaller. Synflorescence corymbiform to corymbosely paniculiform, with few to numerous capitula or rarely with solitary capitulum. Involucre dark green, campanulate, ca. 1.5 cm in diam. Phyllaries in several [to many] rows, abaxially rarely with capitate stipitate glandular hairs on midvein, abaxially glabrous, base sometimes with minute stellate hairs, apex acute; outermost and outer phyllaries lanceolate, 3.5–4.5 × 0.8–1.2 mm; innermost phyllaries ± linear-lanceolate, 8–10 × ca. 1 mm. Florets yellow. Achene dark purple, cylindric, ca. 3 mm, with 10 ribs. Pappus pale yellow, ca. 6 mm. Fl. and fr. Jul–Sep. $2n$ = 18, 27.

Forest margins, forests, dense grassy areas, sandy soils on floodplains, clear-cuttings; (200–)1000–3000(–3300) m. Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [India, Japan, Kazakhstan, Mongolia, Pakistan, Russia, Uzbekistan; SW Asia, Europe, North America].

2. Hieracium virosum Pallas, Reise Russ. Reich. 1: 501. 1771.

粗毛山柳菊 cu mao shan liu ju

Hieracium prostratum Candolle; *H. sabaudum* Pallas.

Herbs, perennial, 40–80[–120] cm tall, with thick rhizomes. Stem solitary to few fascicled, basally purple, stout, erect, glabrous or basally with sparse to moderate simple hairs, apically branched. Stem leaves (10–)25–40[–80], basal and lower stem leaves absent at anthesis. Middle stem leaves sessile, ovate, ovate-lanceolate, narrowly elliptic-lanceolate, or narrowly elliptic, 5–8 × 1.5–5 cm, glaucescent, abaxially pale green and distinctly reticulately veined, margin or only abaxial veins with dense to sparse ± setose simple hairs, base cordate and amplexicaul, margin entire or with sparse and sharp teeth, apex acute to shortly acuminate. Upper stem leaves similar to middle stem leaves but gradually smaller. Synflorescence shortly corymbiform to long paniculiform, with (10–)15–50(–80) capitula. Peduncle glabrous. Involucre campanulate or basally turbinate, 0.9–1.1 cm. Phyllaries in few rows, green or dark green, abaxially glabrous, apex obtuse to acute; outer phyllaries lanceolate, linear, or broadly linear, ca. 3 × 1 mm, often recurved; middle phyllaries lanceolate, 4.5–8 × ca. 1.5 mm; inner phyllaries lanceolate, ca. 1.1 cm × 1 mm. Florets yellow. Achene blackish brown, cylindric, ca. 3 mm, with 10 ribs. Pappus pale yellow, ca. 6 mm. Fl. and fr. Jun–Oct. $2n$ = 27, 36.

Grasslands, forests, thickets; 1700–2100 m. Xinjiang [India, Japan, Kazakhstan, Mongolia, Russia, Uzbekistan; SW Asia, SE Europe].

3. Hieracium robustum Fries, Nova Acta Regiae Soc. Sci. Upsal. 14: 193. 1848.

新疆山柳菊 xin jiang shan liu ju

Herbs, perennial, 40–80[–120] cm tall, with thick rhizomes. Stem solitary to few fascicled, basally purple, stout,

erect, branched apically, glabrous or basally with sparse to moderate simple hairs, apically and under capitula with sparse to moderate stellate hairs. Stem leaves (10–)25–50[–80], basal and lower stem leaves absent at anthesis. Middle stem leaves sessile, ovate-lanceolate to narrowly elliptic-lanceolate, 5–9 × 1.5–3 cm, subglaucescent, abaxially pale green and reticulately veined, margin or only abaxial veins with moderate to sparse simple hairs and sparse to moderate stellate hairs, base cordate to rounded, margin entire to deeply dentate, apex acute to shortly acuminate. Upper stem leaves similar to middle stem leaves but gradually smaller. Synflorescence corymbiform to long paniculiform, with (10–)15–50(–80) capitula. Involucre campanulate, (0.9–)1–1.2 cm. Phyllaries in few rows, green or dark green, abaxially with moderate stellate hairs, apex obtuse to acute; outer phyllaries lanceolate, linear, or broadly linear, 2–3 × ca. 1 mm; middle phyllaries lanceolate, 4–7 × ca. 1 mm; inner phyllaries lanceolate, 0.8–1.2 cm × ca. 1 mm. Florets yellow. Achene blackish brown, cylindric, ca. 3 mm, with 10 ribs. Pappus pale yellow, ca. 6 mm. Fl. and fr. Jun–Oct. $2n = 27, 36$.

Grasslands, slopes; ?1700–2100 m. Xinjiang [India, Kazakhstan, Russia; SW Asia, SE Europe].

4. Hieracium korshinskyi Zahn in Engler, Pflanzenr. 76(IV. 280): 528. 1921.

高山柳菊 gao shan liu ju

Crepis shawanensis C. Shih.

Herbs, perennial, 30–60 cm tall, with long rhizomes. Stem purplish red, erect, branched apically or rarely unbranched, basally densely villous, apically with arachnoid and minutely stellate hairs, under capitula with long simple hairs mixed with capitate stipitate glandular hairs and minutely stellate hairs. Basal leaves present at anthesis; petiole winged; leaf blade elliptic to lanceolate, 6–16 × 1–6 cm, sparsely villous, base cuneate-attenuate, margin with sparse sharp teeth, entire, or subentire, apex acute to obtuse. Stem leaves few, similar to basal leaves. Lower stem leaves shortly petiolate or sessile; leaf blade basally cuneate-attenuate, subamplexicaul, or amplexicaul. Synflorescence corymbiform, with (1 or)2 to several capitula. Involucre campanulate, ca. 6 mm in diam. Phyllaries in 3 rows, dark green, abaxially with sparse simple hairs and few minute stellate hairs; outer phyllaries linear-lanceolate to broadly linear, ca. 3.5 × 0.5 mm, apex acute; inner phyllaries linear-lanceolate, ca. 9 × 1.2 mm, apex acute to obtuse. Florets yellow. Achene purple to purplish black, cylindric, ca. 3.2 mm, with 10 ribs. Pappus dirty white, pale yellow, or brownish, ca. 6 mm. Fl. and fr. Jul–Sep. $2n = 18, 27$.

Forests, open places in forests; 1600–2200 m. Xinjiang [Kazakhstan, Mongolia, SC Russia].

5. Hieracium morii Hayata, Icon. Pl. Formosan. 8: 80. 1919.

腺毛山柳菊 xian mao shan liu ju

Hieracium morii var. *tsugitakaense* Mori; *H. pinanense* Kitamura.

Herbs, perennial, 10–35 cm tall. Stem simple or branched, erect, moderately to densely microglandular, basally densely pilose, upward moderately pilose. Basal leaves spatulate, 5–13 × 1–2 cm, pilose and microglandular, base narrowly attenuate into a winged petiole, margin mucronulately serrate, apex obtuse and mucronulate. Stem leaves 8–15, gradually smaller toward stem apex, up to densely microglandular. Synflorescence racemiform, with 1–16 capitula. Involucre obconic-campanulate, 1.2–1.5 × 0.6–0.9 cm. Phyllaries in 2 or 3 rows; outer phyllaries abaxially densely covered with dark hispid glandular capitate hairs to 1 mm; inner phyllaries linear, ca. 8 mm, abaxially glabrous. Achene cylindric, ca. 2.5 × 0.8 mm, with conspicuous ribs. Pappus brownish, 3.5–5 mm.

• Alpine meadows. Taiwan.

The present authors have not seen the type nor any reliable material of this species, and the above description is taken from the original publication and from the treatment in Fl. Taiwan (ed. 2, 4: 990. 1998).

6. Hieracium regelianum Zahn in Engler, Pflanzenr. 79(IV. 280): 936. 1922.

卵叶山柳菊 luan ye shan liu ju

Herbs, perennial, 30–100 cm tall, with short and thick rhizomes. Stem solitary to few fascicled, erect, branched apically, basally brown long hirsute and apically under capitulum glabrous or with capitate stipitate glandular hairs mixed with stellate hairs or sometimes mixed with simple hairs, glabrescent. Basal and lower stem leaves withered in fruit. Middle stem leaves sessile, ovate, ovate-lanceolate, elliptic-lanceolate, or narrowly elliptic, 4–9 × 1–3 cm, abaxially sparsely hirsute on veins, adaxially glabrous, base auriculate and semiamplexicaul, margin entire or minutely toothed and sparsely ciliate, apex acuminate. Upper stem leaves similar to middle stem leaves but gradually smaller. Synflorescence sparsely corymbosely paniculiform, with capitula moderate in number. Involucre campanulate, ca. 1 cm. Phyllaries in 3 rows, dark green to ± dark green, abaxially usually with simple hairs on midvein intermixed with capitate stipitate glandular hairs and stellate hairs; outer phyllaries linear-lanceolate, ca. 2 × 0.7 mm, apex acute to obtuse; middle phyllaries linear-lanceolate, ca. 4 × 1 mm, apex acute to obtuse; inner phyllaries broadly linear, ca. 1.1 cm × 1.2 mm, apex obtuse. Florets yellow. Achene dark brown, cylindric, ca. 4 mm, with 8–10 ribs, basally attenuate. Pappus dirty white, ca. 6 mm. Fl. and fr. Jul–Sep.

Open places in forests; 1700–2000 m. Xinjiang [Kazakhstan].

85. PILOSELLA Hill, Brit. Herb. 441. 1756.

细毛菊属 xi mao ju shu

Shi Zhu (石铸 Shih Chu); Günter Gottschlich

Herbs, perennial, rosulate. Stem solitary to few fascicled, branched or unbranched. Rosette leaves sessile, rarely withered at anthesis, margin entire or rarely denticulate; stem leaves [absent or] few or [rarely] numerous. Synflorescence corymbiform [or pseudocymiform, sometimes capitulum solitary]. Capitula with numerous florets. Involucre ovoid to hemispheric, [4–]6–10[–14] mm.

Phyllaries in several irregular rows, linear-lanceolate or rarely ovate-lanceolate. Florets yellow [rarely pale yellow or orangish red], sometimes outer ones red striped. Achene cylindric, ellipsoid, or narrowly obconic, 1–2[–2.5] mm, with [8–]10[–14] equal apically distinct ribs not confluent in an obscure ring, apex truncate. Pappus white or dirty white, of scabrid bristles.

About 110 species (broad species concept) with ca. 700 apomictic or hybrid taxa: N Africa, Asia, Europe; two species in China.

1a. Stem with spreading bristles; involucre [9–]10–11 mm ..... 1. *P. procera*
1b. Stem with appressed or upward-curved bristles; involucre 6–9 mm ..... 2. *P. echioides*

1. Pilosella procera (Fries) F. W. Schultz & Schultz Bipontinus, Flora 45: 431. 1862.

棕毛细毛菊 zong mao xi mao ju

Hieracium procerum Fries, Symb. Hieracium, 43: 1848; *H. persicum* Boissier.

Herbs, perennial, 20–60 cm tall, rhizomatous. Stem solitary to few fascicled, erect, branched apically, basally densely covered with light brown spreading bristles, apically bristles gradually sparser and intermixed with stellate hairs and capitula becoming white or yellowish pubescent, without capitate stipitate glandular hairs. Leaves with light brown dense bristles and small stellate hairs. Basal leaves withered at anthesis. Stem leaves sessile, narrowly elliptic to lanceolate, 3–10 × 0.2–1.2 cm, apex acuminate. Upper stem leaves lanceolate. Synflorescence corymbiform, with many capitula. Involucre hemispheric, ca. [0.9–]1[–1.1] cm. Phyllaries in 3 or 4 rows, densely covered with stellate hairs and sparsely with long rigid and capitate stipitate glandular hairs; outer phyllaries lanceolate, 3–4 mm, apex acute to subobtuse; inner phyllaries narrowly elliptic-lanceolate, 7–9 mm, apex acute to obtuse. Florets yellow. Achene dark brown, cylindric, ca. 2.2 mm, with 10 ribs. Pappus dirty white, ca. 7 mm. Fl. and fr. Jul–Aug. $2n = 36$.

Dry mountain slopes; 1200–2500 m. Xinjiang [Kazakhstan, Uzbekistan; SW Asia].

2. Pilosella echioides (Lumnitzer) F. W. Schultz & Schultz Bipontinus, Flora 45: 431. 1862.

刚毛细毛菊 gang mao xi mao ju

Hieracium echioides Lumnitzer, Fl. Poson. 348. 1791; *H. echioides* subsp. *asiaticum* Nägeli & Peter; *Pilosella asiatica* (Nägeli & Peter) Schljakov.

Herbs, perennial, 25–100 cm tall, with short rhizomes. Stem solitary to few fascicled, erect, branched apically, basally densely covered with appressed or upward-curved brown long bristles, apically bristles sparser and stellate hairs dense, under capitulum densely white pubescent. Basal leaves withered at anthesis. Lower stem leaves shortly petiolate; leaf blade lanceolate, linear-lanceolate, or narrowly elliptic-lanceolate, 4–16 × 0.5–2 cm, densely hirsute and stellate, base attenuate, apex acute to obtuse. Upper stem leaves sessile, lanceolate, gradually smaller, densely hirsute and stellate. Synflorescence corymbiform, with few to many capitula. Involucre ovoid to hemispheric, 6–9 mm. Phyllaries in 3 rows, brownish gray, abaxially densely pubescent and with or without sparse capitate stipitate glandular hairs; outer phyllaries ovate-lanceolate, 3–5 mm, apex acuminate; inner phyllaries narrowly elliptic-lanceolate, apex acuminate. Florets yellow. Achene brown, narrowly cylindric, ca. 2.2 mm, with 10 ribs. Pappus dirty white, 4–5 mm. Fl. and fr. Jun–Sep. $2n = 18^{*}$, 27, 36.

Desert steppes, dry valleys; ca. 2000 m. Xinjiang [Kazakhstan; C and E Europe].

6. Tribe VERNONIEAE

斑鸠菊族 ban jiu ju zu

Chen Yilin (陈艺林 Chen Yi-ling); Michael G. Gilbert

Herbs, shrubs, sometimes climbing, or trees; hairs simple, T-shaped, or stellate. Leaves usually alternate [rarely opposite or whorled], leaf blade entire or serrate-dentate [rarely pinnately divided], venation pinnate, rarely with 3 basal veins (*Distephanus*). Synflorescences mostly terminal, less often terminal on short lateral branches or axillary, mostly cymose paniculate, less often spikelike, forming globose compound heads or reduced to a solitary capitulum. Capitula discoid, homogamous. Phyllaries generally imbricate, in several rows, rarely in 2 rows, herbaceous, scarious or leathery, outer gradually shorter. Receptacle flat or rather convex, naked or ± fimbriate. Florets 1–400, all bisexual, fertile; corolla tubular, purple, reddish purple, pink, or white, rarely yellow (*Distephanus*), limb narrowly campanulate or funnelform, 5-lobed. Anther base bifid, auriculate, acute or hastate, rarely caudate, apex appendaged. Style branches usually long and slender, apex subulate or acute, dorsally pilose, without appendage. Achenes cylindric or slightly flattened, (2–)5–10[–20]-ribbed, or 4- or 5-angled, rarely ± terete; pappus usually present, persistent, of many filiform setae, bristles, or scales, often 2-seriate with inner series of setae or bristles and shorter outer series of scales, sometimes very few and deciduous (*Camchaya*) or absent (*Ethulia*).

Up to 120 genera and 1,400 species: throughout the tropics and extending into some temperate regions; six genera (one introduced) and 39 species (ten endemic, two introduced) in China.

The classification of this tribe is still in flux with some authors not accepting most of the recent segregates from *Vernonia*. See Robinson and Skvarla (Taiwania 55: 254–272. 2010) for a treatment of the Chinese species of Vernonieae using these segregates.

1a. Capitula densely clustered into compound synflorescences subtended by (1–)3 leaflike bracts, each involucre with 1–4 florets and ca. 8 phyllaries.
  2a. Capitula (1–)10–40 per cluster, clusters terminal, solitary or in flat-topped synflorescences, each subtended by (2 or)3 ± triangular bracts; pappus with many straight, scabrid-barbellate, basally widened awns ..... 90. *Elephantopus*
  2b. Capitula 1–5+ per cluster, clusters axillary in long spikelike synflorescences, each subtended by 1 or 2 lanceolate to spatulate or linear bracts; pappus with 2 very long, bent or curved awns ..... 91. *Pseudelephantopus*
1b. Capitula in lax panicles, rarely in sessile clusters and then each involucre with more than 4 florets and always with many phyllaries.
  3a. Corolla golden yellow; leaves basally 3-veined ..... 88. *Distephanus*
  3b. Corolla pale to dark purple, pink, or white; leaves pinnately veined.
    4a. Pappus absent; achenes (2–)4- or 5(or 6)-ribbed, apex truncate or concave with an enlarged rim ..... 86. *Ethulia*
    4b. Pappus present [or absent]; achenes 10-ribbed, 4- or 5-angled, or terete, apex rounded.
      5a. Pappus of 1–10 easily deciduous bristles [or absent] ..... 89. *Camchaya*
      5b. Pappus long, copious, persistent, outermost setae sometimes short and scalelike ..... 87. *Vernonia*

86. ETHULIA Linnaeus f., Dec. Prima Pl. Horti Upsal. 1. 1762.

都丽菊属 du li ju shu

Herbs, annual or perennial; indumentum of simple hairs and sessile globose glands. Leaves alternate, petiole often ill-defined, margin usually dentate, pinnately veined. Synflorescence terminal, paniculate, densely clustered to laxly corymbose. Involucre campanulate or hemispheric; phyllaries imbricate, to 4-seriate, usually with scarious margins, apex obtuse to acute [to acuminate], outer shorter. Receptacle flat or rather convex, naked. Florets [3–]18–24[–50]; corolla purplish or reddish, narrowly tubular, usually with scattered glands, with narrowly campanulate limb, lobes 5, narrow. Anthers obtusely auricled. Style branches subulate, puberulent. Achenes cylindric or obconical, prominently [2–]4- or 5(or 6)-ribbed, glandular between ribs, otherwise glabrous, apex [cupular to] truncate, with well-defined callose ring. Pappus absent.

About 19 species: most in tropical Africa, three or four restricted to Indonesia and Philippines, and one a widely distributed adventive; two species in China.

1a. Fruiting capitula with involucre spreading-rotate and exposing hemispheric cluster of achenes, usually with some capitula sessile; corolla 1.2–1.5 mm; achene broadly obpyramidal, apex truncate with conspicuously swollen callose ring ..... 1. *E. conyzoides*
1b. Fruiting capitula with involucre campanulate and concealing achenes, capitula always clearly pedunculate; corolla 2.2–2.5 mm; achene narrowly obpyramidal to almost cylindric, apex shallowly cupular with narrow callose ring ..... 2. *E. gracilis*

1. Ethulia conyzoides Linnaeus f., Dec. Prima Pl. Horti Upsal. 1. 1762.

都丽菊 du li ju

Ethulia ramosa Roxburgh.

Herbs, annual, 0.4–1[–2] m tall. Stems erect, upper parts branched, lower part green or purplish, striate, adpressed pu-

berulent or subglabrous. Leaves denser, lowermost withered and shed by anthesis, median leaves oblong or oblong-lanceolate, 5–9[–13] × 1.5–2.5 cm, both surfaces gland-dotted, lateral veins 7- or 8-paired, adaxially rather prominent, base cuneately attenuate into short petiole, margin subentire to distantly coarsely serrate, apex acuminate or acute; upper leaves smaller, shallowly serrate or subentire. Synflorescence usually in terminal corymbs, often 2 or 3 together in sessile cluster. Capitula small; peduncles 0–6 mm, densely ferruginous puberulent. Involucre hemispheric at anthesis, rotate in fruit, to 2.5 × 5–7 mm; phyllaries 4- or 5-seriate, subequal, ovate or oblong-lanceolate, ca. 3 mm, apex acuminate or rather obtuse, outer and median ferruginous puberulent and glandular, inner glabrous and glandular. Florets to ca. 30; corolla pale purplish, tubular, 1.2–1.5 mm, glandular; lobes lanceolate. Achenes obconical, 1.2–2.1 mm, (3 or)4 or 5(or 6)-ribbed, apical rim expanded laterally to form wide truncate apex, fulvous glandular between ribs. Pappus absent. Fl. Apr–May.

By ponds and rice fields; 600–1400 m. Taiwan, S Yunnan [Cambodia, India, Laos, Thailand; Africa, South America (introduced)].

2. Ethulia gracilis Delile in Cailliaud, Voy. Méroé 4: 334. 1827.

纤细都丽菊 xian xi du li ju

Herbs, annual, to 1.3 cm tall. Stems erect, upper parts branched, striate, adpressed puberulent. Leaves subsessile, narrowly lanceolate to lanceolate, to 10.5 × 2 cm, both surfaces adpressed puberulent, base narrowly cuneate, margin obscurely, sparsely dentate, apex acute. Peduncles (0–)0.7–6.5 mm. Involucre hemispheric; phyllaries ca. 3-seriate. Florets 18–24; corolla pale lilac to mauve, tubular, 2.2–2.5 mm. Achenes subcylindric, 0.8–1.7 mm, (2–)4–6-ribbed, apical rim narrow, forming shallow cup. Pappus absent.

By ponds and rice fields. ?Yunnan [Thailand; E and NE Africa].

There has been confusion, particularly in Asia, between this species and the more widely distributed and more weedy *Ethulia conyzoides*, though the two are easily distinguished if ripe fruit are available. For example, the illustration in Higher Pl. China (11: 135, pl. 186. 2005) clearly depicts this species rather than *E. conyzoides*.

87. VERNONIA Schreber, Gen. Pl. 2: 541. 1791, nom. cons.

斑鸠菊属 ban jiu ju shu

Herbs, shrubs, or trees, sometimes climbing; indumentum of simple or T-shaped hairs and sessile globose glands. Leaves alternate, rarely opposite, petiolate or subsessile, often ill-defined, margin entire, serrate, or dentate, pinnately veined. Synflorescence terminal or axillary, paniculate, densely clustered to laxly corymbose, sometimes thyrsoid, racemelike, or reduced to solitary capitulum. Involucre bowl-shaped to narrowly cylindric; phyllaries imbricate, to 6-seriate, often with scarious margins, apex obtuse, acute, or acuminate into spinescent or threadlike tip, outer phyllaries shorter, inner occasionally caducous. Receptacle flat, areolate, naked or sometimes shortly hairy. Florets (1–)3–100+; corolla pink, purplish, rarely white, narrowly tubular, often glandular, with campanulate or campanulate-funnelform limb; lobes 5. Anthers hastate, obtusely auricled. Style branches subulate, puberulent. Achenes cylindric or obconical, mostly with (7–)10 well-defined ribs, less often 4- or 5-ribbed or angled, rarely terete, usually glandular between ribs, glabrous or shortly hairy, apex truncate, often callose at base. Pappus usually double, outer pappus of short bristles or narrow scales, occasionally absent, inner pappus of many scabrid-barbellate-plumose bristles, deciduous or persistent, often colored.

About 1,000 species in the wide sense: tropical Asia and Africa, North and South America; 31 species (eight endemic, one introduced) in China.

Robinson (Proc. Biol. Soc. Washington 112: 220–247. 1999; in Kadereit & C. Jeffrey, Fam. Gen. Vasc. Pl. 8: 149–175. 2007) has proposed the segregation of many smaller genera from *Vernonia*, with *Vernonia* s.s. restricted to ca. 17 species in North America. Most of his segregates can be rather difficult to delimit, and the placement of individual species is not always easy; so *Vernonia* continues to be used mostly in its old, very wide, sense. However, there are some segregates that are quite widely accepted. One of these, *Distephanus*, occurs in China and is recognized in this Flora. The Chinese species are divided below into informal groups corresponding to these potential segregate genera.

Vernonia andersonii C. B. Clarke (Compos. Ind. 27. 1876; *Decaneuropsis andersonii* (C. B. Clarke) H. Robinson & Skvarla) is included in the following key on the basis of Robinson and Skvarla (Taiwania 55: 262. 2010). All the material so named seen so far by the present authors has proved to be *V. cumingiana*.

1a. Trees, shrubs, or climbers; florets (1 or)2–12 per involucre, rarely more and then plant a climber with axillary synflorescences.
2a. Trees or self-supporting shrubs.
3a. Leaves obovate to oblanceolate, clearly widest above middle, basal secondary veins substraight toward leaf margins; petiole short and broad or expanded into a sheath at base; synflorescence conically thyrsoid (3. *Monosis* group).
4a. Trees 3–8 m tall; leaf blade to 50 × 20 cm, abaxially glabrous or sparsely pubescent, lateral veins 12–17-paired; achenes 3–4 mm ..... 8. *V. volkameriifolia*
4b. Shrubs 2–3 m tall; leaf blade 15–30 × 4–9 cm, abaxially densely pubescent to fulvous tomentose, lateral veins 7–12-paired; body of mature achenes ca. 2.5 mm ..... 9. *V. parishii*
3b. Leaves ovate to elliptic or oblong, widest at or below middle, basal secondary veins curved and often becoming subparallel to basal leaf margins; petiole slender; synflorescence flat-topped to rounded.
5a. Corolla 8–10 mm, uniformly slender from base before widening into limb; achenes strongly 10-ribbed; style base without node; sweeping hairs of style branches pointed (4. *Gymnanthemum* group) ..... 10. *V. extensa*

5b. Corollas 5–7 mm, widening gradually from near base; achenes 5-ribbed to weakly 10-ribbed; style base with large distinct node; sweeping hairs of style branches blunt (1. *Strobocalyx* group p.p.).
6a. Trees; branches fulvous or brown tomentose; inner phyllaries persistent.
7a. Florets 5 or 6 per capitulum; involucres 6–8 mm in diam.; phyllaries ovate-oblong, shortly pubescent or subglabrous; achenes subtriangular in section, 8–10-ribbed, glabrous, glandular; leaf blade thinly leathery, glabrous or sparsely puberulent along veins, margin entire ..... 1. *V. arborea*
7b. Florets ca. 10 per capitulum; involucres 4–5 mm in diam.; phyllaries ovate, abaxially densely tomentose; achenes 4- or 5-angled, glabrous; leaf blade papery, abaxially hispidulous, adaxially tomentose, margin repand or laxly dentate ..... 2. *V. solanifolia*
6b. Shrubs, rarely small trees; branches gray or gray-brown tomentose; innermost phyllaries ± deciduous.
8a. Capitula 6–8 mm in diam., florets 8–12; involucres subglobose or hemispheric with rounded base, 4–6 mm in diam.; phyllaries obtuse or rounded at apex, white sericeous; achenes 3.5–4 mm, 3-ribbed ventrally, glabrous; leaves membranous or thinly papery ..... 3. *V. bockiana*
8b. Capitula 2–3 mm in diam., florets 5 or 6; involucres obconical with cuneate base, 2–3 mm in diam.; phyllaries few, acute or slightly acute at apex, sparsely shortly pubescent; achenes ca. 3 mm, slightly ribbed, sparsely puberulent, glandular; leaves hardly papery ..... 4. *V. esculenta*
2b. Scandent shrubs.
9a. Synflorescences terminal and subterminal, forming broad panicle; pappus white or dirty white; branches densely reddish- or yellowish brown pubescent (1. *Strobocalyx* group p.p.).
10a. Branches densely reddish brown pubescent, eglandular; lateral veins 7- or 8-paired; capitula 7–12 mm in diam., with ca. 10 florets, peduncle up to 15 mm; achenes 10-ribbed, eglandular ..... 5. *V. sylvatica*
10b. Branches densely yellowish brown pubescent, glandular; lateral veins 3–6-paired; capitula 3–5 mm in diam., with 2 or 3 florets, peduncle less than 2 mm; achenes 5-ribbed, glandular ..... 6. *V. chunii*
9b. Synflorescences mostly axillary, forming long thyrse; pappus reddish, yellow, or brown; branches grayish brown pubescent.
11a. Hairs of stems and leaves T-shaped with long arms, shortly stalked and pressed against stems or leaf surface, silky; corollas without long slender bases; style with distinct basal node; achenes 5-angled (2. *Tarlmounia* group) ..... 7. *V. elliptica*
11b. Hairs of stems and leaves simple, not T-shaped; corollas with long and filiform bases; bases of styles without nodes; achenes strongly 10-ribbed (5. *Decaneuropsis* group).
12a. Capitula in terminal or subterminal panicles; receptacle ferruginous pubescent; pappus reddish or reddish brown; leaves papery; branches reddish brown or grayish brown tomentose ..... 11. *V. cumingiana*
12b. Capitula mostly axillary or on short lateral branches, solitary or in groups of 3–5, forming leafy thyrse; receptacle glabrous; pappus yellowish brown; leaves leathery or thinly leathery; branches sparsely, shortly pubescent or glabrescent.
13a. Leaf blade oblong or oblong-lanceolate, lateral veins 7–9-paired, adaxially densely gray-green tomentose; capitula with ca. 10 florets; achenes 3–3.5 mm.
14a. Phyllaries linear or linear-lanceolate, acute at apex, with dense short pubescence on margins and tips ..... 12. *V. gratiosa*
14b. Phyllaries oblong, with short acute tips, glabrous ..... *V. andersonii* (see note under *V. cumingiana*)
13b. Leaf blade ovate-oblong or oblong-elliptic, lateral veins 5–7-paired, adaxially sparsely pubescent; capitula with 18 or more florets; achenes 4–4.5 mm.
15a. Capitula 7–8 mm in diam., 3–5 in small axillary panicles; florets 20–25, reddish purple; achenes 3–3.5 mm, 10-ribbed, with short patent hairs and glands; leaves thinly leathery, elliptic or ovate-elliptic, entire ..... 13. *V. blanda*
15b. Capitula ca. 20 mm in diam., solitary in leaf axils, racemose; florets many, white; achenes 7–9 mm, 7- or 8-ribbed, glabrous; leaves leathery, obovate-oblong or elliptic-oblong, margin often revolute, sparsely denticulate at upper margins ..... 14. *V. chingiana*
1b. Erect annual or perennial herbs; florets 19 or more per involucre; synflorescences terminal.
16a. Achenes 4- or 5-angled to almost terete; phyllary apex acute or aristate-acuminate; plants often annual herbs (7. *Cyanthillium* group).
17a. Achenes unribbed or rarely inconspicuously ribbed, ± compressed, densely white pilose; pappus 2-seriate, outer setae many, short, and persistent; capitula small, ca. 6 mm in diam., many in relatively broad panicles; florets 19–28.
18a. Corolla ca. as long as pappus; leaf blade rhombic to ovate ..... 26. *V. cinerea*
18b. Corolla much longer than pappus at anthesis; leaf blade linear-lanceolate to lanceolate ..... 27. *V. benguetensis*
17b. Achenes 4- or 5-angled, glabrous and glandular; pappus 1-seriate, deciduous; capitula larger, 6–10 mm in diam., few or 2 or 3 terminal on branches; florets more than 30.
19a. Capitula several, laxly corymbose, 5–7 mm in diam.; stem leaves crowded, spatulate, apex rounded or obtuse, margin subentire, abaxially densely white hispidulous; small subshrubs, ca. 10 cm tall ..... 28. *V. maritima*

19b. Capitula usually 2 or 3 terminal on branches or paired, 8–10 mm in diam.; stem leaves widely separated, ovate, ovate-elliptic, rarely orbicular, apex obtuse, slightly acute, margin crenate-shallowly dentate, abaxially sparsely shortly hairy or glabrous, adaxially gray sericeous-pubescent; robust annual herbs, to 1 m tall ..... 29. *V. patula*

16b. Achenes (7–)10-ribbed or striate.

20a. Capitula subtended by foliose bracts as long as phyllaries; phyllary apex ± leaflike; corolla with slender base more than 2 × as long as abruptly wider narrowly campanulate limb; pappus bristles flattened on outer surface (9. *Baccharoides* group) ..... 31. *V. anthelmintica*

20b. Capitula without foliose or membranous appendaged bracts at base of involucre; phyllary apex not leaflike; corolla with slender base up to as long as narrowly funnel-shaped limb; pappus segments rounded and/or scabrid on outer surface.

21a. Lower part of leaf blade with mostly spreading secondary veins; slender base of corolla tube ca. as long as limb; base of style without node (8. *Khasianthus* group) ..... 30. *V. subsessilis*

21b. Lower part of leaf blade with secondary veins ascending at 45° angles or more; slender base of corolla tube shorter than limb; base of style with distinct node (6. *Acilepis* group).

22a. Capitula ca. 30 mm in diam.; phyllaries abaxially pale yellowish white tomentose ..... 25. *V. albosquama*

22b. Capitula 5–25 mm in diam.; phyllaries glabrous to densely pubescent, green, often with darker apex.

23a. Outer pappus bristles many, short.

24a. Capitula usually more than 5 in terminal, often somewhat elongated, panicle or thyrse, 5–8 mm in diam.; achenes glabrous; pappus white or dirty white ..... 15. *V. saligna*

24b. Capitula few, usually 2 or 3(–5) in ± flat-topped cyme, rarely solitary in leaf axils, 8–15 mm in diam.; achenes hairy and glandular; pappus sordid white or rubescent, outer bristles deciduous or persistent.

25a. Stems hispidulous; capitula 10–15 mm in diam., peduncle very short to almost absent; florets ca. 30; phyllary apex apiculate; leaves oblanceolate or obovate-elliptic, sharply serrate, hispidulous on both surfaces ..... 16. *V. aspera*

25b. Stems shortly pubescent or adpressed hairy; capitula 6–8(–10) mm in diam., peduncle 7–15 mm; florets 15–20; phyllary apex acute or acuminate; leaves oblong, oblong-lanceolate, obovate, or obovate-elliptic, denticulate or sparsely serrate toward apex, subglabrous or shortly pubescent along veins only.

26a. Involucres hemispheric; phyllaries with apex acute, upper part arachnoid pubescent and glandular; achenes hispidulous; leaves papery, laxly on stems, oblong or oblong-lanceolate, sparsely serrate on upper margins ..... 17. *V. clivorum*

26b. Involucres obconical; phyllaries with apex acuminate, subscarious, margin pubescent; achenes patently villous; leaves leathery, often conferted below flowering branches, obovate or obovate-elliptic, upper leaves linear or linear-lanceolate, denticulate ..... 18. *V. attenuata*

23b. Outer pappus bristles few to none.

27a. Capitula 4–6 mm in diam.; florets 8–12; shrubs or shrubby herbs 1–3 m tall; phyllary apex obtuse or bluntly acute, adpressed to form smooth involucre ..... 19. *V. divergens*

27b. Capitula 12–25 mm in diam.; florets many; herbs 15–80(–200) cm tall; phyllary apex acute to acuminate, often conspicuous or colored spinescent, often recurved.

28a. Capitula sessile or nearly so, solitary, often axillary and forming spikelike synflorescence; outermost phyllaries almost subulate ..... 24. *V. squarrosa*

28b. Capitula mostly clearly pedunculate, often in flat-topped cymes, never axillary; outer phyllaries lanceolate to ovate.

29a. Achenes glabrous; [inner phyllaries ca. 2.5 mm wide; stem hairs pigmented, clearly multicellular].

30a. Panicles relatively broad, ± flat-topped; phyllaries often recurved at tip ..... 21. *V. silhetensis*

30b. Panicles relatively narrow, ± cylindric; phyllaries straight to slightly incurved ..... 22. *V. doichangensis*

29b. Achenes adpressed hairy; inner phyllaries 1.5–2.2 mm wide; stem hairs pale, slender, obscurely multicellular.

31a. Involucre 12–15 mm wide; leaf blade thinly papery; achenes eglandular ..... 20. *V. nantcianensis*

31b. Involucre 15–20 mm wide; leaf blade more stiffly papery; achenes glandular ..... 23. *V. spirei*

1. Strobocalyx group

Strobocalyx (Blume ex Candolle) Spach; *Vernonia* sect. *Strobocalyx* Blume ex Candolle, Prodr. 5: 21. 1836.

Perhaps seven species: India to China and Indonesia; six species (four endemic) in China.

1. Vernonia arborea Buchanan-Hamilton, Trans. Linn. Soc. London 14: 218. 1824.

树斑鸠菊 shu ban jiu ju

Eupatorium celebicum Blume; *E. javanicum* Blume; *Gymnanthemum arboreum* (Buchanan-Hamilton) H. Robinson; *Strobocalyx arborea* (Buchanan-Hamilton) Schultz Bipontinus; *S. blumeana* (Candolle) Schultz Bipontinus; *S. celebica* (Blume) Schultz Bipontinus; *S. javanica* (Blume) Schultz Bipontinus; *Vernonia arborea* var. *javanica* (Blume) C. B. Clarke; *V. blumeana* Candolle; *V. celebica* (Blume) Candolle; *V. javanica* (Blume) Candolle; *V. urdanetensis* Elmer; *V. vaniotii* H. Léveillé.

Trees or erect shrubs, to 20 m tall. Branches densely fulvous tomentulose or ± glabrescent, rarely glabrous. Petiole 10–30 mm, densely pubescent; leaf blade ovate, elliptic-ovate, or oblong, 8–25 × 4–10 cm, thinly leathery, abaxially white pubescent, densely so on veins, or glabrous, adaxially fulvous pubescent along veins or glabrous, glandular, lateral veins 8–12-paired, adaxially distinctly raised, veinlets reticulate, base obtusely rounded or attenuate, margin entire, apex acuminate. Synflorescences terminal, panicles broader than long, shallowly rounded to ± flat-topped. Capitula very many; peduncles to 10 mm, mostly much shorter, densely pubescent; bracteoles absent. Involucre cup-shaped, 2–3 × 6–8 mm; phyllaries ca. 5-seriate, ovate or ovate-oblong, 0.5–2 mm, densely pilose, rarely subglabrous, apex obtuse or subacute, outer very short, ovate. Receptacle flat, areolate. Florets 5 or 6; corolla pink, pale purplish, or white, tubular, 5–7 mm, lobes acute, glabrous. Style branches long. Achenes compressed, 2–3 mm, 3- or 4-angled and 8–10-ribbed, inconspicuously pilose and glandular. Pappus 1- or 2-seriate, dirty white; outer setae few, almost absent, ca. 1 mm; inner setae 5–7 mm. Fl. and fr. Aug–Nov.

Open forests in valleys or on slopes; (100–)800–1200 m. Guangxi, SE Yunnan [India, Indonesia, Laos, Malaysia, Nepal, Sri Lanka, Thailand, Vietnam].

Many collections named as *Vernonia arborea* in European herbaria are *V. bockiana*.

2. Vernonia solanifolia Bentham, London J. Bot. 1: 486. 1842.

茄叶斑鸠菊 qie ye ban jiu ju

Gymnanthemum solanifolium (Bentham) H. Robinson; *Strobocalyx solanifolia* (Bentham) Schultz Bipontinus; *Vernonia fortunei* Schultz Bipontinus.

Erect shrubs or trees, 8–12 m tall. Branches sometimes scandent, terete, fulvous or yellowish tomentose. Petiole 10–25 mm, densely tomentose; leaf blade ovate-oblong, 6–16 × 4–9 cm, abaxially scabrid, sparsely adpressed hispidulous, ± glabrescent, glandular, adaxially densely yellowish tomentose, lateral veins 7–9-paired, veinlets rather parallel and reticulate, base ± oblique, margin entire, shallowly repand, or laxly obtusely dentate, apex sometimes truncate. Synflorescences terminal, panicles flat-topped, up to 20 cm wide, leafy. Capitula many, small, 5–6 mm in diam.; peduncles 4–6 mm, densely tomentose. Involucre hemispheric, 4–5 mm wide; phyllaries 4- or 5-seriate, ovate, elliptic, or oblong, 2–6 mm, yellowish tomentose, apex obtuse. Receptacle flat, areolate. Florets ca. 10; corolla pink or purplish, fragrant, tubular, ca. 6 mm, with slender tube and narrowly campanulate limb; lobes linear-lanceolate, glandular, apically white puberulent. Achenes rather compressed, 2–2.5 mm, 4- or 5-angled, glabrous. Pappus 2-seriate, yellowish; outer setae very short; inner setae scabridulous.

Open forests in valleys, climbing on trees; 500–1000 m. Fujian, Guangdong, Guangxi, Yunnan [Cambodia, India, Laos, Myanmar, N Thailand, Vietnam].

Vernonia solanifolia is used medicinally for treating carbuncle of the abdomen, intestinal pains, and eruptive diseases.

3. Vernonia bockiana Diels, Bot. Jahrb. Syst. 29: 608. 1901.

南川斑鸠菊 nan chuan ban jiu ju

Gymnanthemum bockianum (Diels) H. Robinson; *Pluchea rubicunda* C. K. Schneider; *Strobocalyx bockiana* (Diels) H. Robinson et al.

Shrubs or small trees, 3–6 m. Branches terete, finely striate, densely gray or yellowish fulvous tomentose. Petiole stout, 12–25 mm, densely gray or yellowish fulvous tomentose; leaf blade oblong-lanceolate or oblong-elliptic, rarely ovate-lanceolate, (8–)12–22 × 3–3.5 cm, membranous or thinly papery, abaxially dark green, rather scabrid, papillose, adaxially gray pubescent and white glandular, lateral veins 10–13-paired, adaxially prominent, veinlets reticulate, margin obscurely repand-denticulate, repand, or subentire, apex acuminate or long acuminate, mucronulate. Synflorescences terminal, panicles lax, flat-topped, 10–20 cm wide, lower branches subtended by well-developed leaves. Capitula many, 6–8 mm in diam.; peduncle 5–10 mm, gray tomentose. Involucre subglobose or hemispheric, 4–6 × 4–6 mm; phyllaries 5-seriate, dark brown or purplish red, leathery, ovate-oblong or oblong-obovate, rarely spatulate, white sericeous, apex obtuse, thickened mucronate, outer short, inner 4–5 × ca. 1.5 mm. Receptacle rather convex, foveolate. Florets 8–12; corolla reddish purple, tubular, ca. 7 mm, glandular; lobes linear-lanceolate, glandular. Achenes yellowish fulvous, subcylindric, 3.5–4 mm, 3-ribbed adaxially, glabrous or subglabrous, glandular. Pappus 2-seriate, white; outer setae short; inner setae as long as corolla, scabrid. Fl. Jul–Nov.

• Open places on slopes, thickets, forest margins; 500–1300 m. Chongqing, Guizhou, Sichuan, Yunnan.

Material of *Vernonia bockiana* has been incorrectly identified as *V. arborea* or *V. esculenta* in several herbaria.

4. Vernonia esculenta Hemsley, J. Linn. Soc., Bot. 23: 401. 1888.

斑鸠菊 ban jiu ju

Gymnanthemum esculentum (Hemsley) H. Robinson; *Strobocalyx esculenta* (Hemsley) H. Robinson et al.; *Vernonia arbor* H. Léveillé; *V. papillosa* Franchet.

Shrubs or small trees, 2–6 m tall. Branches terete, ± angled, striate, gray or gray-brown tomentose. Petiole 5–20 mm, densely gray tomentulose; leaf blade oblong-lanceolate or lanceolate, 10–23 × 3–8 cm, thinly papery, abaxially pale, uniformly densely gray pilose to sparsely tomentulose on veins only, adaxially dark green, rather scabrid, papillose, glandular on both surfaces, lateral veins 9–13-paired, adaxially prominent, veinlets reticulate, base cuneate, rarely subrounded, mar-

gin mucronate-denticulate, repand, or entire, apex acute or acuminate. Synflorescences terminal, panicles dense, broad. Capitula many, 2–4 mm in diam.; peduncles 2–5 mm or almost absent, slender, densely tomentose. Involucre obconical, 2–3 mm wide, base acute; phyllaries few, ca. 4-seriate, dark green, ovate, ovate-oblong, or oblong, leathery, gray pilose, apex acute or rather acute, mucronulate. Receptacle small, foveolate. Florets 5 or 6; corolla reddish purple, tubular, ca. 7 mm, glandular, dilated toward apex; lobes linear-lanceolate, glandular. Achenes yellowish brown, subcylindric, ca. 3 mm, rather angled, sparsely puberulent and glandular. Pappus 2-seriate, white or sordid white; outer setae short; inner setae 6–7 mm, scabrid. Fl. Jul–Dec.

• Sunny places on slopes, grassy slopes, lax thickets, forests, forest margins; 1000–2700 m. W Guangxi, Guizhou, SW and W Sichuan, Yunnan.

Vernonia esculenta differs from *V. bockiana* in having smaller capitula with obconical involucres 2–3 mm in diam., 5 or 6 florets, and fewer phyllaries that are ca. 4-seriate, ovate or ovate-oblong, acute, and gray pilose on the margins.

5. Vernonia sylvatica Dunn, J. Linn. Soc., Bot. 35: 501. 1903.

林生斑鸠菊 lin sheng ban jiu ju

Strobocalyx sylvatica (Dunn) H. Robinson et al.

Scandent shrubs. Stems terete, striate, densely reddish brown pubescent. Petiole 5–10 mm, densely reddish brown pubescent; leaf blade ovate or oblong, 6–13 × 2–5.5 cm, papery, both surfaces densely pubescent along veins and concavely glandular, lateral veins 7- or 8-paired, adaxially prominent, veinlets reticulate, base obliquely rounded, margin entire or sometimes sinuately denticulate, apex shortly acute or acuminate, or obtuse. Synflorescences terminal, panicles broad. Capitula many, 7–12 mm in diam.; peduncles 5–15 mm; bracteoles 1 or 2, ovate-lanceolate. Involucre hemispheric, 3–5 mm; phyllaries ca. 4-seriate, black in center when dry, ovate or ovate-lanceolate, densely brownish pubescent, apex acute, outer short, ovate. Receptacle flat, foveolate. Florets ca. 10, 3–4 × as long as involucre; corolla purple or pink-purple, tubular, ca. 7 mm, lobes lanceolate, glandular. Immature achenes cylindric, ?4- or 5-ribbed, glabrous or sparsely puberulent. Pappus 2-seriate, white; outer setae very short; inner setae subequal to corolla, scabrid. Fl. and fr. Sep–Mar.

• Open forests in valleys, thickets on roadsides; 500–1900 m. Guangxi, Yunnan.

6. Vernonia chunii C. C. Chang, Sunyatsenia 3: 272. 1937.

少花斑鸠菊 shao hua ban jiu ju

Strobocalyx chunii (C. C. Chang) H. Robinson et al.

Scandent shrubs. Stems inconspicuously striate, fulvous tomentulose, mixed with glands. Leaf blade oblong or elliptic-oblong, rarely ovate, 7–13 × 2.8–5.7 cm, papery, gray or fulvous tomentulose except on veins, lateral veins 3–6-paired, adaxially prominent, veinlets reticulate, base rounded or attenuate, margin entire or repand, apex shortly acute, rarely rounded-obtuse. Synflorescences terminal, panicles broad. Capitula many, 3–5 mm in diam.; peduncles to 2 mm, fulvous tomentulose; bracteole 1, at base. Involucre tubular, 4–5 mm; phyllaries 4–6-seriate, midrib often purple, thinly leathery, ovate to oblong, 1-veined, dorsally and margin tomentulose, apex obtuse, rarely acute, outer short, ovate, 1–1.5 mm. Receptacle flat, subfoveolate. Florets 2 or 3; corolla violaceous, tubular, 5–6 mm, lobes linear-lanceolate, glabrous. Achenes suboblong, ca. 2.5 mm, inconspicuously 5-ribbed, glabrous, glandular. Pappus 2-seriate, white or dirty white; outer setae very short; inner setae ca. 6.5 mm, scabrid. Fl. and fr. Jul–Oct.

• Forests on slopes in valleys. Hainan.

2. Tarlmounia group

Tarlmounia H. Robinson et al.

One species: India, Myanmar, Thailand; introduced to China.

7. Vernonia elliptica Candolle in Wight, Contr. Bot. India, 5. 1834.

光耀藤 guang yao teng

Strobocalyx elliptica (Candolle) Schultz Bipontinus; *Tarlmounia elliptica* (Candolle) H. Robinson et al.

Scandent shrubs. Stems striate, all parts gray sericeous, hairs T-shaped. Petiole curved, ca. 2 mm; leaf blade elliptic-oblong, 2–6.5(–10) × 1–4(–6) cm, abaxially densely sericeous, adaxially sericeous on main veins, glabrous to thinly hairy between, lateral veins ca. 7-paired, base cuneate to rounded, margins entire, apex subacute. Synflorescences terminal and subterminal, panicles elongated, thyrselike. Capitula clustered at tips of branches. Involucre tubular, 3–4 × 1.5–2.5 mm; phyllaries ca. 4-seriate, tinged purple at tip, outer suborbicular, adpressed sericeous, apex rounded, inner oblong-elliptic. Florets 5; corolla pale pink, 5–6 mm, sparsely glandular, lobes ca. 2 mm. Achenes pale brown, cylindric-clavate, 1.8–2.2 mm, 5-angled, densely and minutely glandular. Pappus tawny-white; inner setae 4–5.5 mm, scabrid.

Occasionally cultivated, locally escaped and naturalized. S Taiwan [native to India, Myanmar, and Thailand].

This species is cultivated in Hong Kong.

3. Monosis group

Monosis Candolle.

Seven species: India to China; two species in China.

8. Vernonia volkameriifolia Candolle, Prodr. 5: 32. 1836 [*"volkameriaefolia"*].

大叶斑鸠菊 da ye ban jiu ju

Gymnanthemum volkameriifolium (Candolle) H. Robinson; *Monosis volkameriifolia* (Candolle) H. Robinson & Skvarla; *Vernonia acuminata* Candolle; *V. esquirolii* H. Léveillé

(1912), not Vaniot (1907); *V. leveillei* Fedde ex H. Léveillé; *V. punduana* Candolle.

Trees, 3–8 m tall. Branches robust, terete, yellowish brown tomentose. Petiole short and broad, basally often expanded into a sheath, 10–18 mm, densely tomentose; leaf blade obovate or obovate-cuneate, rarely oblong-oblanceolate, 15–50 × 4–20 cm, abaxially glabrous or sparsely pubescent on midrib, adaxially pubescent along veins, glandular, lateral veins 12–17-paired, veins adaxially raised, veinlets reticulate, base cuneately attenuate, margin sinuate or sparsely coarsely dentate, rarely entire, apex shortly acute or obtuse, rarely acuminate. Synflorescences terminal, panicles flat-topped, 20–30 cm, leafless, lower branches of panicles 8–10 cm. Capitula many, 5–8 mm in diam., densely fulvous tomentose. Involucre narrowly campanulate, 5–6 mm wide; phyllaries ca. 5-seriate, brownish or apically purplish, ovate or ovate-oblong, 3–6 mm, pubescent or ± glabrescent, apex acuminate, outer short and obtuse, inner rather acute. Receptacle flat, foveolate. Florets 10–12; corolla pink or reddish purple, tubular, 7–8 mm, glabrous, with short tube and narrowly campanulate limb; lobes linear-lanceolate, glandular. Achenes oblong-cylindric, 3–4 mm, 10-ribbed, glandular between ribs or ± puberulent. Pappus 2-seriate, white or dirty white; outer setae short; inner setae 8–9 mm. Fl. Oct–Apr.

Thickets or mixed forests in valleys; 800–1600 m. Guangxi, Guizhou, Xizang, Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

This taxon was first named invalidly as *"Conyza volkameriaefolia"* by Wallich (Numer. List, no. 3001. 1831) and listed as *"Eupatorium volkameriaefolium"* by Candolle (Prodr. 5: 33. 1836).

9. Vernonia parishii J. D. Hooker, Fl. Brit. India 3: 240. 1881.

滇缅斑鸠菊 dian mian ban jiu ju

Monosis parishii (J. D. Hooker) H. Robinson & Skvarla; *Vernonia laosensis* Gandoger; *V. volkameriifolia* Candolle var. *lanata* S. Y. Hu.

Small trees, rarely shrubs, 2–3 m tall. Stems erect, 1–1.5 cm in diam. at base, branches robust, terete, densely fulvous or brown tomentose. Petiole short and broad, 5–10 mm, densely tomentose; leaf blade obovate or oblanceolate, 10–30 × 4–9 cm, papery, abaxially sparsely minutely pubescent or ± glabrescent, adaxially fulvous or brown tomentose, glandular on both surfaces, lateral veins 7–12-paired, reticulate, base cuneately attenuate, margin obscurely toothed, rarely subentire, apex obtuse or subacute. Synflorescences terminal or axillary, panicles to 20 cm or more long. Capitula many, 5–8 mm in diam.; peduncles 2–5 mm or subsessile, densely tomentose; bracteoles ovate-lanceolate, at base. Involucre narrowly campanulate to subcylindric, 5–7 mm wide, white tomentose; phyllaries 5-seriate, purple, ovate, ovate-lanceolate, or oblong, 2–7 mm, outer short and obtuse, inner rather acute, white villous. Receptacle flat, foveolate. Florets ca. 10; corolla red-purple, tubular, ca. 7 mm, glandular, with dilated limb; lobes linear, apically glandular. Achenes yellowish brown, subcylindric, 2.5–3 mm, 3-ribbed adaxially, glabrous or subglabrous, glandular. Pappus 2-seriate, white; outer setae short; inner setae as long as corolla. Fl. Mar–May.

Thickets or mixed forests on slopes; 500–1700 m. SE and W Yunnan [Laos, Myanmar, Thailand].

4. Gymnanthemum group

Decaneurum Candolle, nom. illeg. superfl.; *Gymnanthemum* Cassini.

More than 40 species: mostly in Africa and Madagascar, extending into Asia; one species in China.

10. Vernonia extensa Candolle, Prodr. 5: 33. 1836.

展枝斑鸠菊 zhan zhi ban jiu ju

Gymnanthemum extensum (Candolle) Steetz; *Vernonia subarborea* Vaniot.

Shrubs or subshrubs, 2–3 m tall. Branches terete, striate, densely yellowish brown puberulent and glandular. Petiole 5–10 mm, densely puberulent; leaf blade oblong or oblong-lanceolate, 9–12 × 3–7.5 cm, thick or submembranous, abaxially densely or sparsely yellow puberulent, glandular, adaxially dark green, adpressed hispidulous or ± glabrescent, lateral veins 9- or 10-paired, veins abaxially ± raised, veinlets inconspicuously reticulate, base cuneately attenuate, margin mucronate-serrate, apex acuminate. Synflorescences usually terminal and subterminal, panicles lax or dense, flat-topped. Capitula many, 4–5 mm in diam.; peduncles (3–)5–8 mm; bracteoles 1 or 2, linear, densely yellowish puberulent and glandular. Involucre cylindric, 6–7 × 4–5 mm; phyllaries few, ca. 5-seriate, yellow-green or with reddish purple tip, leathery, concave, ovate-oblong, puberulent or subglabrous, apex obtuse, outermost very short, inner linear-oblong, 6–7 × 1–1.5 mm. Receptacle small and flat, foveolate. Florets 8–10; corolla white or reddish, tubular, 8–10 mm, glandular-puberulent; lobes linear-lanceolate, 2.5–3 mm, apically glandular. Achenes oblong-cylindric, ca. 4 mm, 10-ribbed, puberulent and glandular. Pappus 2-seriate, reddish; outer setae few, short; inner setae 8–10 mm, scabrid. Fl. Oct–Mar.

Open forests or thickets in valleys, roadsides on slopes; 1200–2100 m. Guizhou, Yunnan [Bhutan, India (Sikkim), Myanmar, Nepal].

This taxon was first named *"Conyza extensa"* (in Wallich, Numer. List, no. 3016. 1831), which is a nomen nudum and was therefore not validly published. Material of this species has been misidentified as *Vernonia cylindriceps* C. B. Clarke (see Merrill, Brittonia 4: 182. 1941).

5. Decaneuropsis group

Decaneuropsis H. Robinson & Skvarla.

Twelve species: SE Asia, China, India; four species (two endemic) in China.

11. Vernonia cumingiana Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 232. 1852.

毒根斑鸠菊 du gen ban jiu ju

Decaneuropsis cumingiana (Bentham) H. Robinson & Skvarla; *Gymnanthemum cumingianum* (Bentham) H. Robinson.

Scandent shrubs, 3–12 m. Stems terete, striate, densely ferruginous or gray-fulvous tomentose. Petiole 5–15 mm, densely ferruginous tomentulose; leaf blade ovate-oblong, oblong-elliptic, or oblong-lanceolate, 7–21 × 3–8 cm, thickly papery, abaxially puberulent except midrib and lateral veins, glabrous, or subglabrous, adaxially densely or more densely ferruginous pubescent, glandular on both surfaces, lateral veins 5–7-paired, joined near margin, veins adaxially prominent, veinlets conspicuously reticulate, base cuneate or subrounded, margin entire or rarely remotely sinuate, apex acute or shortly acuminate. Synflorescences terminal, often on short lateral branches, or axillary, sometimes more than 1 per axil, panicles often longer than wide. Capitula usually very many, 8–10 mm in diam.; peduncle 5–10 mm; bracteoles often 1 or 2, linear, densely ferruginous or gray-brown tomentulose and glandular. Involucre ovoid-globose or campanulate, 6–8 × 8–10 mm; phyllaries 5-seriate, ovate to oblong, ferruginous or fulvous tomentulose, apex obtuse or slightly acute, outer short, inner oblong, 6–7 × 1–1.5 mm. Receptacle flat, ca. 3 mm in diam., ferruginous puberulent, foveolate. Florets 18–21; corolla reddish or reddish purple, tubular, 8–10 mm, glandular; lobes linear-lanceolate, apically glandular. Achenes subcylindric, 4–4.5 mm, 10-ribbed, puberulent. Pappus 1- or 2-seriate, red or reddish brown; outer setae few or absent; inner setae 8–10 mm, scabrid-barbellate. Fl. Oct–Apr.

Climbing on trees in *Quercus* forests or thickets in valleys; 300–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Sichuan, Taiwan, Yunnan [Cambodia, Laos, Thailand, Vietnam].

The roots or stems can be used medicinally for lumbago, muscular strain of the lumbar region, and numbness of limbs, as well as for fever, malaria, toothache, and conjunctival hyperemia. The roots and stem contain the glucoside Vernonine.

There has been confusion between this and *Vernonia gratiosa* members of the possible segregate genus *Decaneuropsis* H. Robinson & Skvarla, with much material having been labeled as *V. andersonii* C. B. Clarke. Robinson and Skvarla include *V. andersonii* in their treatment of the tribe in China, but the material so named examined to date has proved to be *V. cumingiana*. In view of this confusion, *V. andersonii* has been included in the key to species. The error seems to have been first introduced by Forbes and Hemsley (J. Linn. Soc., Bot. 23: 400. 1888). Material has also been misidentified as *V. scandens* Candolle (e.g., Merrill, Lingnan Sci. J. 5: 182. 1927).

12. Vernonia gratiosa Hance, J. Bot. 20: 290. 1882.

台湾斑鸠菊 tai wan ban jiu ju

Decaneuropsis gratiosa (Hance) H. Robinson & Skvarla; *Vernonia andersonii* C. B. Clarke var. *albipappa* Hayata.

Scandent shrubs, to 3 m. Stems many, terete, striate, densely gray-brown tomentose. Petiole 4–10 mm, densely pubescent; leaf blade oblong or lanceolate-oblong, 6–12 × 1.5–4 cm, papery, abaxially sparsely puberulent or subglabrous, adaxially densely gray-green or gray-brown pubescent, lateral veins 6–12-paired, veins adaxially inconspicuously raised, veinlets reticulate, base cuneate-rounded, margin entire or laxly mucronulate, apex shortly acuminate. Synflorescences terminal or axillary, paniculate. Capitula several, 10–15 mm in diam.; peduncles 2–12 mm. Involucre campanulate, ca. 6 × 7 mm, usually 1/2 as long as pappus; phyllaries ca. 4-seriate, outer short, linear or linear-lanceolate, densely brown pubescent, apex acute, median and inner oblong. Receptacle rather convex, foveolate. Florets ca. 10; corolla purple, tubular, ca. 10 mm, tube ca. 5 mm, densely puberulent; lobes linear-lanceolate, glabrous. Achenes cylindric, rather compressed, 3–3.5 mm, 10-ribbed, puberulent. Pappus 2-seriate, sordid brown or reddish brown; outer setae very short, deciduous; inner setae 9–10 mm, scabrid-barbellate. Fl. and fr. Aug–Feb.

• Forest margins on slopes; 400–700 m. Fujian, Taiwan.

13. Vernonia blanda Candolle, Prodr. 5: 32. 1836.

喜斑鸠菊 xi ban jiu ju

Decaneuropsis blanda (Candolle) H. Robinson & Skvarla; *Vernonia tavoyana* C. E. C. Fischer.

Scandent shrubs, up to 3 m. Stems terete, distinctly striate, brown puberulent, rarely glabrous, glandular. Petiole 4–8 mm, puberulent; leaf blade elliptic or ovate-elliptic, rarely ovate-oblong, 4.5–12 × 2–5 cm, leathery, abaxially glabrous except midrib and lateral veins, glandular, adaxially glabrous, lateral veins 4- or 5-paired, veins adaxially prominent, base cuneate-rounded, margin entire, apex acuminate or shortly acute. Synflorescences terminal and axillary, panicles small, rarely solitary capitula in upper axils, ± thyrselike, leafy. Capitula usually 3–5, 7–8 mm in diam.; peduncles 5–8 mm, densely brown puberulent; bracteole 1, linear-lanceolate. Involucre narrowly campanulate, 8–10 × 5–7 mm; phyllaries 5- or 6-seriate, yellow-green, dark brown on veins, ovate or oblong-lanceolate, glabrous or subglabrous, 3-veined, margins ciliate especially in upper part, apex acute or rather acute, outer ca. 2 mm, inner 7–8 × ca. 1.5 mm. Receptacle foveolate. Florets 20–25; corolla purplish, tubular, 7–8 mm, tube ca. 3 mm, slender, limb funnelshaped; lobes lanceolate, glandular. Achenes subcylindric, 3–3.5 mm, ± angled, ribbed, patently puberulent and glandular. Pappus 1-seriate, reddish, ca. 8 mm. Fl. Sep–Feb.

Thickets or forests on slopes; 1700–2000 m. Guangxi, Xizang, Yunnan [India, Laos, Malaysia, Myanmar, Vietnam].

This taxon was first named *"Conyza blanda"* (in Wallich, Numer. List, no. 3033. 1831), which is a nomen nudum and was therefore not validly published. Material of this species was treated as *Vernonia scandens* by Gagnepain (in Lecomte, Fl. Gen. Indo-Chin. 3: 468. 1924).

14. Vernonia chingiana Handel-Mazzetti, Sinensia 7: 622. 1936.

广西斑鸠菊 guang xi ban jiu ju

Decaneuropsis chingiana (Handel-Mazzetti) H. Robinson & Skvarla.

Scandent shrubs, 1.5–3 m tall. Stems brown or olive-brown, distinctly striate, puberulent when young, glabrescent, sparsely yellow lenticellate, buds ferruginous tomentose. Petiole 5–15 mm, puberulent; leaf blade obovate-oblong or elliptic-oblong, 4–14 × 1.5–6.5 cm, leathery, brown when dry, glabrous,

nitid, adaxially adpressed puberulent, lateral veins 4- or 5-paired, midrib and lateral veins abaxially prominent, veinlets laxly reticulate, base cuneately attenuate into petiole, margin entire or laxly denticulate, reflexed, apex acute or acuminate, rarely obtuse or shortly acute. Synflorescences terminal and subterminal, ± racemelike, lower capitula subtended by well-developed leaves. Capitula 3–6, ca. 20 mm in diam.; peduncles 3–10 mm; bracteoles several, leaflike, densely puberulent. Involucre broadly campanulate, 12–15 × 15–20 mm; phyllaries ca. 5-seriate, hard, often overtopping disk, apically many striate, apex obtuse or rather acute, outer ovate, ca. 3 mm, inner sublanceolate or oblong-lanceolate, 8–10 × ca. 3 mm, with narrowly scarious margins, glabrous or ciliate on margins. Receptacle convex, 4–5 mm in diam., foveolate. Florets many, fragrant; corolla white, tubular, tube 10–11 mm, limb broadly campanulate; lobes lanceolate, acute, often reflexed, glabrous. Achenes cylindric, 7–9 mm, obscurely 7-ribbed, glabrous or sparsely puberulent. Pappus 2-seriate, yellow or fulvous; outer setae short, easily deciduous; inner setae ca. 12 mm, scabrid-barbellate.

• Open forests on stony mountains, on rocks, thickets on slopes; 400–600 m. Guangxi.

The roots and leaves of *Vernonia chingiana* are used for treating infantile convulsions and injuries of the skin.

6. Acilepis group

Acilepis D. Don; *Lysistemma* Steetz; *Xipholepis* Steetz.

Thirty-three species: India to China; 11 species (two endemic) in China.

15. Vernonia saligna Candolle, Prodr. 5: 33. 1836.

柳叶斑鸠菊 liu ye ban jiu ju

Acilepis saligna (Candolle) H. Robinson; *Aster coriaceifolius* H. Léveillé & Vaniot; *Vernonia longicaulis* Candolle; *V. martini* Vaniot; *V. seguinii* Vaniot.

Herbs, perennial, hard, 60–100(–200) cm tall. Stems erect, woody at base, to 8 mm in diam., terete, striate, sparsely adpressed-puberulent or subglabrous, glandular. Petiole short to almost absent; leaf blade elliptic-oblong or oblanceolate, 5–18 × 1–5 cm, papery, both surfaces scabrid-puberulent and glandular, lateral veins 7- or 8-paired, veins abaxially prominent, reticulate veins sometimes very prominent, base narrowly cuneate, margin remotely serrate, apex acuminate or acute. Synflorescences terminal or axillary, panicles flat-topped, leafy. Capitula usually 6–8, 5–8 mm in diam.; peduncles 5–8 mm, densely puberulent and glandular. Involucre narrowly campanulate, 5–7 × ca. 6 mm; phyllaries 4- or 5-seriate, reddish purple in upper part, ovate or oblong, 1.5–6 mm, scabrid, sparsely tomentose-ciliate or subglabrous, apex obtuse and mucronulate. Florets 16–20; corolla reddish pink to pale violet, occasionally ± white, tubular, 6–7 mm, with slender tube and narrowly campanulate limb; lobes lanceolate, glandular. Achenes cylindric, ca. 2 mm, 10-ribbed, glabrous, glandular. Pappus 1-seriate, setae whitish, ca. 7 mm, scabrid-barbellate. Fl. Sep–Feb.

Thickets or open forests on slopes; 500–1600(–2100) m. Guangdong, Guangxi, Yunnan [Bangladesh, India, Myanmar, Nepal, Vietnam, Thailand].

This taxon was first named *"Conyza saligna"* (in Wallich, Numer. List, no. 3061. 1831), which is a nomen nudum and was therefore not validly published.

The leaves are used to treat fever, including malaria.

16. Vernonia aspera Buchanan-Hamilton, Trans. Linn. Soc. London 14: 219. 1824.

糙叶斑鸠菊 cao ye ban jiu ju

Acilepis aspera (Buchanan-Hamilton) H. Robinson; *Eupatorium pyramidale* D. Don; *Vernonia pyramidalis* (D. Don) S. N. Mitra; *V. roxburghii* Lessing; *V. thorelii* Gagnepain; *Xipholepis aspera* (Buchanan-Hamilton) Steetz.

Herbs, perennial, 1–2 m tall. Stems erect, rigid, woody at base, 6–7 mm in diam., simple or rarely branched, green or reddish purple tinged, striate, pale fulvous hispidulous or subglabrous in lower part. Petiole very short to almost absent; leaf blade oblanceolate or obovate-lanceolate, rarely elliptic, 5–12 × 1.5–4.5 cm, stiffly papery, abaxially densely hispidulous, both surfaces glandular, adaxially papillose-hispidulous, lateral veins 7–10-paired, veins abaxially prominent, veinlets reticulate, base narrowly cuneate, margin serrate, obscure or subentire in lower part, apex acuminate or acute. Synflorescences terminal or subterminal, panicles usually (2 or)3–5, dense, flat-topped. Capitula 10–15 mm in diam., shortly pedunculate or subsessile. Involucre campanulate, ?10–12 × ca. 15 mm; phyllaries 5- or 6-seriate, purplish red at apex, ovate, oblong, or linear, 3–12 mm, sparsely pubescent or ± glabrescent, apex mucronulate. Receptacle flat, foveolate. Florets ca. 30; corolla reddish purple, tubular, 7–8 mm; lobes linear, glandular. Achenes oblong-cylindric, 2–2.5 mm, 10-ribbed, puberulent. Pappus 2-seriate, sordid white or ± reddish later; outer setae few, very short; inner setae 8–9 mm, scabrid-barbellate. Fl. Oct–Mar.

Open grasslands on slopes, roadsides; ca. 1400 m. Guizhou, Hainan, Yunnan [India, Laos, Myanmar, Nepal, Thailand, Vietnam].

The epithet was first introduced by Roxburgh as *"Eupatorium asperum"* (Hort. Bengal. 61. 1814), which is a nomen nudum. Merrill (Lingnan Sci. J. 5: 182. 1927) treated material of this species as *Vernonia teres* (a synonym of *V. squarrosa*).

17. Vernonia clivorum Hance, J. Bot. 7: 164. 1869.

岗斑鸠菊 gang ban jiu ju

Acilepis clivorum (Hance) H. Robinson; *Vernonia kingii* C. B. Clarke.

Herbs, perennial, 50–90 cm tall. Stems erect, simple or rarely branched, angled or striate, puberulent, densely in upper part. Petiole 3–5 mm, puberulent; leaf blade oblong or oblong-lanceolate, 7–12 × 1.5–5 cm, papery, abaxially puberulent and glandular along veins, adaxially glabrous or sparsely puberulent along midrib, lateral veins 7- or 8-paired, veins abaxially convex, veinlets reticulate, base broadly cuneate or rounded, margin entire basally, sparsely serrate toward leaf apex, apex acuminate or shortly acuminate. Synflorescences terminal and sub-

terminal, panicles small, divaricately branched, ± grouped into thyrse. Capitula up to 4, 6–8 mm in diam.; peduncles slender, 8–21 mm, puberulent; bracteoles mostly clustered below involucre, ca. 1 mm, linear. Involucre bowl-shaped, 6–7 × 6–8 mm; phyllaries 5-seriate, green or purple-red at apex, scarious, upper part arachnoid pubescent and glandular, apex acute, mucronulate, outer short, subulate, inner 6–8 × ca. 1 mm, with narrowly scarious margins. Receptacle flat, fimbriate, foveolate. Florets 15–20; corolla purple, tubular, 6–8 mm, glabrous, sparsely glandular. Achenes oblong-cylindric, 3–3.5 mm, 10-ribbed, hispidulous and glandular. Pappus 2-seriate, white; outer setae short; inner setae ca. 6 mm, scabrid-barbellate. Fl. Oct–Feb.

Open places in valleys or thickets by lakes; ca. 1900 m. Guangdong, S Yunnan [Myanmar].

Dunn and Tutcher (Bull. Misc. Inform. Kew, Addit. Ser. 10: 138. 1912) treated material of this species as *Vernonia saligna*.

18. Vernonia attenuata Candolle, Prodr. 5: 33. 1836.

狭长斑鸠菊 xia chang ban jiu ju

Acilepis attenuata (Candolle) H. Robinson & Skvarla.

Herbs, perennial, 30–70 cm tall or more. Stems erect, ± woody at base, simple or inflorescence-branched in upper part, green, striate, adpressed puberulent and glandular. Leaves clustered below synflorescence branches; petiole sometimes absent, 2–5 mm, densely puberulent; leaf blade of lower leaves obovate or obovate-elliptic, rarely obovate-oblong, 7–14 × 3–5 cm, thinly leathery, abaxially sparsely puberulent along veins, adaxially glabrous, concavely glandular, lateral veins 6–8-paired, convex, veinlets prominently reticulate on both surfaces, base broadly cuneate or subrounded, margin sparsely mucronulate-denticulate, apex acuminate or shortly acute, rarely obtuse; upper leaves few, remote, linear or linear-lanceolate, 3.5–12 × 0.8–2 cm, base rounded, margin inconspicuously finely toothed or subentire, apex acuminate. Synflorescences terminal, lax, flat-topped panicles sometimes plus solitary, axillary capitula at lower nodes. Capitula usually 3–5, 10–12 mm in diam.; peduncles 7–15(–20) mm, densely yellowish puberulent and glandular; bracteole 1, at base. Involucre obconical, 8–10 × ca. 8 mm; phyllaries 6-seriate, green or apically reddish purple, oblong to linear, margin and apex yellowish puberulent, dorsally subglabrous, apex subscarious, apiculate, outer short and small, subulate, inner ca. 8 × 1 mm, glabrous, with narrowly scabrid margins. Receptacle flat, foveolate. Florets 15–20; corolla reddish purple, tubular, 7–8 mm, sparsely glandular; lobes linear-lanceolate, glandular at apex. Achenes subcylindric, ca. 3 mm, 10-ribbed, densely villous and glandular. Pappus 2-seriate, white; outer setae few, short; inner setae ca. 6 mm, scabrid. Fl. Oct–Feb. $2n = 18$.

Thickets or lax forests in valleys; 600–1100 m. S Yunnan [India (Sikkim), Myanmar].

The taxon was first named *"Conyza attenuata"* (in Wallich, Numer. List, no. 3030. 1831), which is a nomen nudum and was therefore not validly published.

19. Vernonia divergens (Candolle) Edgeworth, J. Asiat. Soc. Bengal 21: 172. 1853.

叉枝斑鸠菊 cha zhi ban jiu ju

Decaneurum divergens Candolle in Wight, Contr. Bot. India, 8. 1834; *Acilepis divergens* (Candolle) H. Robinson & Skvarla; *Eupatorium divergens* Roxburgh (1832), not Lessing (1830); *Lysistemma divergens* (Candolle) Steetz; *L. multiflorum* Steetz; *Vernonia nilgherryensis* Candolle.

Shrubby herbs, (0.6–)1–3 m tall. Stems erect, robust, divaricately branched, striate, red-brown pubescent-tomentulose, more densely so in upper part and branches. Petiole 5–7 mm, densely tomentulose; leaf blade elliptic-ovate or lanceolate, 5–12 × 2.5–10 cm, abaxially yellowish or reddish brown tomentose, denser along veins, adaxially papillose-scabrid-hairy, lateral veins 7-paired, veinlets reticulate, base cuneately attenuate, margin shallowly serrate, apex acuminate or shortly acute. Synflorescences usually terminal, panicles many branched, flat-topped. Capitula many; peduncles very short. Involucre campanulate, 5–6 mm wide; phyllaries 3- or 4-seriate, with greenish or purplish tip, ovate-oblong or ovate, 1–5 mm, puberulent or subglabrous, apex obtuse or shortly acute, outer short, ovate. Receptacle flat or rather convex, foveolate. Florets 8–12; corolla pink, tubular, 5–6 mm; lobes acute, glabrous. Achenes subcylindric, conspicuously 10-ribbed, glabrous, glandular between ribs. Pappus 2-seriate, sordid white or reddish; setae linear-lanceolate. $2n = 18$.

Grasslands, thickets, forest margins; 1000–2400 m. Guangxi, Guizhou, Yunnan [Laos, Myanmar, N Thailand].

Candolle included the illegitimate name *Eupatorium divergens* within his new species.

20. Vernonia nantcianensis (Pampanini) Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 608. 1937.

南漳斑鸠菊 nan zhang ban jiu ju

Vernonia bracteata Wallich ex C. B. Clarke var. *nantcianensis* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 18: 98. 1911; *Acilepis nantcianensis* (Pampanini) H. Robinson; *V. silhetensis* (Candolle) Handel-Mazzetti var. *nantcianensis* (Pampanini) Handel-Mazzetti.

Herbs, annual or perennial, 50–80(–100) cm tall. Stems erect or ascending branched above, distinctly striate, sparsely scabrid, rarely subglabrous and glandular hairy. Petiole 5–15 mm; leaf blade ovate or lanceolate-elliptic, 3–10 × 1–4 cm, thinly papery, abaxially puberulent and glandular along veins, adaxially sparsely adpressed hispidulous, lateral veins 5–7-paired, midrib and lateral veins adaxially inconspicuous, base cuneately attenuate into petiole, margin laxly serrate at middle, apex acuminate. Synflorescences terminal or axillary. Capitula solitary, 13–15 mm in diam.; peduncles robust, rather dilated above, densely puberulent and glandular. Involucre campanulate, 10–13 × 12–15 mm; phyllaries 5- or 6-seriate, upper part and margin purple-red, ovate to ovate-oblong, densely pubescent, apex mucronulate, inner 1.5–2.2 mm, acuminate. Receptacle slightly convex, foveolate. Florets many; corolla pink-purple, tubular, ca. 12 mm, with 7–8 mm tube and campanulate limb; lobes linear-lanceolate, glandular. Achenes dark brown, cylindric, ca. 4 mm, 10-ribbed, sparsely sericeous, eglandular. Pappus 1-seriate, yellowish brown; outer setae short, easily deciduous; inner setae 7–8 mm, scabrid. Fl. and fr. Aug–Oct.

● Forest margins in valleys or on slopes; 700–2000 m. W Hubei, Sichuan.

21. Vernonia silhetensis (Candolle) Handel-Mazzetti, Symb. Sin. 7: 1084. 1936.

反苞斑鸠菊 fan bao ban jiu ju

Decaneurum silhetense Candolle, Prodr. 5: 67. 1836; *Acilepis silhetensis* (Candolle) H. Robinson; *Gymnanthemum silhetense* (Candolle) Schultz Bipontinus; *Vernonia bracteata* Wallich ex C. B. Clarke; *V. bracteata* var. *subserrata* Hosseus; *V. silhetensis* var. *subserrata* (Hosseus) Craib ex Kerr; *Xipholepis silhetensis* (Candolle) Steetz.

Erect herbs, to 60 cm tall or more. Stems erect, terete, striate, purplish hispidulous, denser toward apex, sparsely glandular. Leaves rather crowded, mostly uniform in size; petiole ± absent; leaf blade oblanceolate, 5.5–9 × 2.1–2.5 cm, stiffly papery, abaxially hispidulous on veins, glandular, adaxially sparsely minutely hispidulous between veins, eglandular, lateral veins 5–7-paired, adaxially prominent, reticulate veins abaxially very prominent, base cuneate, sometimes ± attenuate into petiole, margin sparsely serrate to subentire, apex acute or slightly acuminate; upper leaves smaller. Synflorescences terminal and subterminal, forming ill-defined panicle, sometimes reduced to single capitulum. Capitula 1–5 or more, 15–25 mm in diam.; peduncle to 5 cm, very variable, densely hispidulous, often with leaflike bracteoles. Involucre campanulate, 15–20 × 15–25 mm; phyllaries 5- or 6-seriate, upper part dark purplish, outer ovate to lanceolate, arachnoid when young, apex acuminate, often recurved, innermost oblong-oblanceolate, ca. 2.5 mm wide, apex often obtuse. Florets more than 50; corolla deep rose-purple, tubular, ca. 12 mm, sparsely glandular toward apex. Achenes cylindric, 2.5–3 mm, 10-ribbed, glabrous, glandular. Pappus 1-seriate, off-white; setae ca. 10 mm.

Open dry stony meadows at forest margins; 1300–1800(–3000) m. Yunnan [Bhutan, Cambodia, India, Myanmar, Thailand].

H. Koyama (Bull. Natl. Sci. Mus., Tokyo, B 30: 28. 2004) placed all collections from outside Assam in *Vernonia silhetensis* var. *subserrata* and included *V. spirei* within this taxon.

22. Vernonia doichangensis H. Koyama, Bull. Natl. Sci. Mus., Tokyo, B 30: 22. 2004.

泰国斑鸠菊 tai guo ban jiu ju

Acilepis doichangensis (H. Koyama) H. Robinson & Skvarla.

Herbs, perennial, 0.5–2 m tall. Rootstock a woody rhizome. Stems erect, branched above, terete, finely striate, shortly pubescent throughout. Petiole to 5 mm; leaf blade elliptic to oblanceolate, 7–15 × 2–5.5 cm, abaxially shortly pubescent, adaxially sparsely scaberulous, both surfaces gland-dotted, base cuneate, margin subentire or remotely serrulate, apex acute or acuminate; upper leaves gradually smaller. Synflorescences terminal and axillary, thyrselike, panicles small, relatively long pedunculate, axillary ones narrowly divergent from main axis. Capitula to 5, clustered at tips of branches, ca. 20 mm in diam.; peduncle to 15 mm, shortly pubescent. Involucre narrowly campanulate, ca. 12 × 20 mm; phyllaries ca. 6-seriate, outer ovate, apex acuminate, spreading, often shortly recurved, inner lanceolate, lanate, gland-dotted toward apex, apex acute. Receptacle alveolate, glabrous. Florets ca. 35; corolla reddish- or purplish violet, lilac, or purple, ca. 10 mm, gland-dotted lobes ca. 5 mm. Achenes pale brown, cylindric, ca. 5 mm, 10-ribbed, glabrous. Pappus 2-seriate, straw-colored; outer setae few, 1.5–3 mm, caducous; inner setae ca. 8 mm. $2n = 54$.

Yunnan [Thailand].

In his protologue, H. Koyama cited a collection from China for this species (Yunnan: Tien-sin, *Maire s.n.* (P)), but that specimen has not been seen by the present authors.

23. Vernonia spirei Gandoger, Bull. Soc. Bot. France 54: 194. 1907.

折苞斑鸠菊 zhe bao ban jiu ju

Acilepis spirei (Gandoger) H. Robinson; *Serratula darrisii* H. Léveillé; *Vernonia stibaliae* Handel-Mazzetti.

Herbs, perennial, 40–80 cm tall. Stems erect, hard, branched, rarely simple, distinctly striate, ferruginous puberulent. Petiole 3–5 mm, densely pubescent; leaf blade elliptic-obovate or oblong-lanceolate, rarely oblanceolate, 5–12 × 2.5–4 cm, thickly papery, abaxially or along veins puberulent and white glandular, adaxially dark green, slightly scabrid, hispidulous, lateral veins 5–7-paired, veins abaxially prominent, veinlets reticulate, base rather narrowed or cuneately attenuate, margin sparsely serrulate or serrate, apex shortly acute or acuminate, or sometimes obtuse. Synflorescences terminal, ± racemelike, leafy. Capitula few, sometimes solitary, 15–20 mm; peduncle 3–9 cm, densely ferruginous pubescent, often with 1 or 2 reduced leaflets. Involucre conic or subspheroidal, 10–15 × 15–20 mm; phyllaries 6-seriate, green or apex reddish purple, outer subulate, short, yellow or yellowish brown arachnoid villous, abruptly attenuate into 3–5 mm recurved mucro, median ovate or ovate-oblong, inner linear, 10–12 × ca. 1.5 mm, margins broadly scarious, sparsely puberulent, apex red-purple, ± lacerate, hardly mucronate. Receptacle flat, ca. 5 mm in diam., foveolate. Florets many; corolla tubular, 9–10 mm, glandular; lobes linear-lanceolate, 3–4 mm, glandular. Achenes oblong-cylindric, ca. 4 mm, 10-ribbed, adpressed puberulent, glandular. Pappus 2-seriate, yellowish brown; outer setae few, short; inner setae ca. 8 mm, scabrid. Fl. Sep–Nov.

Grasslands, thickets, forest margins; 1000–2400 m. Guangxi, Guizhou, Yunnan [Laos].

24. Vernonia squarrosa (D. Don) Lessing, Linnaea 6: 627. 1831.

刺苞斑鸠菊 ci bao ban jiu ju

Acilepis squarrosa D. Don, Prodr. Fl. Nepal. 169. 1825; *Vernonia rigiophylla* Candolle; *V. squarrosa* var. *orientalis* Kitamura; *V. teres* Wallich ex Candolle.

Herbs, perennial, 15–35 cm tall or higher. Stems erect, hard, usually simple, terete, finely striate, rather scabrid, adpressed brownish puberulent and glandular. Leaves crowded together; petiole short to almost absent; leaf blade obovate, elliptic-obovate, or oblong-lanceolate, 5–8 × 1.5–2.5 cm, hard, abaxially sparsely adpressed puberulent and glandular, adaxially and marginally scabrid-papillose or scabrid-hairy, lateral

veins 6-paired, veins adaxially prominent, veinlets conspicuously reticulate, base attenuate or sometimes rounded, margin finely serrate, apex shortly acute or obtuse. Synflorescences terminal and axillary. Capitula solitary, 20–25 mm in diam.; peduncle short to almost absent, with reduced leaflets. Involucre obconic, 15–16 × ca. 15 mm; phyllaries 6-seriate, with red-purple tinge, outer short, subulate or subulate-lanceolate, white arachnoid tomentose, glandular, apex rigid-spinescent, median oblong-lanceolate, inner sublinear, 14–15 × ca. 1 mm, margins narrowly scarious, glabrous, apex long acuminate. Receptacle flat and foveolate. Florets 30–50; corolla reddish purple or purple, tubular, 13–14 mm, glandular; lobes linear, ca. 4 mm, apically glandular. Achenes oblong-cylindric, 3–4 mm, 10-ribbed, densely sericeous, glandular. Pappus 2-seriate, sordid white or yellowish; outer setae few, short; inner setae 8–9 mm, scabrid. Fl. Sep–Nov. $2n = 36$.

Grassy slopes; 1200–1800 m. Yunnan [Bhutan, Cambodia, India, Myanmar, Nepal, Thailand, Vietnam].

25. Vernonia albosquama Y. L. Chen, Kew Bull. 39: 157. 1984.

白苞斑鸠菊 bai bao ban jiu ju

"Small tree." Branches robust, striate, buds densely ferruginous tomentose. Petiole stout, 3–7 mm, densely ferruginous tomentose; leaf blade ovate-oblanceolate or oblanceolate, 11–18 × 3–7.5 cm, leathery or thinly leathery, brownish when dry, abaxially densely brownish fulvous tomentose, adaxially puberulent, glabrescent later, lateral veins 18–20, midrib and lateral veins abaxially prominent, reticulate veins prominent on both surfaces, base cuneate, margin obscurely denticulate and callose-mucronulate, apex shortly acuminate or acute. Synflorescences terminal and subterminal, panicles flat-topped, subglobose. Capitula 8 or 9, up to 30 mm in diam.; peduncle 1.5–4 cm, densely fulvous tomentose; bracteoles linear-lanceolate. Involucre obconical, ca. 25 × 30 mm; phyllaries 7- or 8-seriate, leathery, outer ovate, 3–4 × 2–2.5 mm, median ovate-oblong, 8–10 × ca. 4 mm, inner oblong, 15–17 × 2.5–3 mm, densely yellowish tomentose and glandular, apex rounded. Florets many; corolla reddish, ca. 12 mm, glandular and puberulent; lobes lanceolate, 3–4 mm, apex white pilose. Achenes cylindric, 7–8 mm, 10-ribbed, sparsely adpressed puberulent and glandular. Pappus 2-seriate, sordid white; outer setae few, scalelike; inner setae ca. 11 mm, scabrid. Fl. Jun.

● Mixed forests on limestone hills. Guangxi (Jishan).

One of us (Gilbert) believes that this species belongs with the group of species placed by Robinson in *Acilepis* and that the description of it as a "tree" is rather misleading. Based on the image of the herbarium sheet, it seems much more likely that it came from a robust erect herb, perhaps with a single stem and hence the description as a small tree.

7. Cyanthillium group

Cyanopis Blume; *Cyanthillium* Blume; *Isonema* Cassini (1817), not R. Brown (1810); *Seneciodes* Linnaeus ex Post & Kuntze.

More than seven species: tropical Africa, E and SE Asia, Oceania, widely adventive; four species in China.

26. Vernonia cinerea (Linnaeus) Lessing, Linnaea 4: 291. 1829.

夜香牛 ye xiang niu

Conyza cinerea Linnaeus, Sp. Pl. 2: 862. 1753; *Blumea chinensis* (Linnaeus) Candolle (1836), not Walpers (1843), nor Hooker & Arnott (1837); *B. esquirolii* H. Léveillé & Vaniot; *Cacalia cinerea* (Linnaeus) Kuntze; *Conyza chinensis* Linnaeus; *Cyanthillium cinereum* (Linnaeus) H. Robinson; *Seneciodes cinerea* (Linnaeus) Kuntze; *Serratula cinerea* (Linnaeus) Roxburgh; *Vernonia abbreviata* Candolle; *V. cinerea* var. *parviflora* (Reinwardt) Candolle; *V. exilis* Miquel; *V. parviflora* Reinwardt ex Blume.

Herbs, annual or perennial, to 100 cm tall. Root vertical, ± woody, branched, with fibrous rootlets. Stems erect, usually branched above, or rarely from base, striate, gray adpressed puberulent with T-shaped hairs, glandular. Lower and middle leaves: petiole 10–20 mm, leaf blade rhombic-ovate, rhombic-oblong, or ovate, 3–6.5 × 1.5–3 cm, abaxially gray-white or yellowish puberulent, especially along veins, both surfaces glandular, adaxially green, sparsely puberulent, lateral veins 3- or 4-paired, base cuneately attenuate into winged petiole, margin remotely mucronate-serrate, or repand, apex acute or slightly obtuse; upper leaves progressively smaller, shortly petiolate or subsessile, narrowly oblong-lanceolate or linear. Synflorescences terminal, flat-topped, panicles branching often rather divaricate. Capitula many, rarely few, 6–8 mm in diam.; peduncle 5–15 mm; bracteoles linear, sometimes absent, densely puberulent. Involucre campanulate, 4–5 × 6–8 mm; phyllaries 4-seriate, green or sometimes becoming purple, outer linear, 1.5–2 mm, puberulent and glandular, apex acuminate, median linear, inner linear-lanceolate, spinescent, 1-veined or sometimes conspicuously 3-veined in upper part. Receptacle flat, foveolate. Florets 19–28; corolla reddish purple, tubular, 5–6 mm, sparsely puberulent, glandular; lobes linear-lanceolate, puberulent and glandular at apex. Achenes cylindric, ca. 2 mm, densely puberulent and glandular. Pappus 2-seriate, white; outer setae many, short; inner setae 4–5 mm, scabrid. Fl. year-round. $2n = 18$.

Weed of open disturbed sites. Fujian, Guangdong, Guangxi, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Indonesia, Japan, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Arabia, Australia, Pacific islands; introduced to the Americas].

Vernonia cinerea is used medicinally for a variety of purposes, including to reduce fever, draw out pus, promote digestion, relieve dyspepsia, and as a tranquilizer and sedative.

Dwarf plants, usually less than 20 cm tall, with smaller capitula and more sparsely hairy leaves are sometimes placed in *Vernonia cinerea* var. *parviflora* (Reinwardt) Candolle (Prodr. 5: 24. 1836; 小花夜香牛 xiao hua ye xiang niu).

27. Vernonia benguetensis Elmer, Leafl. Philipp. Bot. 1: 361. 1908.

本格特斑鸠菊 ben ge te ban jiu ju

Herbs, perennial, 45–55 cm tall. Stems erect, branched above, subglabrous. Middle stem leaves linear-elliptic, ca. 3 ×

0.8 cm, abaxially pubescent, especially along veins, gland-dotted, adaxially subglabrous, base cuneate, margin subentire, apex obtuse; upper leaves progressively smaller, linear. Synflorescences terminal, flat-topped, panicles to ca. 10 cm wide. Capitula ca. 10 mm in diam. Involucre campanulate, 5–6 mm; phyllaries 5-seriate, outer linear, ca. 2 mm, brownish pubescent and glandular, apex acuminate, median linear-lanceolate, awn-tipped. Florets to 20; corolla violet, 6–7 mm. Achenes densely shortly hispid. Pappus 2-seriate, brownish white; outer setae ca. 0.1 mm; inner setae 4–5 mm, scabrid.

Yunnan [Philippines, Thailand].

Vernonia benguetensis is included on the basis of the collection *Legendre 1841* (P), as cited by H. Koyama (Bull. Natl. Sci. Mus., Tokyo, B 24: 110. 1998).

28. Vernonia maritima Merrill, Philipp. J. Sci., C, 3: 440. 1909.

滨海斑鸠菊 bin hai ban jiu ju

Cyanthillium maritimum (Merrill) H. Robinson & Skvarla.

Dwarf subshrubs, 7–10 cm tall, rarely higher. Stems often curved or procumbent, obliquely ascending in upper part, many branched, striate, gray-white hispidulous. Lower leaves withered by anthesis, middle leaves many, closely spaced; leaf blade spatulate, 1.5–2.5 × 0.4–0.7 cm, densely gray-white hispidulous, base progressively attenuate into slender petiole, margin entire or repand, apex rounded or obtuse; upper leaves smaller, spatulate. Synflorescences terminal, panicles ± flat-topped. Capitula few, usually 3–5, 5–7 mm in diam.; peduncle 5–12 mm; bracteoles 1 or 2, subulate, densely hispidulous. Involucre ca. 4 × 5–7 mm; phyllaries 5-seriate, outer subsubulate, 1.5–2 mm, spinescent, puberulent, median ovate, ca. 3 mm, apex acute and mucronulate, inner oblong, sparsely puberulent, with scarious margins. Receptacle flat, foveolate. Florets more than 20; corolla tubular, ca. 2.5 mm, with campanulate limb; lobes lanceolate, apically glandular. Achenes subcylindric, 1–1.2 mm, 5-angled, glandular between ribs or sometimes sparsely puberulent, apex truncate. Pappus 1-seriate, white, ca. 1 mm, readily deciduous.

Taiwan [Philippines].

"*Vernonia maritima* Hayata" (J. Coll. Sci. Imp. Univ. Tokyo 22: 202. 1906) is a nomen nudum not mentioned by Merrill.

29. Vernonia patula (Aiton) Merrill, Philipp. J. Sci., C, 3: 439. 1909.

咸虾花 xian xia hua

Conyza patula Aiton, Hortus Kew. 3: 184. 1789; *Cacalia patula* (Aiton) Kuntze; *Cyanopis madagascariensis* Candolle; *Cyanthillium patulum* (Aiton) H. Robinson; *C. pubescens* Blume; *C. villosum* Blume; *Isonema ovata* Cassini; *Staehelina conyzoides* Sprengel, nom. illeg. superfl.; *Vernonia chinensis* Lessing; *V. kawakamii* Hayata; *V. pratensis* Klatt.

Herbs, annual, 30–90 cm tall. Root vertical, with many fibrous rootlets. Stems erect, many branched, branches spreading, terete, conspicuously striate, gray puberulent and glandular. Lower leaves withered by anthesis; middle and upper leaves: petiole 1–2 cm, upper part winged; leaf blade ovate, ovate-elliptic, rarely orbicular, 2–9 × 1–5 cm, abaxially densely adpressed gray pubescent and glandular, adaxially green, sparsely puberulent or glabrous, lateral veins 4- or 5-paired, ascending, base broadly cuneate into petiole, margin crenate-mucronate toothed, repand, or subentire, apex obtuse or rather acute; upper leaves gradually smaller. Synflorescences terminal, panicles broad, often flat-topped. Capitula usually 2 or 3 clustered at tips of branches, 8–10 mm in diam.; peduncle 5–25 mm, densely sericeous-villous; bracteoles absent. Involucre compressed spheroidal, 6–7 × 8–10 mm, base rounded, ± concave; phyllaries 4- or 5-seriate, green or rather purple, with straw-colored margins, lanceolate, 3–4 mm, subleathery, sericeous-villous and glandular, apex subspinelike-acuminate, outermost spreading, median and inner narrowly oblong-lanceolate, ca. 6 mm, spiculate. Receptacle slightly convex, foveolate. Florets 75–100; corolla reddish purple, tubular, 4–5 mm; lobes linear-lanceolate, puberulent and glandular, apex acute. Achenes subcylindric, 1–1.5 mm, 4- or 5-angled, glabrous, glandular. Pappus 1-seriate, white; setae 2–3 mm, scabrid, easily deciduous. Fl. Jul–May.

Open places on slopes, fields, and roadsides. Fujian, Guangdong, Guangxi, Guizhou, Taiwan, Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam; Madagascar; introduced to the Caribbean].

Vernonia patula is a medicinal plant, and its many uses include reducing fevers and treating malaria, stomach and intestinal disorders, and common cold headaches.

"*Vernonia patula* Martius ex Candolle" (Prodr. 5: 55. 1836) appears to be an unpublished name for the Brazilian taxon *V. tricholepis* Candolle.

8. Khasianthus group

Khasianthus H. Robinson & Skvarla.

One species: China, India, Myanmar.

30. Vernonia subsessilis Candolle var. **macrophylla** J. D. Hooker, Fl. Brit. India 3: 230. 1881.

腾冲斑鸠菊 teng chong ban jiu ju

Khasianthus subsessilis H. Robinson & Skvarla var. *macrophyllus* (J. D. Hooker) H. Robinson & Skvarla.

Herbs, to 60 cm tall or more. Stems erect or ascending, few branched, terete, striate, densely adpressed gray puberulent. Lower leaves lost by anthesis; middle and upper leaves: petiole to 5 mm, abaxially densely pubescent, adaxially shallowly channeled, almost flat; leaf blade oblanceolate, papery, abaxially puberulent when very young, soon glabrous except for puberulent main veins, adaxially glabrous except for very minutely puberulent midvein, lateral veins 9–12-paired, adaxially prominent, reticulate veins prominent on both surfaces, base minutely rounded, margin coarsely toothed to subentire, apex rounded. Synflorescences terminal, panicles ± flat-topped to

somewhat elongated, lower branches subtended by leaflike bracts. Capitula peduncle bracteoles several just below involucre, linear. Involucre obconic, 10–12 mm; phyllaries 5- or 6-seriate, subulate or subulate-lanceolate, sparsely pubescent, apex acute, sometimes recurved, outer much shorter, almost subulate, inner 10–12 × ca. 0.8 mm. Florets 40–50; corolla mauve, tubular, ca. 14 mm, sparsely glandular; lobes linear, ca. 3.5 mm. Immature achenes cylindric, 2–2.5 mm, 10-ribbed, densely sericeous. Pappus 2-seriate, pale reddish; outer setae few, short; inner setae to 13 mm.

Yunnan [India, Myanmar, Nepal].

The variety recognized here, as seen in the collection *Rock 7839* from between Tengyueh in Yunnan and Bhamo in N Myanmar, has leaf apex almost rounded and synflorescences nearly racemiform rather than broadly corymbiform. The leaves are also somewhat more pubescent abaxially. In Rock's field notes, on file in US, this collection is cited as "one day from Tengyueh," evidently inside China.

9. Baccharoides group

Ascaricida (Cassini) Cassini; *Baccharoides* Moench; *Candidea* Tenore; *Stengelia* Steetz; *Vernonia* subg. *Ascaricida* Cassini.

About 25 species: mostly African; one species in China.

31. Vernonia anthelmintica (Linnaeus) Willdenow, Sp. Pl. 3: 1634. 1803.

驱虫斑鸠菊 qu chong ban jiu ju

Conyza anthelmintica Linnaeus, Sp. Pl., ed. 2, 2: 1207. 1763; *Ascaricida anthelmintica* (Linnaeus) Sweet; *A. indica* Cassini, nom. illeg. superfl.; *Baccharoides anthelmintica* (Linnaeus) Moench; *Centratherum anthelminticum* (Linnaeus) Gamble; *Phyllocephalum anthelminticum* (Linnaeus) S. R. Paul & S. L. Kapoor; *Serratula anthelmintica* (Linnaeus) Roxburgh; *Vernonia stenolepis* Oliver.

Herbs, annual, up to 60 cm tall. Stems erect, robust, branched above, conspicuously canaliculate, glandular-pubescent. Leaves ovate, ovate-lanceolate, or lanceolate, 1.5–4.5 cm, membranous, both surfaces shortly pubescent, adaxially glandular, lateral veins 8-paired or more, veinlets fine and dense, reticulate, base attenuate into petiole, margin coarsely or sharply serrate, apex acute or acuminate. Synflorescences terminal, laxly corymbose. Capitula many, 15–20 mm in diam.; peduncle 5–15 mm, often bearing linear bracts, apically dilated, densely shortly pubescent and glandular. Involucre hemispheric; phyllaries 3-seriate, green, leaflike, subequal, outer slightly patent, 10–12 mm, pubescent and glandular, median oblong-linear, acute, inner oblong, somewhat membranous, acute; all bracts reflexed in fruit. Receptacle flat or rather concave, areolate. Florets 40–50; corolla purplish, tubular, 9–12 mm, with 6–7 mm slender tube and narrowly campanulate limb; lobes 5, lanceolate. Achenes black, cylindric, 4–5 mm, 10-ribbed, pubescent, glandular between ribs. Pappus 2-seriate, reddish; outer setae to 1.8 mm, scalelike, shiny, deciduous; inner setae 5.5–8 mm, rigid, flattened. Fl. Nov–Feb.

Grasslands, roadsides. SW Yunnan [Afghanistan, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka; Africa].

88. DISTEPHANUS Cassini, Bull. Sci. Soc. Philom. Paris 1817: 151. 1817.

黄花斑鸠菊属 huang hua ban jiu ju shu

Antunesia O. Hoffmann; *Gongrothamnus* Steetz; *Newtonia* O. Hoffmann (1892), not Baillon (1888).

Shrubs, sometimes climbing; indumentum of simple hairs and sessile globose glands. Leaves alternate, petiolate or subsessile, often ill-defined, margin entire, 3-veined. Synflorescence terminal, paniculate. Involucre campanulate or hemispheric; phyllaries to 6-seriate, imbricate, apex acute to long acuminate. Florets many; corolla golden yellow. Pappus double, outer pappus of short bristles, inner pappus of many distinctly flattened, scabrid, barbellate or plumose bristles, persistent.

Forty or more species: most numerous in Madagascar, also in Africa, SW China, and India; two species (both endemic) in China.

1a. Capitula usually 3–7 together in dense flat-topped panicles; involucre 12–18 mm in diam.; phyllaries sparsely lanate or ± glabrescent; achenes 4–5 mm, pilose and glandular; scandent shrubs ..... 1. *D. henryi*

1b. Capitula solitary, terminal; involucre ca. 20 mm in diam.; phyllaries glabrous or sometimes arachnoid lanate; achenes ca. 3 mm, densely sericeous-villous; erect shrubs ..... 2. *D. forrestii*

1. Distephanus henryi (Dunn) H. Robinson, Proc. Biol. Soc. Washington 112: 238. 1999.

黄花斑鸠菊 huang hua ban jiu ju

Vernonia henryi Dunn, J. Linn. Soc., Bot. 35: 500. 1903.

Scandent shrubs. Stems conspicuously angled, at first white lanate, glabrescent, most parts yellow gland-dotted; new shoots white lanate-tomentose. Petiole 3–5 mm, densely pubescent; leaf blade ovate, 5–12.5 × 2–7.5 cm, papery, abaxially glabrescent except for scabrid veins, adaxially glabrescent except for very sparsely scabridulous veins, both surfaces yellow gland-dotted, basally 3-veined, veins adaxially distinctly raised, veinlets ± netted, base rounded or broadly cuneate, somewhat oblique, margin entire, apex long acuminate; upper leaves gradually smaller. Synflorescences densely corymbose at top of stem and branches. Capitula usually 3–7, 12–18 mm in diam.; peduncle to 1 cm, slender, ascending, with 1 ovate-lanceolate bracteole, thinly white tomentose. Involucre campanulate, 8–10 mm; phyllaries 5- or 6-seriate, tips dark brown when dry, subleathery, ovate to oblong, ca. 2 mm wide, lower part glabrescent, upper part sparsely lanate, apex acute, outer ovate. Recep-

tacle flat and foveolate. Florets 2 × as long as involucre; corolla golden yellow, fragrant, tubular, 7–8 mm; lobes linear-lanceolate, glandular. Achenes cylindric, 4–5 mm, 10-ribbed, puberulent and glandular. Pappus 2-seriate, yellowish; outer setae few, very short; inner setae 6–7 mm, scabrid. Fl. Sep–Nov.

• Sunny places on slopes; 1200–1400 m. Yunnan.

2. Distephanus forrestii (J. Anthony) H. Robinson & B. Kahn, Proc. Biol. Soc. Washington 99: 499. 1986.

滇西斑鸠菊 dian xi ban jiu ju

Vernonia forrestii J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 35. 1933.

Shrubs, up to 3 m tall. Stems gray-white, conspicuously angled, at first white lanate, glabrescent, most parts yellow gland-dotted; new shoots white lanate-tomentose. Petiole 10–15 mm; leaf blade ovate, 4–5 × 1.5–2.5 cm, papery, abaxially or along veins gray-white pubescent, both surfaces yellow gland-dotted, densest adaxially, basally 3-veined, veinlets abaxially raised, base cuneate or subrounded, margin entire, apex acuminate; upper leaves gradually smaller. Synflorescences terminal, very open flat-topped panicles. Capitula 1–4, ca. 20 mm in diam.; peduncle to 4 cm, stiffly spreading, sometimes with leaflike bracteoles, white tomentose. Involucre obconical-campanulate, to 20 mm; phyllaries 5- or 6-seriate, tips dark brown when dry, leathery, linear-lanceolate, ca. 2 mm wide, lower part lanate, upper part glabrescent, attenuate into very slender recurved tip, outer very short, extending slightly down peduncle, sometimes arachnoid lanate. Receptacle flat and foveolate. Florets many (ca. 80); corolla golden yellow, tubular, 8–10 mm glandular; lobes linear-lanceolate. Achenes obconical, ca. 3 mm, 10-ribbed, densely silky-villous. Pappus 2-seriate, white; outer setae few, short; inner setae longer than corolla, scabrid. Fl. Sep–Oct.

• SW Sichuan, NW Yunnan.

89. CAMCHAYA Gagnepain, Notul. Syst. (Paris) 4: 14. 1920.

凋缨菊属 diao ying ju shu

Thorelia Gagnepain (1920), nom. cons., not Hance (1877); *Thoreliella* C. Y. Wu.

Herbs, annual; indumentum of simple hairs and sessile globose glands. Leaves alternate, petiolate, margin repand or serrate, pinnately veined. Synflorescence terminal, paniculate, often reduced to 1 or 2 capitula. Involucre hemispheric; phyllaries to 6-seriate, imbricate, herbaceous, with marginal setae. Receptacle flat, rounded foveolate, naked. Florets many; corolla purple or purplish, tubular, slender, with narrowly campanulate limb; lobes 5, triangular or linear-lanceolate, often glandular hairy. Anthers obtusely auriculate at base. Style branches linear, acuminate, puberulent. Achenes obovate or oblong-obovoid, rather compressed, 10-ribbed or rarely 5-ribbed, glabrous though sometimes glandular between ribs. Pappus sparse or absent, bristles 1–10, scabrid, easily deciduous.

Five species: China, Laos, Thailand, Vietnam; one species in China.

Species have been transferred recently to *Vernonia* and *Iodocephalopsis* S. Bunwong & H. Robinson.

1. Camchaya loloana Kerr, Bull. Misc. Inform. Kew 1935: 327. 1935.

凋缨菊 diao ying ju

Herbs, annual, 50–80 cm tall. Stems erect, branched in upper part, striate, with adpressed hairs and sparsely glandular hairs. Lower leaves lanceolate, 5–6 × 2–2.5 cm, papery, both surfaces adpressed sparsely hispidulous and glandular, lateral veins 7–9-paired, abaxially prominent, base progressively attenuate into a short petiole, margin repand or shallowly dentate, apex shortly acute or acuminate; upper leaver smaller, ovate, rounded at base, obtuse. Synflorescence terminal or axillary, solitary. Capitula large, ca. 10 mm in diam.; peduncle 0.5–2 cm, densely adpressed pilose. Involucre hemispheric; phyllaries multiseriate, outer small, lanceolate, 3–7 × 0.7–1.3 mm, dorsally adpressed setose and glandular, margin setose, apex long acuminate, innermost oblong-lanceolate, ca. 8 × 1 mm, dorsally sparsely pilose and glandular, margin shortly ciliate, apex acute. Florets purple; corolla tubular, ca. 5 mm, with slender tube and narrowly campanulate limb; lobes triangular. Achenes obovoid, ca. 2 mm, 10-ribbed, glabrous. Pappus bristles very few, ca. 2 mm, easily deciduous. Fl. Aug–Nov.

Thickets in valleys, forest margins, open forests; 500–1600 m. S Yunnan [Thailand].

The inclusion of *Thorelia montana* Gagnepain as a synonym in FRPS (74: 42. 1985) is incorrect; *Camchaya montana* (Gagnepain) Kerr is a distinct species restricted to Laos and Vietnam, differing by the almost linear outer phyllaries and smaller florets, ca. 3.5 mm, only 12–30 per capitulum. If it were synonymous then the name *C. montana* would have priority.

90. ELEPHANTOPUS Linnaeus, Sp. Pl. 2: 814. 1753.

地胆草属 di dan cao shu

Herbs, perennial. Leaves alternate, sessile or shortly petiolate, entire or serrate, or rarely pinnately lobulate, pinnately veined. Synflorescence terminal, compound with dense clusters of capitula densely aggregated in secondary heads surrounded by leaflike bracts, secondary heads solitary or variously arranged into panicles or spikes. Involucre cylindric, slightly compressed; phyllaries generally 8, in 4 decussate pairs, oblong, apex acute or apiculate, outer 4 shorter than inner 4. Receptacle small, naked. Florets 4;

corolla purplish or white, tubular, with funnelform limb; lobes 5, usually more deeply cleft between 2 inner lobes. Anthers shortly acute, shortly hastate at base, obtusely auriculate. Style branches filiform, apically subulate. Achenes oblong-obovoid, somewhat flattened, 10-ribbed, setose, often glandular between ribs. Pappus sparse, bristles 5 to many, scabrid-barbellate, basally widened, rarely reduced to a scaly corona. $x = 11$.

About 30 species: pantropical, mostly in South America; two species in China.

1a. Stems ± dichotomously branched, adpressed hirsute; basal leaves persistent by anthesis; florets white ..... 1. *E. scaber*
1b. Stems multibranched, villous; basal leaves withered by anthesis; florets purplish or pink ..... 2. *E. tomentosus*

1. Elephantopus scaber Linnaeus, Sp. Pl. 2: 814. 1753.

地胆草 di dan cao

Asterocephalus cochinchinensis Sprengel; *Scabiosa cochinchinensis* Loureiro.

Herbs, perennial, 20–60 cm tall. Rhizomes procumbent or obliquely ascending, with many fibrous roots. Stems erect, ± dichotomously branched, slightly scabrid, densely white adpressed hirsute. Basal leaves persistent by anthesis, rosulate, spatulate or oblanceolate, 5–18 × 2–4 cm, abaxially densely hirsute and glandular, adaxially sparsely hirsute, base gradually attenuate into short, broad petiole, margin crenate-serrate, apex rounded or shortly acute; cauline leaves few and small, oblanceolate or oblong-lanceolate, progressively smaller toward apex. Synflorescence densely aggregated in compound heads, surrounded by leaflike bracts; bracts broadly ovate or oblong-ovate, 1–1.5 × 0.5–1 cm, hirsute and glandular, with conspicuously raised veins, apex acuminate. Capitula many. Involucre narrow, 8–10 × ca. 2 mm; phyllaries green or apically purple-red, oblong-lanceolate, hirtellous and glandular, 1- or 3-veined, apex acuminate and spinescent, outer 4–5 mm, inner ca. 10 mm. Florets 4, herbaceous, purplish or pink; corolla 7–9 mm, tube 4–5 mm. Achenes oblong-linear, ca. 4 mm, angled, puberulent. Pappus sordid white, of 5(or 6) basally widened bristles, 4–5 mm. Fl. Jul–Nov. $2n = 22$*.

Often on open slopes, roadsides or forest margins in valleys; ca. 1400 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Yunnan, Zhejiang [widely distributed in tropical areas of Africa, America, and Asia].

Elephantopus scaber is used medicinally to promote diuresis and reduce edema, as well as to treat a variety of ailments, including common cold headaches, stomach disease, pharyngolaryngitis, tonsillitis, conjunctival hyperema, and furuncles.

2. Elephantopus tomentosus Linnaeus, Sp. Pl. 2: 814. 1753.

白花地胆草 bai hua di dan cao

Elephantopus bodinieri Gagnepain.

Herbs, perennial, 0.8–1 m tall or more. Rhizomes robust, obliquely ascending or procumbent, with fibrous roots. Stems erect, multibranched, angled, white villous. Basal leaves withered by anthesis, subsessile or shortly petiolate, lower leaves oblong-obovate, 8–20 × 3–5 cm, abaxially densely villous and glandular, adaxially rugose and verrucose, sparsely or densely puberulent, basally progressively attenuate into winged, rather amplexicaul petiole, margin mucronate-serrate, rarely entire, apex acute; upper leaves elliptic or oblong-elliptic, 7–8 × 1.5–2 cm; uppermost very small. Synflorescence laxly corymbose, aggregated into compound heads, surrounded by 3 leaflike bracts; bracts green, ovate-cordate. Capitula 12–20; peduncle slender, long. Involucre oblong, 8–10 × 1.5–2 mm; phyllaries green or sometimes apically purple-red, outer 4 lanceolate-oblong, 4–5 mm, glabrous or subglabrous, 1-veined, apex acute, inner 4 elliptic-oblong, 7–8 mm, sparsely adpressed shortly hairy and glandular, 3-veined, apex acute. Florets 4, white, funnelform, 5–6 mm, with slender tube; lobes lanceolate, glabrous. Achenes oblong-linear, ca. 3 mm, 10-ribbed, puberulent. Pappus sordid white, of 5 basally widened bristles. Fl. Aug–May. $2n = 22$*.

Open slopes, roadsides, or thickets. Fujian, Guangdong, Taiwan [widely distributed in tropical areas].

91. PSEUDELEPHANTOPUS Rohr, Skr. Naturhist.-Selsk. 2(1): 214. 1792 [*"Pseudo-Elephantopus"*], nom. cons.

假地胆草属 jia di dan cao shu

Chaetospira S. F. Blake; *Distreptus* Cassini; *Matamoria* La Llave; *Spirochaeta* Turczaninow.

Herbs, perennial. Leaves alternate, basal leaves usually aggregated and rosulate, subsessile, entire or remotely serrate, pinnately veined. Synflorescence compound, spikelike, long, capitula in axillary clusters of 1–6, subtended by leaflike bracts. Involucre cylindric; phyllaries generally 8, in 4 decussate pairs, oblong, outer 2 shorter than inner. Receptacle small, naked. Florets: corolla white to bluish purple, tubular, lobes 5, slightly zygomorphic and pseudoligulate, more deeply cleft between 2 of inner lobes. Anthers apically rather short and obtuse, shortly hastate at base, obtusely auriculate. Style branches filiform, acute, hairy. Achenes obovoid, somewhat flattened, 10-ribbed, setose, often glandular between ribs. Pappus bristles flattened, scabrid-barbellate, some or all bent or curved. $x = 11$.

Two species: tropical Africa and America; one species (introduced) in China.

1. Pseudelephantopus spicatus (Jussieu ex Aublet) C. F. Baker, Trans. Acad. Sci. St. Louis 12: 45, 55, 56. 1902.

假地胆草 jia di dan cao

Elephantopus spicatus Jussieu ex Aublet, Hist. Pl. Guiane 2: 808. 1775; *Distreptus spicatus* (Jussieu ex Aublet) Cassini.

Herbs (40–)60–100 cm tall. Stems erect, branched, striate,

sparsely hirsute or subglabrous. Leaves subsessile, slightly amplexicaul, lower leaves oblong-obovate or oblong-spatulate, 7–20 × 1–5 cm, abaxially especially hirtellous on veins and densely glandular, adaxially scabrid, sparsely scabrid hairy or subglabrous and glandular, lateral veins 8–11-paired, base attenuate, margin entire or remotely serrate, apex obtuse or shortly acute; upper leaves oblong-lanceolate, 2.5–11.5 × 0.5–1.5 cm, attenuate at both ends. Synflorescence arranged in terminal spikes. Capitula in clusters of 1–6. Involucre oblong, 10–12 × ca. 4 mm; phyllaries dark green, elliptic-oblong, ca. 10 × 2 mm, glandular, 1-veined, apex acuminate or acute. Florets: corolla white, subtubular; lobes 5, lanceolate. Achenes linear-oblong, ca. 6 mm, 10-ribbed, densely setose, glandular between ribs. Pappus setae few, ca. 4 mm, 2 setae often bent. $2n = 22$*.

Grasslands. Guangdong, Taiwan [Indonesia, Malaysia, Philippines, N Thailand; native to tropical Africa and America].

7. Tribe SENECIONEAE

千里光族 qian li guang zu

Chen Yilin (陈艺林 Chen Yi-ling), Liu Shangwu (刘尚武), Liu Ying (刘莹), Yang Qiner (杨亲二);
Bertil Nordenstam, Irina D. Illarionova, Charles Jeffrey, Hiroshige Koyama, Leszek Vincent

Herbs, annual or perennial, rarely subshrubs, shrubs, or trees. Leaves alternate, sometimes rosulate or opposite, sessile or petiolate, entire to lobed or deeply divided. Capitula arranged in corymbs or racemes, or solitary, heterogamous and radiate or disciform, or homogamous and discoid; plants sometimes dioecious. Phyllaries 1- or 2(or rarely pluri)-seriate, free or connate, outer row of bracts (calyculus) smaller, or absent. Receptacle flat or raised, rarely conical, naked or alveolate. Ray florets female, radiate or shortly tubular; styles 2-lobed. Disk florets bisexual or functionally male; corolla tubular, or with limb funnelform or campanulate, 4- or 5-lobed; stamens 4 or 5, anthers basally rounded, acute, or sagittate, sometimes caudate; style bifid, style branches flat with entire or divided stigmatic area inside, sometimes sterile or entire, apically truncate, obtuse, or rounded to conical, sometimes appendaged or with tufts of hair penicillate, glabrous or papillate to hirsute, with or without apical sweeping hairs; endothecial cell wall thickenings radial or polarized or transitional, antheropodium straight and uniform or dilated toward base. Achene cylindric or terete-angular to ellipsoid-oblong or sometimes flattened, ribbed or smooth, glabrous, glandular, or pubescent. Pappus 1- to many seriate, bristles few or numerous or 0, rarely absent from all florets, white or colored, persistent or caducous. Pollen "senecioid" or sometimes "helianthoid."

About 150–170 genera and ca. 3,500 species: worldwide; 23 genera (four endemic, three introduced), and 464 species (315 endemic, six introduced) in China.

This is a major tribe in the Asteraceae. Nordenstam (in Kadereit & C. Jeffrey, Fam. Gen. Vasc. Pl. 8: 208–241. 2007) recognized 151 genera, and, more recently, Nordenstam et al. estimated the number to around 160 (in V. A. Funk et al., Syst. Evol. Biogeogr. Compositae, 503–525. 2009). Some new genera have recently been added and a few more will be published, so the number will probably increase to ca. 170. Subtribal classification is problematic. Sometimes only two or three subtribes are recognized, viz., Senecioninae, Tussilagininae, and Blennospermatinae Rydberg. The latter is better included in the Tussilagininae, except for *Abrotanella* Cassini, which should be treated as a monogeneric subtribe, Abrotanellinae (Robinson et al., Ann. Missouri Bot. Gard. 84: 893–906. 1997; Nordenstam et al., loc. cit.). A satisfactory subtribal classification would probably recognize ca. eight subtribes, but it has not yet been produced. The Chinese members of the tribe Senecioneae are here provisionally divided into three subtribes: Tussilagininae (Cassini) Dumortier, Tephroseridinae C. Jeffrey & Y. L. Chen, and Senecioninae (Cassini) Dumortier (*Farfugium*, *Ligularia*, and *Cremanthodium* were treated in Senecioninae in FRPS (77(2): 1–171. 1989) but are here referred to the Tussilagininae). Twenty-three genera with 463 species are recorded in the present treatment. Plants in some genera have economic value, such as *Gynura*, *Ligularia*, *Parasenecio*, *Petasites*, and *Tussilago*, which are used medicinally. Several genera are well known in horticulture (*Doronicum*, *Euryops* (Cassini) Cassini, *Farfugium*, *Kleinia* Miller, *Ligularia*, *Parasenecio*, *Pericallis*, *Senecio*, *Sinacalia*, *Steirodiscus* Lessing, etc.).

1a. Antheropodia (filament collars) balusterform, i.e., slightly to distinctly broadened toward base (although sometimes long and narrow) and with at least some basal cells larger than rest ..... 3. Senecioninae (p. 489)
1b. Antheropodia (filament collars) cylindric, i.e., of uniform width throughout (although rarely gradually slightly broadened toward base) with all cells ± uniform in size, larger basal cells absent.
2a. Phyllaries in 2 rows, all similar, herbaceous ..... 1. Tussilagininae (*Doronicum*; p. 371)
2b. Phyllaries at least initially in 1 row, although sometimes an outer series (calyculus) of bracts distinct in size and form (usually shorter) also present.
3a. Inner florets functionally male or plants subdioecious; flowering precocious ..... 1. Tussilagininae (p. 371)
3b. Inner of all florets bisexual; flowering not precocious.
4a. Leaves basally sheathed ..... 1. Tussilagininae (p. 371)
4b. Leaves basally not sheathed.
5a. Capitula discoid.
6a. Phyllaries 18–22 ..... 2. Tephroseridinae (*Tephroseris rufa* and *T. turczaninovii*; p. 464)
6b. Phyllaries 3–12 ..... 1. Tussilagininae (p. 371)
5b. Capitula radiate.
7a. Ray florets white ..... 3. Senecioninae (*Hainanecio*; p. 489)
7b. Ray florets yellow, orange, or reddish.
8a. Rhizomes dilatate, tuberiform ..... 1. Tussilagininae (*Sinacalia*; p. 371)
8b. Rhizomes slender or absent ..... 2. Tephroseridinae (p. 464)

1. Subtribe TUSSILAGININAE

款冬亚族 kuan dong ya zu

Liu Shangwu (刘尚武), Chen Yilin (陈艺林 Chen Yi-ling);
Irina D. Illarionova, Bertil Nordenstam, Hiroshige Koyama, Charles Jeffrey

Antheropodia cylindric or obconic, without enlarged marginal basal cells; endothecial tissue cell wall thickenings polarized,

cells short; stigmatic areas usually confluent or contiguous; chromosome number usually 30, sometimes 29, 28, 27, 26, or 25, rarely 20 or 19.

About 60 genera and 900 species: worldwide; 11 genera (three endemic) and 269 species (193 endemic) in China.

1a. Phyllaries in 2 series, all alike, herbaceous ..... 92. *Doronicum*
1b. Phyllaries in 1 series, herbaceous, cartilaginous, or leathery, if an outer series (calyculus) also present then distinct in size and form from inner series.
2a. Inner florets functionally male; florets precocious.
3a. Plants monoecious; peduncles 1-headed ..... 101. *Tussilago*
3b. Plants subdioecious; capitula with polygamous florets; peduncles several headed ..... 102. *Petasites*
2b. Inner florets bisexual, florets not precocious.
4a. Leaves basally sheathed; achenes not beaked.
5a. Leaf margins involute; achenes hairy ..... 93. *Farfugium*
5b. Leaf margins revolute; achenes glabrous.
6a. Involucres cylindric or obconic ..... 94. *Ligularia*
6b. Involucres broadly campanulate or hemispheric ..... 95. *Cremanthodium*
4b. Leaves basally not sheathed; achenes beaked or not.
7a. Capitula radiate; rhizomes dilated, tuberiform ..... 96. *Sinacalia*
7b. Capitula discoid, homogamous, florets bisexual; rhizomes not tuberiform.
8a. Style branches with papillae divided at apex into 2 brushlike lobes ..... 97. *Dicercoclados*
8b. Style branches with papillae undivided at apex.
9a. Cotyledons 1; radical leaves umbraculiform, pendulous when young ..... 100. *Syneilesis*
9b. Cotyledons 2; basal leaves not umbraculiform, not pendulous when young.
10a. Anthers caudate or sagittate; radical leaves withered by anthesis ..... 98. *Parasenecio*
10b. Anthers obtuse, not caudate; radical leaves persistent at anthesis ..... 99. *Ligulariopsis*

92. DORONICUM Linnaeus, Sp. Pl. 2: 885. 1753.

多榔菊属 duo lang ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, perennial. Leaves alternate; basal leaves long petiolate; stem leaves sessile and semiamplexicaul. Capitula large, usually solitary or 2–6(–8) laxly corymbose, radiate; involucre hemispheric or broadly campanulate; phyllaries 2(or 3)-seriate, herbaceous, subequal; outer phyllaries lanceolate, oblong-lanceolate, or lanceolate-linear; inner phyllaries linear or linear-lanceolate, laxly pubescent or glandular, apex long acuminate. Receptacle slightly raised, glabrous or hairy, heterogamous, all florets fertile. Ray florets uniseriate, female. Disk florets many seriate, bisexual, tubular, yellow; limb cylindric or campanulate, 5-lobed. Anther bases entire or ± auriculate, filamentous cells equal in size, appendages ovate, style 2-lobed, style branches shortly linear, apex rounded or truncate, puberulent. Achenes oblong or oblong-obconic, glabrous or adpressed hairy, ribbed; pappus of many fine bristles, white or reddish, usually absent in ray florets.

About 40 species: temperate N Africa, Asia, and Europe; seven species (four endemic) in China.

The capitula of the genus are large and colorful. Some species are often cultivated as ornamental plants and some used medicinally.

Doronicum is morphologically and chemically anomalous in the Senecioneae, and molecular data place it either outside the tribe or basally in the tribe (Pelser et al., Taxon 56: 1077–1104. 2007; Nordenstam et al. in V. A. Funk et al., Syst. Evol. Biogeogr. Compositae, 503–525. 2009). Thus, it may be treated either as the only genus of tribe Doroniceae Panero (Phytologia 87(1): 1. 2005), or the name Doroniceae may be treated within synonymy of the Senecioneae.

Doronicum bargusinense Sergievskaya var. *pilosum* C. H. An (Fl. Xinjiang. 5: 477. 1999) is of uncertain status and could not be treated here because no material was seen by the present authors.

1a. Ray florets as long as involucre or shorter; capitula 1.5–2(–2.5) cm in diam., few arranged in racemes at apex of stem.
2a. Peduncle thick, 3–8 cm, apex dilated and obconic, glandular villous; ray lamina oblong or oblong-elliptic, 7–8 × ca. 2 mm; achenes heteromorphic, glabrous and without pappus in ray florets, densely puberulent in disk florets ..... 6. *D. conaense*
2b. Peduncle slender, 1–1.5 cm, apex not dilated, densely villous, glandular hairy; ray lamina linear, 7–10 × 0.2–0.5 mm; achenes similar; achenes in all florets puberulent, pappus present ..... 7. *D. stenoglossum*
1b. Ray florets distinctly overtopping involucre; capitula 5–7 cm in diam., solitary, rarely 2.
3a. Ovary and achenes heteromorphic, achenes in ray florets glabrous and without pappus, in disk florets pappus present and adpressed hairy.

4a. Basal leaves elliptic or obovate-oblong, 2–6(–10) cm, base attenuate into 16–20 cm petiole; outer phyllaries lanceolate, 1.5–3.5 mm wide, inner phyllaries narrowly lanceolate, 1.2–3 mm wide; tube of ray florets glabrous, lamina basally puberulent ..... 4. *D. oblongifolium*

4b. Basal leaves obovate-spatulate or suborbicular, 4–11 cm, base attenuate into 4–15 cm winged petiole; outer phyllaries linear-lanceolate or lanceolate, 1.8–2 mm wide, inner phyllaries linear, 1–1.5 mm wide; tube of ray florets densely glandular hairy, lamina basally glabrous ..... 5. *D. turkestanicum*

3b. Ovary and achenes similar, glabrous or laxly hairy, all achenes with pappus.

5a. Rhizomes slender, often stoloniferous; capitula 3–5 cm in diam.; involucres 1.5–2 cm in diam., phyllaries laxly or densely pubescent; achenes glabrous ..... 3. *D. gansuense*

5b. Rhizomes robust, not stoloniferous; capitula 4–7 cm in diam.; phyllaries glandular hairy or villous.

6a. Basal leaves ovate or ovate-oblong, rarely orbicular, petioles 6–19 cm, lower stem leaves ovate-oblong, basally attenuate into ca. 2 cm broadly winged petiole, glabrous or glandular ciliate on margin; involucre 2–3 cm in diam.; ray florets 1.6–2.5 cm, pappus as long as or only slightly longer than achenes; achenes glabrous or sometimes laxly puberulent ..... 1. *D. altaicum*

6b. Basal leaves obovate-spatulate or oblong-elliptic, petioles shorter, lower stem leaves ovate-oblong or oblong-spatulate, basally attenuate into 2–4 cm broadly winged petiole, both surfaces articulate-villous and glandular hairy especially on veins; involucre 3–3.5 cm in diam.; ray florets 2.2–2.8 cm, pappus ca. 3 × as long as achenes; achenes laxly puberulent on veins ..... 2. *D. calotum*

1. Doronicum altaicum Pallas, Acta Acad. Sci. Imp. Petrop. 2: 271. 1779.

阿尔泰多郎菊 a er tai duo lang ju

Aronicum altaicum (Pallas) Candolle.

Rhizomes procumbent or sometimes ascending, stout, ca. 1 cm in diam. Stem solitary, erect, green or brown, sometimes purple tinged, 20–80 cm tall, simple, basally glabrous, apically densely glandular hairy, more densely so below capitula. Radical leaves usually withered by anthesis; petiole long, 6–19 cm; blade ovate or obovate-oblong, 5–10 × 4–5 cm, base attenuate, apex rounded or obtuse. Stem leaves 5 or 6; uppermost leaves ovate-oblong, 5–6 × 4–4.5 cm, base attenuate into ca. 2 cm broadly winged petiole; other stem leaves sessile, broadly ovate, semiamplexicaul. Median leaves 7–8 × 3–3.5 cm, upper leaves 2.5–3.5 × 0.8–2.5 cm, all glabrous, base broadly cordate, semiamplexicaul, margin undulate-denticulate, or sometimes entire, glandular ciliate, apex obtuse or slightly acute. Capitula solitary, large, 4–6 cm in diam. with ray florets. Involucre hemispheric, 2–3 cm in diam.; phyllaries equal, 1–1.3 cm; outer phyllaries oblong-lanceolate or lanceolate, 1.8–2 mm wide, densely glandular hairy at base; inner phyllaries linear-lanceolate or linear, 0.5–1 mm wide, glabrous or ciliate on margins only, all phyllaries apically long acuminate. Ray florets yellow, (1.6–)2–2.5 cm, with 2–2.5 mm tube, glabrous; lamina linear-oblong, 16–22 × 2–2.5 mm, 3-veined, apically 3-denticulate. Disk florets yellow, 5–5.3 mm, with 1.5–2 mm tube and cylindric campanulate limb, 5-lobed, lobes ca. 1 mm, apically acute; anthers ca. 2 mm, basally obtuse, appendages ovate; style branches short, apically obtuse or truncate. Achenes yellow-brown or dark brown, cylindric, 2–4 mm, ribbed, glabrous or sparsely puberulent. Pappus present in all florets, white or red-brown at base, 3–4 mm. Fl. Jun–Aug. $2n = 30, 60$.

Grasslands on slopes, understories of *Picea* forests; 2300–2500 m. Nei Mongol, Shaanxi, N Xinjiang [Mongolia, Russia (Siberia)].

2. Doronicum calotum (Diels) Q. Yuan, Acta Bot. Yunnan. 30: 439. 2008.

西藏多郎菊 xi zang duo lang ju

Cremanthodium calotum Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 105. 1905; *Doronicum limprichtii* Diels; *D. thibetanum* Cavillier.

Rhizomes procumbent or ascending, stout, ca. 1 cm in diam., tuberous, sometimes short and slender. Stem solitary, erect, green or sometimes purple tinged, (6–)10–75 cm tall, simple, densely villous, yellow-brown, with intermixed short glandular hairs, more densely so below capitula, part of stem leafy. Radical leaves often withered by anthesis, long petiolate; petiole 2–4 cm, dilated at base; leaf blade obovate-spatulate or oblong-elliptic, 4–15 × 1.5–3.5 cm, submembranous, base attenuate into narrow or broad petiole, apex obtuse or rounded. Stem leaves dense or lax, usually up to apex of stem; lower leaves ovate-oblong or oblong-elliptic, base narrowed into 2–4 cm broadly winged petiole, margin ciliate. Capitula solitary, terminal, large, 5–6(–7) cm in diam. Involucre hemispheric, 3–3.5 cm in diam.; phyllaries 2- or 3-seriate, equal; outer phyllaries lanceolate or linear-lanceolate, 15–18 × 1.5–2.2 mm; inner phyllaries linear-lanceolate or linear, 1–1.5 mm wide, densely pubescent and shortly glandular hairy, apically narrowly lanceolate. Ray florets yellow, 2.2–2.8 cm, with ca. 3 mm tube, glabrous; lamina oblong-linear, 1.8–3 mm wide, 3- or 4-veined, apically 3-denticulate. Disk florets yellow, 4.5–5 mm, with 2–2.5 mm tube and campanulate limb, 5-lobed, lobes ovate-triangular, apically acute; anthers 1–1.5 mm, basally obtuse; style branches 2-fid, apex obtuse or truncate. Achenes cylindric, 1.5–2 mm, 10-ribbed, sparsely puberulent on ribs. Pappus present in all achenes, numerous, yellow-brown, 5–5.5 mm, scabrid. Fl. Jul–Sep.

• Alpine grasslands, thickets, stony slopes; 3400–4200 m. Qinghai, S Shaanxi (Qin Ling), SW and W Sichuan, Xizang, NW Yunnan.

3. Doronicum gansuense Y. L. Chen, Acta Phytotax. Sin. 36: 73. 1998.

甘肃多郎菊 gan su duo lang ju

Doronicum cavillieri Álvarez Fernández & Nieto Feliner.

Rhizomes erect or ascending, slender, clad in persistent brown petiole bases. Stem solitary or rarely with stoloniferous branches, green, erect, 10–20 cm tall, simple, glabrous, or upper part especially below capitula yellow-brown glandular hairy. Radical and stoloniferous leaves long petiolate; petiole 3.5–7.5 cm, slender, not winged; leaf blade obovate-oblong, ca. 2.5 × 1.5–2 cm, base slightly cordate, apex rounded. Lower stem leaves with petiole dilated at base; blade obovate or obovate-spatulate, ± membranous, base narrowed into ca. 2 cm winged petiole, apex rounded or obtuse. Median and upper leaves sessile, ovate to ovate-oblong, 2.5–4 × 1–2.5 cm, both surfaces glabrous or sparsely puberulent, base cordate, semiamplexicaul, margin apically entire or rarely inconspicuously denticulate, ciliate, apex obtuse or rounded. Capitula solitary, terminal, 3–5 cm in diam. Involucre hemispheric or broadly campanulate, 1.5–2 cm in diam.; phyllaries 2-seriate, green, subequal, herbaceous; outer phyllaries narrowly lanceolate, 10–13 × 1.5–1.8 mm; inner phyllaries linear-lanceolate, 1–1.3 mm wide, abaxially laxly or densely white hairy, apex acuminate. Ray florets 1.8–2.3 cm, with ca. 2 mm tube, glabrous; lamina yellow, 16–20 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets yellow, 4.5–5 mm, with ca. 2 mm tube and campanulate limb; lobes ovate, ca. 1 mm; anthers obtuse at base; style branches apically truncate. Achenes cylindric, ca. 2 mm, ribbed, glabrous. Pappus present in all florets, yellow-brown, 3–4 mm, scabrid. Fl. Jul–Aug.

• Grassy slopes, forest understories; ca. 3100 m. Gansu.

4. Doronicum oblongifolium Candolle, Prodr. 6: 321. 1838.

长圆叶多郎菊 chang yuan ye duo lang ju

?*Doronicum tianshanicum* C. H. An.

Rhizomes short, stout, ca. 2.5 cm in diam., sometimes tuberous, ascending, with black membranous bristles at collar of root. Stem solitary, erect, green, sometimes reddish violet in upper part, 25–30(–50) cm tall, glabrous, glandular hairy in upper part. Radical leaf petiole 16–20 cm; blade elliptic or obovate-oblong, 2–6(–10) × 1.5–2.5 cm, base tapered, attenuate, apex rounded-obtuse. Lower stem leaves similar to radical leaves but narrowed to large winged petioles, semiamplexicaul or sometimes sessile. Median stem leaves sessile, narrowly oblong, 4–8 × 2–3 cm, base semiamplexicaul, apex obtuse or rather acute. Upper leaves 3–4 × ca. 1 cm. All leaves glabrous, margin entire or sometimes terminal leaves inconspicuously dentate, glandular ciliate on margin. Capitula solitary, long pedunculate, 3–4 cm in diam., hemispheric, 1.2–2 cm. Phyllaries 1.2–2 cm, white pubescent, with long, simple, and orbicular glandular hairs; outer phyllaries lanceolate, 1.5–3.5 mm wide; inner phyllaries narrowly lanceolate, 1.2–3 mm wide. Ray florets 2.2–2.8 cm; corolla yellowish, with ca. 2 mm tube; lamina 18–24 × 3.6–5 mm, hairy at base, 4–6-veined, apically finely toothed. Disk florets 5–6 mm; corolla yellow, with ca. 2 mm tube and campanulate limb, lobes 1–1.5 mm, glabrous. Achenes heteromorphic, achenes in ray florets ca. 1.8 mm, glabrous, without pappus; achenes in disk florets 2–2.8 mm, adpressed hairy. Pappus white, 2–2.3 mm, bristly, serrate. Fl. Jun–Aug. 2*n* = 40.

Beside water canals, forest understories; 1800–2700 m. Xinjiang (Hami) [Kazakhstan, Mongolia, Russia (Siberia)].

Doronicum oblongifolium is similar to *D. turkestanicum* but differs in having radical leaves elliptic or obovate-oblong, inner phyllaries linear-lanceolate, tube of ray florets glabrous, and lamina hairy basally.

5. Doronicum turkestanicum Cavillier, Annuaire Conserv. Jard. Bot. Genève 13–14: 301, 354. 1911.

中亚多郎菊 zhong ya duo lang ju

Doronicum oblongifolium Candolle var. *leiocarpum* Trautvetter.

Rhizomes horizontal or oblique, ca. 1 cm in diam. Stem solitary, erect, striate, green, 25–80 cm tall, simple, with scattered, orbicular, glandular hairs, sometimes subglabrous in lower part. Leaves with both surfaces glabrous or adaxially and marginally sparsely hairy, margin entire or finely and sparsely toothed, base attenuate, apex obtuse or rather acute. Radical leaves withered by anthesis or present, obovate-spatulate or suborbicular, 4–11 × 4–6.5 cm, abruptly or gradually narrowed into a winged petiole 4–10(–15) cm. Stem leaves 4–6, oblong-ovate or oblong, rarely ovate, 3–11 × 1.5–4 cm, sessile or with broadly winged short petiole, semiamplexicaul. Upper leaves smaller, ovate or ovate-lanceolate, rarely linear-lanceolate. Capitula solitary with ray florets 5–6 cm in diam. Involucre hemispheric, (2–)2.5–3 cm in diam.; outer phyllaries lanceolate or lanceolate-linear, 12–17 × (1.5–)1.8–2 mm; inner phyllaries linear, 1–1.5 mm wide; all phyllaries abaxially and marginally sparsely or densely glandular pubescent, apically long acuminate. Ray florets yellowish, 1.8–3 cm, with ca. 2.5 mm tube, outside densely glandular hairy; lamina 1.5–2 cm × 2–2.8 mm, 4- or 5-veined, apically finely (2 or)3-toothed. Disk florets 5.5–7 mm; corolla dark yellow, with 2.5–3 mm tube and campanulate limb, lobes ca. 1 mm; anthers ca. 1.5 mm, basally entire, antheropodium cylindric. Achenes heteromorphic, brown; marginal achenes smooth, 3–4 mm, pappus absent; achenes in disk florets 3–3.5 mm, glabrous or scattered appressed puberulent, pappus of numerous serrate bristles, white, 3–3.5 mm. Fl. Jun–Aug.

Slopes, understories of *Picea* forests; 1900–2700 m. Nei Mongol, N Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

6. Doronicum conaense Y. L. Chen, Acta Phytotax. Sin. 36: 75. 1998.

错那多郎菊 cuo na duo lang ju

Rhizomes short, not tuberous, with numerous fibrous roots. Stem solitary, erect, green, striate, 60–90 cm tall, rather stout, 7–8 mm in diam., simple or branched on synflorescences, scattered glandular hairy in upper part, subglabrous in lower part. Radical leaves often withered by anthesis. Median stem leaves sessile, ovate-oblong, 4–7 × 2.5–3 cm, membranous, both surfaces scattered adpressed glandular pubescent, especially on veins, base dilated, cordate, semiamplexicaul, margin rounded finely toothed or subentire, apex obtuse or rather acute. Upper stem leaves ovate or ovate-lanceolate, 2.5–4 × 1.5–2 cm, both surfaces sparsely shortly glandular hairy, base cordate, semiamplexicaul, apex acuminate. Capitula 3 or 4 in axillary racemes, with ray florets 2–2.5 cm in diam.; peduncles 3–8 cm, glandular pubescent, apically obconically dilated. Involucres hemispheric,

10–13 × 15–20 mm; phyllaries 2- or 3-seriate; outer phyllaries narrowly lanceolate, 1.5–2 mm wide, abaxially glandular pubescent in lower half, glabrous or subglabrous in upper part, margin long ciliate; inner phyllaries linear-lanceolate or linear, 0.5–0.8 mm wide, ciliate; all phyllaries long acuminate, equal to disk or rather shorter than disk. Ray florets yellow, 8–10 mm with 2.5–3 mm tube, glabrous; lamina oblong or oblong-elliptic, 7–8 × ca. 2 mm, 4-veined, apically 2- or 3-denticulate. Disk florets numerous; corolla yellow-green, 3.4–4 mm, with ca. 2.5 mm tube and campanulate-funnelform limb, lobes ovate-triangular; anthers linear, 1–1.2 mm, basally obtuse; style branches short, obtuse or truncate. Achenes heteromorphic, brown, obconic-oblong, 2.5–3 mm, 10-ribbed; marginal achenes glabrous, without pappus; achenes in disk florets densely white hairy, pappus pallid-yellow, 3–3.5 mm, scabrid. Fl. Jul–Sep.

• Thickets on slopes; 3800–3900 m. Xizang (Cona).

7. Doronicum stenoglossum Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 483. 1882.

狭舌多郎菊 xia she duo lang ju

Doronicum souliei Cavillier; *D. yunnanense* Franchet ex Diels.

Rhizomes short, slender, not tuberous. Stem solitary, erect, 50–100 cm tall, simple, rarely virgately inflorescence-branched, sparsely or densely white hairy, with intermixed short glandular hairs. Radical leaves withered by anthesis, elliptic or oblong-elliptic, 8–11 × 3–4 cm, base cuneately narrowed into petiole 3–6 cm, apex obtuse or shortly acuminate. Lower leaves oblong or ovate-oblong, 4–10 × 2.5–4 cm, basally narrowed to narrowly winged petiole. Upper leaves sessile, ovate-lanceolate or lanceolate, 3–12 × 1.5–3.5 cm, base cordate, semiamplexicaul or constricted and lyrate in lower half. All leaves membranous, margin denticulate or subentire, both surfaces pubescent and shortly glandular hairy, especially on veins. Capitula small, 2–2.5 cm in diam., 2–10 arranged in racemes; peduncles 1–1.5 cm, shortly conical, densely glandular pubescent and villous. Involucres hemispheric or broadly campanulate, ca. 1.5 cm; phyllaries 2- or 3-seriate, green, lanceolate or linear-lanceolate, often exceeding disk, 0.3–1.5 mm wide, outside sparsely or densely villous and glandular hairy, subglabrous or glabrous in upper part, apex acuminate. Ray florets pallid yellow, shorter than involucres or equal to them, with 2.5–3 mm tube; lamina linear, 7–10 × 0.2–0.3 mm, 3- or 4-veined, apically 2- or 3-denticulate. Disk florets yellow, ca. 3.5 mm, with 1.5–2 mm tube and narrow campanulate limb; lobes ovate, ca. 0.5 mm; anthers ca. 3 mm, basally obtuse; style branches obtuse or truncate. Achenes homogeneous, brown, subcylindric or slightly curved, 2.5–3 mm, 10-ribbed, puberulent. Pappus present in all florets, white, yellow-white, or reddish, equal to achenes, scabrid. Fl. Jul–Sep.

• Subalpine and alpine grasslands, forest margins, secondary thickets, understories of *Picea* forests; 2100–3900 m. Gansu, Qinghai, NW and W Sichuan, Xizang, NW Yunnan.

93. FARFUGIUM Lindley, Gard. Chron. 4. 1857.

大吴风草属 da wu feng cao shu

Liu Shangwu (刘尚武); Irina D. Illarionova

Herbs, perennial, deciduous or sometimes evergreen, with long rhizomes. Stem scapelike, leafless or with few bracteal leaves, base densely long lanate. Leaves all basal in rosette, each leaf involute and appearing fistlike; petiole broadly sheathed at base; leaf blade reniform or orbicular-reniform, abaxially densely hairy, palmately veined. Capitula many in corymb, base with fewer supplementary bracts (calyculus). Involucre campanulate; phyllaries in 2 rows, outer phyllaries narrow, inner phyllaries broad, margin membranous. Receptacle flat, without scales, alveolate, with shallow pits, margin of pit denticulate. Outer florets radiate, female, in 1 row. Central florets tubular, bisexual; limb 5-lobed. Anthers caudate at base, apex appendage oblong, obtuse; filaments glabrous. Style branches shortly hairy, obtuse at apex. Achenes cylindric, hairy between ribs. Pappus of denticulate hairs, white.

Two species: China, Japan; one species in China.

1. Farfugium japonicum (Linnaeus) Kitamura, Acta Phytotax. Geobot. 8: 268. 1939.

大吴风草 da wu feng cao

Tussilago japonica Linnaeus, Syst. Nat., ed. 12, 2: 550; Mant. Pl. 1: 113. 1767; *Arnica tussilaginea* N. L. Burman; *Farfugium grande* Lindley; *F. japonicum* var. *formosanum* (Hayata) Kitamura; *F. japonicum* var. *nokozanense* (Yamamoto) Kitamura; *F. kaempferi* Bentham; *F. tussilagineum* (N. L. Burman) Kitamura; *F. tussilagineum* var. *formosanum* (Hayata) Kitamura; *Ligularia formosana* (Hayata) Masamune; *L. kaempferi* Siebold & Zuccarini; *L. nokozanense* Yamamoto; *L. tussilaginea* (N. L. Burman) Makino; *L. tussilaginea* var. *formosana* Hayata; *Senecio japonicus* (Linnaeus) Lessing (1832), not Thunberg (1784); *S. kaempferi* Candolle, nom. illeg. superfl.; *S. tussilagineus* (N. L. Burman) Kuntze.

Rhizomes stout, 1–2 cm in diam. Scape to 70 cm tall, 5–6 mm in diam. at base, initially densely shortly pale yellow pilose, glabrescent. Leaves with petiole 15–25 cm, initially densely shortly pale yellow pilose, ± glabrescent, amplexicaul, sheath densely villous inside; leaf blade abaxially pale green, adaxially green, reniform, 9–13 × 11–22 cm, subleathery, initially gray puberulent, glabrescent, base cordate, margin entire or dentate to palmatilobed, apex rounded; sinus ca. 1/3 as long as leaf blade. Stem leaves bracteal, oblong or linear-lanceolate, 1–2 cm. Capitula 2–7 in corymb; peduncles 2–13 cm, puberulent. Involucre campanulate or broadly turbinate, 1.2–1.5 cm, mouth to 1.5 cm in diam., outside puberulent; phyllaries 12–14, oblong, apex acuminate; inner phyllaries broadly membranous at margin. Ray florets 8–12, yellow; lamina oblong or spatulate-oblong, 1.5–2.2 cm × 3–4 mm, apex rounded or acute. Tubular

florets numerous, 1–1.2 cm; tube ca. 6 mm. Achenes ca. 7 mm, ribbed, hairy. Pappus white, as long as tubular corolla. Fl. and fr. Aug to following Mar. $2n = 60$.

Forests, grassy slopes, valleys, sometimes cultivated in gardens; low elevations. ?Anhui, Fujian, Guangdong, Guangxi, Hubei, Hunan, ?Jiangsu, Taiwan, Zhejiang [Japan].

94. LIGULARIA Cassini, Bull. Sci. Soc. Philom. Paris 1816: 198. 1816, nom. cons., not Duval (1809).

橐吾属 tuo wu shu

Liu Shangwu (刘尚武); Irina D. Illarionova

Erythrochaete Siebold & Zuccarini; *Hoppea* Reichenbach; *Jacobaeoides* Vaillant; *Senecillis* Gaertner.

Herbs, perennial. Rhizome short, with non-flowering rosette leaves. Roots stout or slender, glabrous or hairy. Stem arising from outer axil of rosette leaves, erect, usually solitary, base surrounded with remains of old petiole. Basal leaves (rosette and lower stem leaves) well developed, palmately or pinnately veined; petioles longer, base broadly sheathed. Stem leaves alternate, fewer, similar to basal leaves but smaller, gradually smaller upward; petiole short, base with or without broad sheath. Capitula numerous in corymb, compound corymbs, racemes, paniculate racemes, or solitary, base with few or numerous supplementary bracts; peduncle with a leaflike bract. Involucre cylindric, campanulate, turbinate, or hemispheric; phyllaries in 2 rows, separate, outer phyllaries narrow, inner phyllaries broad, margin membranous, or phyllaries in 1 row, united, apex 2–5-dentate. Receptacle flat, without scales. Outer florets female, radiate or rarely narrowly tubular, or sometimes ray florets absent. Central florets tubular, bisexual; limb 5-lobed. Anthers obtuse at base, apex triangular or ovate, acute; filaments glabrous, apex inflated. Style branches slender, apex obtuse or rounded. Achenes ribbed, glabrous. Pappus with 2 or 3 rows of denticulate hairs or hairs sometimes absent.

About 140 species: Asia, Europe; 123 species (89 endemic) in China.

1a. Capitula in corymb or compound corymbs, very rarely solitary.
2a. Leaves pinnately veined; leaflike bracts linear; pappus as long as tubular corolla.
3a. Stem base without dense hairs; stem leaves with conspicuous, broad sheaths.
4a. Ray florets absent; involucre turbinate; pappus yellowish.
5a. Capitula numerous, in compound corymbs; involucre ca. 5 mm in diam., phyllaries 5; florets 5, wholly exceeding involucre; stem robust, 1–1.5 cm in diam. at base ..... 43. *L. myriocephala*
5b. Capitula 2–10, in corymb; involucre 10–15 mm in diam., phyllaries 10–13; florets numerous, not exceeding involucre; stem slender, 3–5 mm in diam. at base.
6a. Leaves oblong or obovate-oblong, base cuneate, margin irregularly coarsely dentate; involucre outside glabrous; outer florets narrowly tubular, female ..... 44. *L. discoidea*
6b. Leaves ovate-cordate, margin denticulate; involucre outside hairy; outer florets tubular, bisexual.
7a. Plants densely blackish purple pilose; phyllaries lanceolate, margin narrowly brown membranous, apex acute ..... 45. *L. atroviolacea*
7b. Plants densely yellow pilose; phyllaries oblong, margin broadly brown membranous, apex obtuse ..... 46. *L. microcardia*
4b. Ray florets present; involucre campanulate; pappus white or reddish brown.
8a. Leaves glabrous or hairy on both surfaces; stem slender, 4–7 mm in diam. at base.
9a. Leaves ovate-lanceolate, margin coarsely dentate, apex acuminate; pappus pale red ..... 50. *L. euryphylla*
9b. Leaves ovate-cordate or ovate-oblong, margin denticulate, apex obtuse; pappus brown ..... 51. *L. tongolensis*
8b. Leaves white arachnoid-puberulent on both surfaces; stem robust, 1–2.5 cm in diam. at base.
10a. Capitula 6–23(–40); involucre hemispheric or broadly campanulate, to 20 mm in diam.; pappus reddish brown or yellowish; leaf base truncate or somewhat cuneate ..... 47. *L. lapathifolia*
10b. Capitula more than 50; involucre campanulate or turbinate, 6–10 mm in diam.; pappus white; leaf base shallowly cordate or cuneate.
11a. Ray floret longer than tubular florets, lamina apically entire; leaf base shallowly cordate ..... 48. *L. cymbulifera*
11b. Ray floret as long as tubular florets, lamina apically 2–4-parted; leaf base cuneate ..... 49. *L. zhouquensis*
3b. Stem base with a densely, brown or reddish brown, floccose-lanate circle; stem leaves without broad sheaths.
12a. Capitula small, in paniculate compound corymbs; involucre narrowly campanulate, cylindric, or turbinate, 5–11 × 3–10 mm.
13a. Leaves ovate-oblong, base subrounded, with prominent reticulate veins on both surfaces ..... 32. *L. rumicifolia*
13b. Leaves sagittate or triangular-cordate, base deeply cordate, without prominent reticulate veins on both surfaces.
14a. Involucre cylindric or narrowly campanulate, 4–7 mm in diam., longer than wide; ray florets 1–4.

15a. Leaves sagittate ..... 33. *L. songarica*
15b. Leaves triangular-cordate ..... 34. *L. thomsonii*
14b. Involucre semispherical or cupular, 8–20 mm in diam., wider than long; ray florets 5–15.
16a. Leaves cordate; capitula 1–15, in corymb; involucre semispherical or cupular, 11–20 mm in diam. ..... 41. *L. narynensis*
16b. Leaves sagittate or ovate-triangular; capitula numerous, in paniculate compound corymbs; involucre cupular, 6–14 mm in diam. ..... 40. *L. thyrsoidea*
12b. Capitula solitary or 2–10 in corymb or basipetal raceme.
17a. Leaves elliptic, base oblique, both laterally unequal ..... 42. *L. kunlunshanica*
17b. Leaves orbicular-cordate to oblong-ovate, base cordate.
18a. Plants without hairs; capitula 3–10.
19a. Achenes glabrous ..... 38. *L. xinjiangensis*
19b. Achenes sparsely hairy between ribs ..... 39. *L. tianschanica*
18b. Plants often hairy; capitula solitary, rarely in basipetal raceme.
20a. Stem white hairy; involucre broadly campanulate ..... 35. *L. schischkinii*
20b. Stem glabrous; involucre semispherical.
21a. Throat of ray floret outside with 6 flat hairs; petioles of stem leaves basally enlarged into lamellate auricle ..... 36. *L. hamiica*
21b. Throat of ray floret outside without hairs; petioles of stem leaves basally not enlarged ..... 37. *L. tulupanica*
2b. Leaves palmately veined, with 3–9 main veins; leaflike bracts ovate to linear; pappus as long as tubular corolla or tube of corolla.
22a. Capitula including ray florets 3–12 cm in diam.; involucre hemispheric or broadly campanulate, (7–)10–30 mm in diam.; ray florets numerous.
23a. Basal leaves ovate, base cordate or rounded, margin regularly sharply dentate; supplementary bracts numerous; pappus yellow, as long as tubular corolla ..... 1. *L. pyrifolia*
23b. Basal leaves reniform or ovate-reniform, base cordate or rounded, margin dentate or palmatisect; supplementary bracts 2–4 or absent; pappus white or brown.
24a. Phyllaries closely imbricate, not spreading, inner ones convex, 2-carinate on outside; pappus reddish brown.
25a. Involucre hemispheric, broader than long, 15–25 × 18–30 mm; ray lamina 4–6.5 cm.
26a. Leaf margin dentate; pappus as long as tubular corolla ..... 2. *L. dentata*
26b. Leaves palmatisect; pappus as long as tube of tubular corolla ..... 3. *L. japonica*
25b. Involucre broadly campanulate, 10–14 × 7–18 mm; ray lamina 1.5–3 cm.
27a. Capitula 1 to many; involucre longer than broad; phyllaries outside glabrous or white pilose, apex broadly triangular, obtuse; pappus as long as tubular corolla ..... 4. *L. hodgsonii*
27b. Capitula 2–4; involucre as long as broad or broader than long; phyllaries outside shortly brown pilose, apex acute; pappus slightly longer than tube of tubular corolla ..... 5. *L. calthifolia*
24b. Phyllaries laxly imbricate, spreading, inner ones not convex, not carinate on outside; pappus yellowish white or purplish brown.
28a. Pappus purplish brown, as long as or shorter than tube of tubular corolla ..... 6. *L. phaenicochaeta*
28b. Pappus yellowish white, as long as tubular corolla.
29a. Involucre 10–12 mm in diam., outside glabrous; stem distally white pilose ..... 7. *L. kangtingensis*
29b. Involucre 10–20 mm in diam., outside hairy; stem distally yellow or black pilose.
30a. Stem distally and involucre outside black pilose ..... 10. *L. retusa*
30b. Stem distally shortly yellow pilose; involucre outside white pilose or glabrous.
31a. Ray lamina oblong, 10–15 × 2–4 mm ..... 8. *L. cremanthodioides*
31b. Ray lamina cuneate or obovate, 7–8 × 3–6 mm ..... 9. *L. cuneata*
22b. Capitula small, including ray florets less than 2 cm in diam.; involucre narrowly campanulate or cylindric, 2–7 mm in diam., if involucre broader then capitula without ray florets.
32a. Capitula with ray florets; lamina slightly extending from involucre, rarely longer and split.
33a. Ray lamina 10–15 mm, 2–5-parted to -divided, rarely entire.
34a. Capitula with 10–15 florets; involucre 4–6 mm in diam., phyllaries 7–10; ray florets 3–5; lamina 3–5-divided ..... 11. *L. stenoglossa*
34b. Capitula with 5–7 florets; involucre 2–3 mm in diam., phyllaries 5; ray florets 1 or 2; lamina 2- or 3-parted or entire ..... 12. *L. oligonema*
33b. Ray lamina 4–7 mm, entire, apex 2- or 3-denticulate or ray floret similar to tubular floret.
35a. Capitula with 2–5 florets; involucre 2–3 mm in diam., outside glabrous; ray floret usually 1 or absent, similar to tubular floret, but split only on one side and as long as tubular floret ..... 13. *L. franchetiana*
35b. Capitula with 5–10 florets; involucre 4–7 mm in diam., outside glabrous or pilose; ray florets 1–6.

36a. Phyllaries linear-lanceolate, apex acuminate, curved; ray floret 1, as long as tubular florets, lamina small and narrow; limbs of tubular florets wholly extending from involucre; pappus brown, as long as tube of tubular corolla ..... 14. *L. curvisquama*
36b. Phyllaries all or only inner ones oblong, apex obtuse or acute, erect; ray florets 1–6, lamina wider; tubular florets slightly longer than involucre; pappus brown or white, as long as or longer than tube of tubular corolla.
37a. Involucre narrowly cylindric, 3–4 mm in diam., outside shortly pilose; ray floret 1, lamina obovate-oblong or oblong, ca. 3 mm wide ..... 15. *L. rockiana*
37b. Involucre narrowly campanulate, ca. 6 mm in diam., outside glabrous; ray florets 3–6, lamina narrowly oblong, 1.5–2 mm wide ..... 16. *L. transversifolia*
32b. Capitula without ray florets.
38a. Involucre narrowly or broadly campanulate, or turbinate, 5–20 mm in diam.
39a. Leaves palmatisect, lobes narrow ..... 17. *L. paradoxa*
39b. Leaves undivided, margin dentate.
40a. Capitula numerous in compound corymbs; involucre turbinate, outside yellowish brown shortly pilose, inner phyllaries marginally broadly brown membranous; pappus brown or white, as long as tube of tubular corolla; stem robust, taller, 1–2 cm in diam. at base ..... 18. *L. purdomii*
40b. Capitula fewer, in corymb; involucre outside glabrous, inner phyllaries marginally narrowly membranous; pappus white, as long as tubular corolla; stem slender, dwarf, ca. 7 mm in diam. at base.
41a. Capitula fewer than 14; involucre 5–10 mm in diam., phyllaries 5–10.
42a. Leaves glabrous, abaxially pale green, adaxially green, margin coarsely sharply dentate; involucre narrowly campanulate, phyllaries 5–8; florets 6–20 ..... 19. *L. yunnanensis*
42b. Leaves often purplish red, abaxially with short hairs on white reticulate veins, margin undulately dentate; involucre turbinate, phyllaries 9 or 10; florets 20–30 ..... 20. *L. potaninii*
41b. Capitula 1–6; involucre broadly campanulate, 15–20 mm in diam., phyllaries 13–15.
43a. Leaves thick, margin undulate-dentate; phyllaries purplish red, petaloid, apex acute ..... 21. *L. cymosa*
43b. Leaves thin, margin regularly sharply dentate; phyllaries dark brown, apex obtuse, mucronate, or acute ..... 22. *L. microcephala*
38b. Involucre narrowly cylindric, 1.5–7 mm in diam.
44a. Peduncles shortly purplish brown pilose; pappus brown, as long as tubular corolla.
45a. Florets 5 or 6(–8), yellow; phyllaries 5; leaves ovate-cordate or subreniform, 5–6(–11) cm wide ..... 24. *L. tenuicaulis*
45b. Florets 3 or 5, purple or yellow; phyllaries 3–5; leaves reniform, 6–17 cm wide.
46a. Florets 4 or 5, purple; phyllaries 4 or 5, outside purple shortly pilose ..... 23. *L. dux*
46b. Florets 3, ?yellow; phyllaries 3, glabrous ..... 25. *L. tongkyukensis*
44b. Peduncles shortly yellow pilose or glabrous; pappus white.
47a. Phyllaries 5–10, narrowly lanceolate, apex acuminate.
48a. Leaf margin regularly triangular-denticulate; florets more than 20; pappus as long as tubular corolla ..... 26. *L. xanthotricha*
48b. Leaf margin irregularly coarsely dentate, teeth to 2 cm wide; florets 6–16; pappus as long as or shorter than tubular corolla.
49a. Phyllaries outside densely shortly yellow pilose; pappus as long as tube of tubular corolla ..... 27. *L. achyrotricha*
49b. Phyllaries outside glabrous, purple ciliate; pappus slightly shorter than tubular corolla ..... 28. *L. macrodonta*
47b. Phyllaries 5–7, oblong, apex acute or obtuse.
50a. Involucre outside densely yellow shortly pilose ..... 31. *L. konkalingensis*
50b. Involucre outside glabrous.
51a. Limb of tubular corolla extending from involucre; pappus as long as or shorter than tube of tubular corolla ..... 29. *L. duciformis*
51b. Limb of tubular corolla slightly extending from involucre; pappus longer than tube of tubular corolla ..... 30. *L. nelumbifolia*
1b. Capitula in panicle-racemes, racemes, or solitary, if in corymb then plant blue-gray; pappus absent.
52a. Basal leaves erect, blue-green or grayish green, often glabrous, usually mealy, leaves pinnately veined.
53a. Phyllaries united.
54a. Capitula numerous in raceme; pappus reddish brown, as long as tube of tubular corolla ..... 52. *L. schmidtii*
54b. Capitula 1–9, solitary or in corymb; pappus absent ..... 53. *L. biceps*
53b. Phyllaries separate.
55a. Pappus reddish brown, as long as or shorter than tube of tubular corolla ..... 54. *L. mongolica*
55b. Pappus white, rarely rufous, as long as tubular corolla.

56a. Racemes paniculate, with dense and numerous branches in lower part of synflorescence, branches longer, each bearing a raceme.
57a. Capitula small; involucre narrowly cylindric or turbinate, 3.5–5 × 2–3 mm, phyllaries 4 or 5; ray florets 1–3; tubular florets 2–7 ..... 55. *L. macrophylla*
57b. Capitula larger; involucre cylindric or campanulate, 6–8 × 5–8 mm, phyllaries 6–8, apex acute or acuminate; ray florets (4 or)5–7; tubular florets 10–14(–16) ..... 56. *L. heterophylla*
56b. Raceme with fewer capitula, rarely branched.
58a. Leaves with conspicuous, white reticulate veins when dry; stem leaves broadly ovate to oblong, ca. 2 × as long as internodes, ascending, base broadened, auriculate or semiamplexicaul.
59a. Capitula without ray florets; leaflike bracts ovate-oblong to lanceolate, membranous, reddish yellow when dry, with conspicuous reticulate veins; involucre broadly campanulate, ca. 10 mm in diam. ..... 57. *L. lingiana*
59b. Capitula with ray florets; leaflike bracts linear; involucre campanulate or turbinate, 4–6 mm in diam.
60a. Leaves herbaceous; petiole of basal leaves broadly winged; phyllaries blackish gray, apex acute or acuminate ..... 58. *L. melanocephala*
60b. Leaves leathery; petiole of basal leaves without wings; phyllaries dark green, apex triangular.
61a. Stem solid; leaf base cordate; phyllaries outside and margin glabrous or brown ciliate ..... 59. *L. dictyoneura*
61b. Stem hollow; leaf base cuneate; phyllaries outside shortly pilose, margin densely white ciliate ..... 60. *L. brassicoides*
58b. Leaves with obscure reticulate veins; stem leaves oblong to lanceolate, shorter than internodes, erect, base narrowed, semiamplexicaul or not.
62a. Leaves usually linear-oblong or elliptic; capitula inclined to one side of raceme rachis ..... 65. *L. pleurocaulis*
62b. Leaves ovate or elliptic.
63a. Capitula without ray florets ..... 64. *L. chalybea*
63b. Capitula with ray florets.
64a. Pappus rufous ..... 63. *L. longifolia*
64b. Pappus white.
65a. Stem white hairy.
66a. Phyllaries outside white puberulent or glabrous, margin densely white ciliate ..... 68. *L. liatroides*
66b. Phyllaries outside glabrous, margin glabrous or sparsely white ciliate ..... 69. *L. eriocaulis*
65b. Stem glabrous.
67a. Phyllaries blackish gray ..... 67. *L. virgaurea*
67b. Phyllaries green.
68a. Leaf margin entire; phyllaries outside glabrous ..... 61. *L. altaica*
68b. Leaf margin dentate; phyllaries outside glabrous or shortly pilose.
69a. Phyllaries outside shortly pilose ..... 62. *L. alpigena*
69b. Phyllaries outside glabrous ..... 66. *L. tangutorum*
52b. Basal leaves spreading or ascending, hairy or at least ciliate on margins, abaxially pale green, adaxially green, leaves pinnately or palmately veined.
70a. Stem scapelike, leafless, base with a circle densely long white lanate; leaves pinnately veined.
71a. Scape stout, base ca. 1 cm in diam.; involucre narrowly campanulate, 6–8 × ca. 5 mm, outside white puberulent; ray lamina ca. 8 mm ..... 70. *L. melanothyrsa*
71b. Scape slender, 4–5 mm in diam.; involucre campanulate, 10–12 × 8–10 mm, outside sparsely puberulent; ray lamina 10–18 mm ..... 71. *L. vellerea*
70b. Stem with normal leaves, base not densely lanate; leaves pinnately or palmately veined.
72a. Leaves pinnately veined; stem leaves without broad sheaths; pappus as long as tubular corolla, rarely shorter than tubular corolla.
73a. Capitulum solitary; leaves hastate ..... 72. *L. jamesii*
73b. Capitula numerous in paniculate racemes or raceme; leaves of other forms.
74a. Synflorescence paniculate-racemose or racemose.
75a. Leaves oblong or ovate-oblong, base truncate; synflorescence to 80 cm; ray lamina 5–9 × to 2 mm; limb as long as tube of tubular corolla ..... 73. *L. fangiana*
75b. Leaves triangular or ovate-triangular, base subtruncate or cordate; synflorescence to 50 cm; ray lamina 13–18 × ca. 6.5 mm; limb 3–4 × as long as tube of tubular corolla ..... 74. *L. jaluensis*
74b. Synflorescence racemose, lower sometimes branched.
76a. Leaves broadly ovate-cordate, abaxially shortly pilose; peduncles usually 2–4, crowded; ray lamina linear, 9–15 × 1–1.5 mm ..... 75. *L. tenuipes*

76b. Leaves ovate, ovate-cordate, triangular, or sagittate; peduncle solitary; ray lamina usually wider, if lamina linear then more than 3 cm.
77a. Stem and abaxial surface of leaves densely puberulent; stem leaves numerous, apex caudate-acuminate.
78a. Leaves ovate-cordate, abaxially shortly brown pilose; involucre campanulate, phyllaries 5, outside shortly pilose; outer florets female, 1 or 2, without corolla; tubular florets 5; pappus shorter than tubular corolla ..... 76. *L. petiolaris*
78b. Leaves ovate or triangular, abaxially gray-white puberulent; involucre shallowly campanulate, phyllaries 8 or 9, outside grayish white puberulent; tubular florets numerous; pappus as long as tubular corolla.
79a. Capitula with ray florets; lamina yellow, to 13 mm ..... 77. *L. lankongensis*
79b. Capitula without ray florets; outer florets 1–3(or 4), narrowly tubular, labiate, not colored, shorter than tubular florets ..... 78. *L. nyingchiensis*
77b. Stem and leaves without dense hairs; stem leaves apex obtuse or acute.
80a. Basal leaves sagittate or ovate-cordate; stem leaves all or at least lower ones with long winged petiole.
81a. Pappus rufous, as long as or slightly longer than tube of tubular corolla; petiole broadly winged.
82a. Plants usually shortly yellowish pilose; wings of petiole dentate; involucre broadly campanulate, phyllaries 8, outside shortly pilose; pappus ca. 4 mm ..... 79. *L. pterodonta*
82b. Plants glabrous; wings of petiole entire or dentate; involucre narrowly campanulate or cylindric, phyllaries 5–8, outside glabrous or white ciliate; pappus 6–7 mm ..... 80. *L. latipes*
81b. Pappus white, as long as tubular corolla; petiole narrowly winged.
83a. Leaves ovate-cordate; involucre broadly campanulate, ca. 10 mm in diam.; ray lamina linear, to 30 mm ..... 81. *L. alatipes*
83b. Leaves sagittate or ovate-cordate; involucre campanulate, 4–8 mm in diam.; ray lamina oblong, 2–12 mm.
84a. Leaflike bracts ovate, membranous; ray lamina 2–3 mm ..... 82. *L. botryodes*
84b. Leaflike bracts narrowly lanceolate or ovate-lanceolate to linear, herbaceous; ray lamina 5–12 mm ..... 83. *L. sagitta*
80b. Basal leaves ovate, base shallowly cordate, truncate, or cuneate; stem leaves sessile, erect or ascending.
85a. Basal leaves broadly sheathed; mouth of sheath recurved; stem leaves numerous and narrow, ovate-lanceolate or lanceolate, erect, adnate, base narrowed, not amplexicaul.
86a. Leaves ovate-cordate; involucre broadly turbinate, to 15 mm in diam.; pappus reddish brown or initially yellowish white; leaflike bracts linear or filiform ..... 84. *L. platyglossa*
86b. Leaves ovate-oblong, triangular, or cordate; involucre 5–10 mm in diam.; pappus yellowish; leaflike bracts linear-lanceolate to rhombic.
87a. Involucre campanulate, longer than wide; phyllaries oblong, apex acute or obtuse, erect ..... 85. *L. kanaitzensis*
87b. Involucre cupular, broader than long; phyllaries broadly obovate or elliptic, apex broadly triangular and recurved mucronate ..... 86. *L. lidjiangensis*
85b. Basal leaves narrowly sheathed; stem leaves fewer and wider, oblong or ovate, base rounded or subtruncate, semiamplexicaul.
88a. Plants taller, more robust; stem to 2.8 cm in diam. at base; leaves ovate-oblong or broadly ovate, with stout midvein; capitula larger; involucre hemispheric or campanulate, to 2.5 cm in diam. ..... 87. *L. ghatsukupa*
88b. Plants of medium height; stem 3–8 mm in diam. at base; capitula smaller; involucre campanulate, 4–7 mm in diam.
89a. Raceme longer; capitula numerous; phyllaries green, outside glabrous, apex dark brown ..... 88. *L. tsangchanensis*
89b. Raceme shorter; capitula 4–13; involucre blackish purple or green, outside shortly pilose ..... 89. *L. muliensis*
72b. Leaves palmately veined, with 3–9 principal veins; stem leaves broadly sheathing; pappus as long as or shorter than tubular corolla.
90a. Pappus as long as tubular corolla.
91a. Leaflike bracts ovate or ovate-lanceolate, margin denticulate.
92a. Leaflike bracts herbaceous, green; raceme not spreading; peduncles short; involucre campanulate, base rounded; leaves glabrous ..... 90. *L. sibirica*

92b. Leaflike bracts membranous, purplish red; raceme spreading; peduncles long; involucre cupular, base truncate; leaves abaxially shortly pilose ..... 91. *L. cyathiceps*
91b. Leaflike bracts linear, margin entire.
93a. Capitula in paniculate racemes, without ray florets; limb ca. 2 × as long as tube of tubular corolla.
94a. Leaves ca. 5 cm wide, glabrous; involucre campanulate or cupular, outside glabrous, nitid; pappus brown ..... 92. *L. leveillei*
94b. Leaves more than 5–11 cm wide, adaxially densely shortly yellow pilose; involucre narrowly campanulate, outside densely shortly yellow pilose; pappus yellow ..... 93. *L. nanchuanica*
93b. Capitula in raceme or solitary, with or without ray florets; limb as long as tube of tubular corolla.
95a. Involucre campanulate to broadly campanulate; pappus reddish brown.
96a. Leaves reniform or cordate, base cordate, margin coarsely triangular-dentate; ray lamina linear, 1.5–2 mm wide ..... 94. *L. hookeri*
96b. Leaves triangular, base truncate, margin denticulate; ray lamina oblong, to 5 mm wide ..... 95. *L. parvifolia*
95b. Involucre campanulate or turbinate; pappus white or pale yellow.
97a. Stem slender, 2–4 mm in diam. at base; leaves triangular-sagittate or ovate-cordate, 2.2–15 cm wide.
98a. Capitula with ray florets; involucre campanulate-turbinate ..... 96. *L. lamarum*
98b. Capitula without ray florets; involucre campanulate ..... 97. *L. subspicata*
97b. Stem robust, 6–10 mm in diam. at base; leaves reniform or cordate, to 24 cm wide.
99a. Leaves abaxially glabrous, adaxially densely shortly pilose; involucre campanulate to broadly turbinate; ray lamina short and wide, 3–4 mm wide ..... 98. *L. wilsoniana*
99b. Leaves abaxially pilose, adaxially glabrous; involucre campanulate; ray lamina longer and narrower, 1–2 mm wide.
100a. Leaves abaxially pale green, shortly pilose only on veins, adaxially dark green; pappus white ..... 99. *L. atkinsonii*
100b. Leaves abaxially densely shortly white pilose; pappus yellowish brown ..... 100. *L. pubifolia*
90b. Pappus shorter than tube of tubular corolla.
101a. Leaflike bracts broadly ovate, ovate-lanceolate, or spatulate, margin usually denticulate, if bracts linear-lanceolate then involucre broadly campanulate, ca. 10 mm in diam.
102a. Leaves variable, base sagittate or hastate; basal lobes divergent; sheaths of stem leaves marginally denticulate or laciniate.
103a. Stem robust, 4–12 mm in diam. at base; stem leaves dense and numerous, gradually smaller upward; raceme 22–65 cm; capitula numerous; involucre narrowly campanulate.
104a. Leaves ovate-cordate, glabrous; ray florets 4–6 ..... 101. *L. phyllocolea*
104b. Leaves triangular-hastate or hastate, brown pilose on both surfaces; ray florets 2 or 3 ..... 102. *L. changiana*
103b. Stem slender, 3.5–6 mm in diam. at base; stem leaves few, 2 or 3, remote; raceme to 30 cm; capitula 5–25.
105a. Involucre broadly campanulate, 8–12 mm in diam.; leaves broadly hastate, 2–3 × wider than long; ray lamina to 4 cm ..... 103. *L. latihastata*
105b. Involucre campanulate or narrowly campanulate, 5–7 mm in diam.; leaves cordate or horseshoe-shaped; ray lamina to 2 cm.
106a. Stem and leaves glabrous; leaves triangular- to ovate-cordate; ray lamina oblanceolate ..... 104. *L. caloxantha*
106b. Stem and leaves yellowish red pilose; leaves horseshoe-shaped; ray lamina linear-oblong ..... 105. *L. odontomanes*
102b. Leaves reniform or triangular-reniform, base cordate; basal lobes suborbicular, not divergent; sheaths of stem leaves marginally entire.
107a. Capitula without ray florets.
108a. Involucre glabrous ..... 107. *L. chekiangensis*
108b. Involucre shortly pilose ..... 111. *L. ianthochaeta*
107b. Capitula with ray florets.
109a. Leaflike bracts submembranous ..... 110. *L. veitchiana*
109b. Leaflike bracts herbaceous.
110a. Petiole of basal leaves distally narrowly dentate; leaflike bracts spatulate, with short petiole ..... 108. *L. anoleuca*
110b. Petiole of basal leaves not winged or distally narrowly winged; wing margins entire; leaflike bracts ovate to lanceolate.

111a. Leaflike bracts ovate in basal half of synflorescence, distally lanceolate ..... 106. *L. fischeri*
111b. Only a few leaflike bracts in base of synflorescence ovate, others lanceolate to linear ..... 109. *L. sachalinensis*
101b. Leaflike bracts linear or linear-lanceolate, margin entire.
112a. Involucre campanulate or broadly campanulate, 8–12 × 4–9 mm, phyllaries 6–10, florets numerous.
113a. Leaves reniform, glabrous, basal lobes not divergent; pappus purplish brown.
114a. Ray florets present; involucre glabrous ..... 112. *L. intermedia*
114b. Ray florets absent; involucre shortly pilose ..... 113. *L. hopeiensis*
113b. Leaves hastate, shortly pilose, basal lobes divergent; pappus pale yellow or yellowish brown.
115a. Leaves abaxially and sheath shortly pilose; ray lamina oblong, to 6 mm wide ..... 114. *L. chimiliensis*
115b. Leaves shortly pilose on both surfaces; ray lamina linear, 1.5–2 mm wide.
116a. Involucre outside glabrous; pappus pale yellow ..... 115. *L. longihastata*
116b. Involucre outside shortly white pilose; pappus yellowish brown ..... 116. *L. ruficoma*
112b. Involucre cylindric, 6–12 × 2–4 mm, phyllaries 4–6, florets 5–15, if phyllaries to 8 then involucre broader, 17–19 × ca. 8 mm.
117a. Leaves divided.
118a. Leaves palmatisect; synflorescence 30–60 cm; capitula 40–100; involucre 2–3 mm in diam.; phyllaries 4–6; ray florets 2 or 3 ..... 117. *L. przewalskii*
118b. Leaves pinnately dissected; synflorescence 10–25 cm; capitula 7–15; involucre 8–10 mm in diam.; phyllaries 8 or 9; ray florets 4 or 5 ..... 118. *L. qiaojiaensis*
117b. Leaves undivided, margin dentate only.
119a. Ray florets absent; leaves shortly pilose on both surfaces ..... 119. *L. confertiflora*
119b. Ray florets persistent; leaves glabrous or abaxially sometimes only shortly hairy on veins.
120a. Leaves cordate-hastate, coarsely 1- or 2-dentate on each outer margin of basal lobes; ray lamina linear-oblong or oblanceolate, 2–4 mm wide.
121a. Stem 3–6 mm in diam. at base; capitula with 6–15 florets; involucre 2.5–4 mm in diam., rarely broader ..... 120. *L. stenocephala*
121b. Stem slender, 2–3 mm in diam. at base; capitula with 4–6 florets; involucre to 2 mm in diam. ..... 121. *L. dolichobotrys*
120b. Leaves reniform or ovate- or cordate-hastate, margin denticulate; ray lamina linear, 1–1.5 mm wide.
122a. Leaves reniform, to 3.5 cm wide, basal lobes not divergent; capitula with 8 or 9 florets ... 122. *L. kojimae*
122b. Leaves ovate- or cordate-hastate, to 6 cm wide, basal lobes divergent; capitula with 5 florets ..... 123. *L. fargesii*

1. Ligularia pyrifolia S. W. Liu, Bull. Bot. Res., Harbin 5(4): 68. 1985.

梨叶橐吾 li ye tuo wu

Stems 1 or 2, erect, 20–25 cm tall, 2.5–3 in diam. at base, glabrous except on synflorescence. Basal leaves petiolate; petiole to 16 cm, glabrous, base sheathed; leaf blade ovate or cordate-ovate, 5–7.5 × 4–6.3 cm, glabrous, both surfaces with prominent palmate veins, base rounded or shallowly cordate, margin regularly dentate, apex caudate-acuminate. Stem leaves 1 or 2, similar but smaller, petiolate, with enlarged sheath. Capitula 3–5, in lax corymb; peduncles 1.3–1.4 cm, distally shortly brown pilose; leaflike bracts linear-lanceolate, 1–1.5 cm, margin entire; supplementary bracts to 15, linear-lanceolate, 10–14 × ca. 1.5 mm wide, glabrous, margin entire. Involucre broadly campanulate, 1.6–2 × ca. 1.5 cm; phyllaries 10–12, in 2 rows, linear-lanceolate or lanceolate, 2–4 mm wide, margin dark brown, apex acute. Ray florets 6–10, yellow; lamina lanceolate, 20–25 × ca. 6 mm, with 6 or 7 brown veins, apex acuminate. Tubular florets numerous, 10–11 mm; tube ca. 4 mm. Pappus brownish or yellow, as long as tubular corolla. Fl. Aug–Oct.

• Mixed forests, between wet rocks; 1600–2500 m. Yunnan (Jingdong).

2. Ligularia dentata (A. Gray) H. Hara, J. Jap. Bot. 15: 318. 1939.

齿叶橐吾 chi ye tuo wu

Erythrochaete dentata A. Gray, Mem. Amer. Acad. Arts, n.s., 6: 395. 1858; *Ligularia clivorum* Maximowicz; *L. japonica* (Thunberg) Lessing var. *clivorum* (Maximowicz) Makino; *Senecillis dentata* (A. Gray) Kitamura; *Senecio clivorum* (Maximowicz) Maximowicz; *S. japonicus* (Thunberg) Schultz Bipontinus var. *integrifolius* Matsumura; *S. labordei* Vaniot.

Stem erect, 30–120 cm tall, ca. 1.2 cm in diam. at base, proximally glabrous, distally and branches of synflorescence white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole 22–60 cm, stout, white puberulent, palmately veined with 5–7 principal veins, base sheathed; leaf blade abaxially grayish white, adaxially green, reniform, 7–30 × 12–38 cm, abaxially white puberulent, adaxially glabrous, margin regularly dentate, ciliate between teeth, apex rounded. Stem leaves similar but smaller; distal stem leaves sessile, broadly

sheathed. Synflorescence corymbose or compound corymbose, spreading; peduncles to 9 cm, white arachnoid-puberulent and shortly yellow pilose; leaflike bracts ovate to linear-lanceolate, margin denticulate; supplementary bracts absent. Capitula numerous. Involucre hemispheric, broader than long, 1.5–2.5 × 1.8–3 cm, outside densely white arachnoid-puberulent; phyllaries 8–14, closely imbricate, oblong, to 1 cm wide; inner phyllaries 2-carinate on convex outside and margin brown membranous. Ray florets yellow; lamina narrowly oblong, to 5 cm × 4–7 mm, apex acute; tube 7–12 mm. Tubular florets numerous, 1–1.8 cm. Achenes brown, cylindric, 7–10 mm, ribbed. Pappus reddish brown, as long as tubular corolla. Fl. and fr. Jul–Oct.

Grassy slopes, riversides, forest margins, forest understories, sometimes cultivated in gardens; 700–3200 m. Anhui, Gansu, Guangxi, Guizhou, ?Hebei, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Myanmar, Vietnam; cultivated in Europe].

3. Ligularia japonica (Thunberg) Lessing, Syn. Gen. Compos. 390. 1832.

大头橐吾 da tou tuo wu

Stem erect, 50–100 cm tall, to 1 cm in diam. at base, distally and branches of synflorescence white arachnoid-puberulent or glabrous. Basal leaves petiolate; petiole grayish green, with purple spots, 20–100 cm, stout, unwinged, base sheathed; leaf blade abaxially pale green, adaxially green, reniform, ca. 40 cm in diam., abaxially initially white puberulent, glabrescent, adaxially glabrous or shortly pilose, veins palmate, palmatisect; lobes 3–5, palmatilobed; segments pinnate, margin dentate, or rarely entire. Middle and distal stem leaves smaller, shortly petiolate, sheath amplexicaul. Distalmost stem leaves without sheaths, palmatipartite. Capitula 2–8, in corymb; supplementary and leaflike bracts usually absent; peduncles to 20 cm, white floccose-puberulent. Involucre hemispheric, broader than long, 1–2.5 × 1.5–2.4 cm, outside white puberulent; phyllaries 9–12, closely imbricate, broadly oblong, to 8 mm wide, apex triangular, mucronate; inner phyllaries 2-carinate on convex outside and margin broadly membranous. Ray florets yellow; lamina oblong, 4–6.5 × ca. 1 cm; tube 7–12 mm. Tubular florets numerous, ca. 2 cm; tube ca. 1 cm. Achenes cylindric, 7–16 mm, ribbed. Pappus reddish brown, as long as tube of tubular corolla. Fl. and fr. Apr–Sep. $2n = 60$.

Stream banks, grassland slopes, forest understories; 600–2300 m. Anhui, Fujian, Guangdong, Guangxi, ?Guizhou, ?Henan, Hubei, Hunan, Jiangxi, Taiwan, Zhejiang [India, Japan, Korea; cultivated in North America].

1a. Leaves adaxially glabrous ..... 3a. var. *japonica*
1b. Leaves adaxially shortly pilose ..... 3b. var. *scaberrima*

3a. Ligularia japonica var. **japonica**

大头橐吾(原变种) da tou tuo wu (yuan bian zhong)

Arnica japonica Thunberg in Murray, Syst. Veg., ed. 14, 768. 1784; *Erythrochaete palmatifida* Siebold & Zuccarini; *Ligularia macrantha* (C. B. Clarke) H. Koyama; *Senecillis japonica* (Thunberg) Kitamura; *Senecio japonicus* (Thunberg) Schultz Bipontinus (1845), not Thunberg (1784), nor (Linnaeus) Lessing (1832); *S. macranthus* C. B. Clarke; *S. palmatifidus* (Siebold & Zuccarini) Wittrock & Juel.

Leaves adaxially glabrous.

Stream banks, grassland slopes, forest understories; 900–2300 m. Anhui, Fujian, Guangdong, Guangxi, ?Guizhou, ?Henan, Hubei, Hunan, Jiangxi, Taiwan, Zhejiang [Japan, Korea; cultivated in North America].

3b. Ligularia japonica var. **scaberrima** Hayata ex Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 2: 532. 1934.

糙叶大头橐吾 cao ye da tou tuo wu

Leaves adaxially shortly pilose.

Grassland slopes, stream banks; 600–700 m. Fujian, Guangdong, Jiangxi, Taiwan, Zhejiang [Japan].

4. Ligularia hodgsonii J. D. Hooker, Bot. Mag. 89: t. 5417. 1863 [*"hodgsoni"*].

鹿蹄橐吾 lu ti tuo wu

Ligularia hodgsonii var. *crenifera* (Franchet) Handel-Mazzetti; *L. hodgsonii* var. *pulchella* (Pampanini) Handel-Mazzetti; *L. hodgsonii* var. *sutchuenensis* (Franchet) A. Henry; *L. yesoensis* (Franchet) Diels; *L. yesoensis* var. *crenifera* (Franchet) Diels; *L. yesoensis* var. *pulchella* Pampanini; *L. yesoensis* var. *sutchuenensis* (Franchet) Diels; *Senecillis hodgsonii* (J. D. Hooker) Kitamura; *Senecio hodgsonii* A. Henry; *S. yesoensis* Franchet; *S. yesoensis* var. *crenifer* Franchet; *S. yesoensis* var. *sutchuenensis* Franchet.

Stem erect, to 100 cm tall, 3–5 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole 10–30 cm, slender, base narrowly sheathed; leaf blade reniform or cordate-reniform, (2–)5–8 × 4.5–13 cm, thick, glabrous, with palmate veins and conspicuous reticulate veins, base cordate, margin triangular-dentate or crenate and ciliate between teeth, apex rounded. Middle to distal stem leaves few, shortly petiolate or sessile, base broadly sheathed; leaf blade reniform, smaller than lower leaves. Capitula 1 to many, solitary or in corymb or compound corymb, branches 6–12 cm, fasciated; leaflike bracts navicular, 2–3 × ca. 1 cm; peduncles 0.5–2.5 cm; supplementary bracts linear-subulate, shorter than involucre. Involucre broadly campanulate, longer than broad, 10–14 × 7–10 mm, outside glabrous or white arachnoid-puberulent, base truncate or rounded; phyllaries 8 or 9, closely imbricate, purplish red, oblong, 3–4 mm wide, brown ciliate, apex broadly triangular, sometimes mucronate; inner phyllaries 2-carinate on convex outside, margin broadly membranous. Ray florets yellow; lamina oblong, 15–25 × to 6 mm wide, apex obtuse and denticulate; tube ca. 4 mm. Tubular florets numerous, extending from involucre, 9–10 mm; tube 2–3 mm. Achenes cylindric, 7–8 mm, ribbed. Pappus reddish brown, as long as tubular corolla. Fl. and fr. Jul–Oct. $2n = 58$.

Stream banks, grassy slopes, forest margins; 900–2800 m. ?Anhui, SW Gansu, W Guangxi, NW Guizhou, ?Henan, Hubei, S Shaanxi, N Sichuan, ?Xizang, E Yunnan [Japan, Russia (Far East), ?Vietnam].

One of us (Illarionova) believes that *Ligularia hodgsonii* is absent from China. Chinese specimens determined as *L. hodgsonii* belong to *L. dentata*. *Ligularia hodgsonii* differs from *L. dentata* by the structure of synflorescence (indeterminate (acropetal) raceme with long peduncles in *L. hodgsonii* vs. (basipetal) corymb in *L. dentata*) and by the navicular membranous bracts near each peduncle. According to Illarionova, *L. hodgsonii* occurs only in Japan and Russia (Far East).

5. Ligularia calthifolia Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 15: 374. 1871 [*"calthaefolia"*].

乌苏里橐吾 wu su li tuo wu

Ligularia hodgsonii J. D. Hooker var. *calthifolia* (Maximowicz) Koidzumi; *Senecillis calthifolia* (Maximowicz) Kitamura; *Senecio calthifolius* (Maximowicz) Maximowicz.

Stem erect, 30–80 cm tall, 2.5–5 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly pilose. Basal leaves petiolate; petiole long and slender, 2–4 × as long as leaf blade, base sheathed; leaf blade cordate-reniform or cordate-ovate, 6–18 × 6–12 mm, glabrous, both surfaces with prominent palmate veins, base cordate, margin obtusely and sharply dentate, apex obtuse or acute. Middle to distal stem leaves 1 or 2, similar but smaller, petiolar base enlarged into a sheath. Capitula (1 or)2–4, in corymb; leaflike bracts ovate-lanceolate, as long as peduncle, white puberulent; peduncles to 9 cm, shortly brown pilose; supplementary bracts narrowly lanceolate, as long as or longer than involucre. Involucre broadly campanulate or cupular, 1.2–1.3 × 1.3–1.8 cm, outside shortly brown pilose; phyllaries (5–)8–12, closely imbricate, ovate-oblong or narrowly lanceolate, apex acute, mucronate; inner phyllaries broader, 2-carinate on convex outside, margin membranous. Ray florets yellow, 8–10; lamina linear-spatulate, 2–3 cm × 4–6 mm; tube 7–9 mm. Tubular florets numerous, 1.2–1.3 cm; tube ca. 6 mm. Achenes brown, cylindric, 7–10 mm, ribbed. Pappus reddish brown, slightly longer than tube of tubular corolla. Fl. Jul, fr. Aug–Sep. $2n = 60$.

Grasslands, meadows, slopes; 100–1600 m. Heilongjiang [Russia (Far East)].

6. Ligularia phaenicochaeta (Franchet) S. W. Liu, Acta Biol. Plateau Sin. 7: 32. 1988.

紫缨橐吾 zi ying tuo wu

Senecio phaenicochaetus Franchet, Bull. Soc. Bot. France 39: 295. 1893; *Cremanthodium phaenicochaetum* (Franchet) R. D. Good; *Senecillis phaenicochaeta* (Franchet) Kitamura.

Stem erect, 15–40 cm tall, 2–2.5 mm in diam. at base, proximally glabrous or hairy, distally shortly brown pilose. Basal leaves petiolate; petiole 4–20 cm, base sheathed; leaf blade orbicular-reniform, 4–8 × 5–12.5 cm, glabrous, palmate veins prominent abaxially, margin regularly triangular-dentate. Stem leaves 1–3, gradually smaller upward, proximal leaves petiolate, base broadly sheathed; leaf blade reniform. Capitula 1–6, solitary or in corymb; leaflike and supplementary bracts linear-subulate, shorter; peduncles shortly brown pilose, longer than involucre. Involucre broadly campanulate or hemispheric, 8–10 mm, to 20 mm wide, outside glabrous; phyllaries 8–14, dark brown, oblanceolate, ca. 3 mm wide, apex obtuse; inner phyllaries membranous at margin. Ray florets yellow; lamina elliptic, 1–1.5 cm × ca. 2 mm, apex acute; tube ca. 3 mm. Tubular florets numerous, yellow, 6–9 mm; tube 1/3–1/2 as long as campanulate limb. Pappus purplish brown, 1–2 mm, as long as or shorter than tube of tubular corolla. Fl. Aug–Sep.

• Wet slopes, alpine meadows; 3200–4200 m. Xizang (Zayü), NW Yunnan.

7. Ligularia kangtingensis S. W. Liu, Bull. Bot. Res., Harbin 5(4): 68. 1985.

康定橐吾 kang ding tuo wu

Stem erect, 25–30 cm tall, 1.5–2 mm in diam. at base, proximally glabrous, distally and synflorescence densely white arachnoid-puberulent. Basal leaves petiolate; petiole to 13 cm, glabrous, base sheathed; leaf blade reniform, 2–3.3 × 4.5–6 cm, glabrous, palmately veined, veins prominent abaxially, margin regularly denticulate, apex rounded, rarely retuse; sinus ca. 1/4 as long as leaf blade, broad. Stem leaf 1, similar but smaller, narrowly petiolate, base broadly sheathed. Capitula 4 or 5, in lax corymb; leaflike bracts navicular, 1.6–4 × 0.6–1.2 cm, glabrous, margin entire; peduncles 3–9 cm; supplementary bracts to 1.2 cm. Involucre campanulate, 8–10 × 10–12 mm, outside glabrous; phyllaries 10–12, dark brown, usually curved, lanceolate, 1.5–2 mm wide, apex acuminate; inner phyllaries membranous at margin. Ray florets yellow; lamina linear, 1.1–1.3 cm × ca. 1 mm, apex acute; tube ca. 5 mm. Tubular florets numerous, yellow, 6–7 mm; tube as long as limb of tubular corolla. Pappus yellowish white, as long as tubular corolla. Fl. Aug.

• Grassy slopes; ca. 4000 m. Sichuan (Kangding).

8. Ligularia cremanthodioides Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 13. 1925.

垂头橐吾 chui tou tuo wu

Cremanthodium cremanthodioides (Handel-Mazzetti) R. D. Good.

Stem erect, 5–60 cm tall, 3–5 mm in diam. at base, proximally glabrous, distally densely shortly yellow pilose. Basal leaves petiolate; petiole 7–33.5 cm, base sheathed; leaf blade reniform, 3.5–13.5 × 4.5–11 cm, glabrous or abaxially shortly pilose only along veins, palmately veined, margin regularly triangular-dentate, tips of teeth mucronate, apex rounded or retuse; sinus ca. 1/3 as long as leaf blade, narrow, basal lobes orbicular. Stem leaves similar but smaller, petiolar base broadly sheathed. Middle to distal leaves smaller, only base broadly sheathed. Capitula 2–11, in corymb or rarely solitary; leaflike and supplementary bracts linear; peduncles to 10 cm, densely shortly yellow pilose. Involucre hemispheric or campanulate, 10–14 × 10–15 mm, outside white arachnoid-puberulent or glabrescent; phyllaries 10–13, in 2 rows, lanceolate or oblong, minutely denticulate, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 10–15 × 2–4 mm, apex acute, 3- or 4-denticulate. Tubular florets numerous, 5–8 mm; limb ca. 2 mm wide; tube 1–2 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

Forest understories of valleys and rocky areas; 3600–4000[–5300] m. SE Xizang, NW Yunnan [Nepal].

9. Ligularia cuneata S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 38: 286. 2000.

楔舌橐吾 xie she tuo wu

Stem erect, 70–100 cm tall, glabrous. Basal leaves not seen. Stem leaves petiolate; petiole 8–14 cm, base broadly sheathed; sheaths 7–12 cm, to 10 cm wide, submembranous, shortly white pilose; leaf blade reniform, 7–12 × 14–24 cm, abaxially shortly yellowish pilose, adaxially shortly white pilose, palmately veined, with 5–9 principal veins, base cordate, margin triangular-dentate, apex retuse. Distalmost stem leaves smaller, reniform. Capitula numerous, in compound corymbs; each peduncle with 1–5 capitula, densely shortly yellowish green pilose; leaflike bracts linear-lanceolate, 8–10 mm. Involucre hemispheric or campanulate, 9–12 × 10–15 mm, outside shortly white pilose; phyllaries many, equal, lanceolate or oblong, 8–10 × 3–5 mm, submembranous, margin ciliate, apex acute or acuminate. Ray florets yellow; lamina obovate or cuneate, 7–8 × 3–6 mm, apex obtuse, 3- or 4-denticulate; tube 4–5 mm. Tubular florets numerous, yellowish brown, 6–7 mm; tube ca. 2 mm. Pappus white, as long as tubular corolla. Fl. Jun.

• Stream banks; ca. 3800 m. S Xizang (Gyirong).

10. Ligularia retusa Candolle, Prodr. 6: 314. 1838.

黑毛橐吾 hei mao tuo wu

Cremanthodium retusum (Candolle) R. D. Good; *Ligularia nigropilosa* Kitamura; *Senecio retusus* (Candolle) Wallich ex J. D. Hooker.

Stem erect, 1 or 2, 38–100 cm tall, 3.5–12 mm in diam. at base, densely shortly black pilose or proximally glabrescent. Basal leaves petiolate; petiole 7.5–20 cm, shortly black pilose, base narrowly sheathed; leaf blade reniform, 2.2–7.5 × 4–15 cm, abaxially glabrous or shortly pilose along veins, adaxially glabrous, palmately veined, margin regularly denticulate, between teeth shortly black pilose, apex retuse; sinus ca. 1/3 as long as leaf blade, basal lobes orbicular. Middle stem leaves similar but smaller, shortly petiolate, base broadly sheathed; sheath cymbiform, 4–9 × 1.5–3 cm, shortly black pilose, rarely glabrous; leaf blade 3–9.5 × 7–16 cm. Distalmost stem leaves only broadly sheathed. Capitula 2–11(–27), solitary or in corymb, branches spreading; branches and peduncles black pilose; leaflike and supplementary bracts linear-lanceolate, less than 1 cm, shortly black pilose. Involucre hemispheric or campanulate, 1–1.5 × 1.5–2 cm, outside shortly black pilose; phyllaries 11–18, oblong or lanceolate, 2–5 mm wide, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets yellow; lamina oblong or oblanceolate, 9–10 × 3–4 mm, apex subtruncate, 2- or 3-denticulate. Tubular florets numerous, yellowish brown, 5–6 mm; tube 1–1.5 mm. Achenes pale brown, cylindric, 7–10 mm, ribbed. Pappus yellow, as long as tubular corolla. Fl. and fr. Jul–Oct.

Stream banks, grassland slopes, alpine grasslands; 3800–4500 m. SE Xizang, NW Yunnan [Bhutan, NE India, Nepal].

11. Ligularia stenoglossa (Franchet) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 111. 1938.

裂舌橐吾 lie she tuo wu

Senecio stenoglossus Franchet, Bull. Soc. Bot. France 39: 304. 1893; *Ligularia schizopetala* (W. W. Smith) Handel-Mazzetti; *L. trinema* Handel-Mazzetti; *Senecillis schizopetala* (W. W. Smith) Kitamura; *S. stenoglossa* (Franchet) Kitamura; *Senecio schizopetalus* W. W. Smith.

Stem erect, robust, to 150 cm tall, 1.5–2 cm in diam. at base, densely shortly yellow pilose or glabrescent. Basal leaves petiolate; petiole to 70 cm, densely shortly yellow pilose, base narrowly sheathed; leaf blade reniform, 10–15 × 22–29 cm, both surfaces shortly pilose, palmately veined, abaxially with prominent reticulate veins, margin triangular-dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves shortly petiolate; petiole to 3 cm, base broadly sheathed; sheath cymbiform, to 11 cm, ca. 5 cm wide; leaf blade reniform, to 21 cm wide. Distalmost stem leaves smaller, sessile. Corymbs compound, spreading; branches to 10 cm, shortly yellow pilose. Capitula numerous; leaflike and supplementary bracts smaller, subulate; peduncles 3–10 mm, shortly yellow pilose. Involucre narrowly campanulate, 9–10 × 4–6 mm, outside glabrous; phyllaries 7–10, oblong, 2–2.5 mm wide, brown ciliate, apex acute; inner phyllaries broadly membranous at margin. Ray florets 3–5, yellow; lamina 3–5-divided, segments filiform or linear, to 1.5 cm; tube ca. 6 mm. Tubular florets more numerous, to 10, yellowish brown, ca. 1 cm; tube as long as limb. Achenes brown, cylindric, 5–6 mm. Pappus reddish brown, slightly shorter than tubular corolla. Fl. and fr. Sep–Nov.

• Forest understories, grassland slopes; 2100–4000 m. NW and W Yunnan.

12. Ligularia oligonema Handel-Mazzetti, Bot. Jahrb. Syst. 69: 111. 1938.

疏舌橐吾 shu she tuo wu

Stem erect, 55–150 cm tall, to 1.2 cm in diam. at base, shortly reddish brown pilose. Basal leaves petiolate; petiole to 53 cm, shortly brown pilose or glabrescent, base narrowly sheathed; sheath striate, to 2 cm wide; leaf blade reniform, 11–27 cm, to 50 cm wide, submembranous, glabrous, or abaxially shortly pilose, palmately veined, abaxially with 5 principal veins and prominent reticulate veins, margin regularly denticulate, tips of teeth black mucronate, apex rounded or slightly retuse; sinus 1/3–1/2 as long as leaf blade, narrow, basal lobes orbicular, divergent. Middle and distal stem leaves shortly petiolate, base broadly sheathed; sheath ovate, ca. 2 cm in diam., shortly yellowish brown pilose; leaf blade reniform, to 18 cm wide. Corymbs compound, spreading; branches to 15 cm. Capitula numerous; leaflike and supplementary bracts smaller, subulate; peduncles 3–14 mm. Involucre cylindric, 9–12 × 2–3 mm, outside glabrous; phyllaries 5, oblong, 1.5–3 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets 1 or 2, yellow; lamina linear, 1–1.5 cm, 2- or 3-divided, segments filiform, rarely undivided; tube ca. 6 mm. Tubular florets 4 or 5, 8–9 mm; tube ca. 4 mm. Achenes brown, cylindric, ca. 6 mm.

Pappus white, shorter than tubular corolla or as long as tube. Fl. and fr. Sep–Oct.

• Forest understories, grassland slopes; 3000–4000 m. SW Sichuan, NW and W Yunnan.

13. Ligularia franchetiana (H. Léveillé) Handel-Mazzetti, Symb. Sin. 7: 1134. 1936.

隐舌橐吾 yin she tuo wu

Senecio franchetianus H. Léveillé, Bull. Géogr. Bot. 25: 16. 1915; *Ligularia aphanoglossa* Handel-Mazzetti; *Senecillis franchetiana* (H. Léveillé) Kitamura.

Stem erect, 70–150 cm tall, 7–21 mm in diam. at base, proximally glabrous, distally shortly purplish red pilose. Basal leaves petiolate; petiole 9–32 cm, glabrous or shortly brown pilose, base sheathed; leaf blade reniform, 4–30 × 6–42 cm, glabrous or abaxially pale green and initially shortly brown pilose, adaxially green, palmately veined, with 5 principal veins and prominent reticulate veins, margin regularly dentate, between teeth brown ciliate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad. Middle and distal stem leaves shortly petiolate, base broadly sheathed; leaf blade reniform. Distalmost stem leaves smaller, sessile, base broadly sheathed. Corymbs compound, spreading, to 17 cm; branches and peduncles to 12 cm, densely shortly brown pilose. Capitula numerous; leaflike and supplementary bracts smaller, subulate. Involucre cylindric, 5–11 × 2–3 mm, outside glabrous; phyllaries (2 or)3–5, oblong, 1–2 mm wide, brown ciliate, margin membranous, apex triangular-acute. Florets (2 or)3–5, yellow; ray floret solitary or absent, tubular, split on one side, as long as tubular florets. Tubular florets 9–10 mm; tube 3–4 mm. Achenes brown, cylindric, to 8 mm. Pappus white, slightly shorter than tubular corolla. Fl. and fr. Jul–Sep.

• Stream banks, forest understories, grassland slopes; 2400–3900 m. SW Sichuan, NE and NW Yunnan.

14. Ligularia curvisquama Handel-Mazzetti, Symb. Sin. 7: 1134. 1936.

弯苞橐吾 wan bao tuo wu

Senecio curvisquamus (Handel-Mazzetti) C. C. Chang; *S. curvisquamus* var. *robustus* C. C. Chang.

Stem erect, to 70 cm tall, 9–27 mm in diam. at base, shortly yellowish brown pilose. Basal leaves petiolate; petiole to 24 cm, ca. 5 cm wide, shortly yellowish brown pilose, base sheathed; sheath to 5 cm; leaf blade reniform, 8–9 × 18–20 cm, both surfaces sparsely shortly pilose, palmately veined, base cordate, margin dentate, between teeth ciliate, apex retuse; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle and distal stem leaves shortly petiolate; sheath enlarged into a leaf blade, to 6 cm wide, not amplexicaul, margin laciniate; leaf blade reniform, 3–8 cm, to 10 cm wide, abaxially shortly pilose. Corymbs compound, branched, not spreading; branches erect, to 23 cm, fasciated, densely shortly yellowish brown pilose. Capitula numerous; leaflike and supplementary bracts smaller, subulate; peduncles 2–10 mm, shortly yellowish brown pilose. Involucre narrowly turbinate, 6–8 mm, mouth ca. 6 mm in diam.; phyllaries 7–10, lanceolate or linear-lanceolate, outside glabrous, apex caudate-acuminate, curved, dark brown, ciliate; inner phyllaries 2–2.5 mm wide, margin membranous. Ray floret 1, yellow; lamina short, narrow, as long as tubular florets, rarely absent. Tubular florets 8 or 9, 6–10 mm, wholly extending from involucre in fruit; tube ca. 2.5 mm. Achenes brown, cylindric, to 7 mm. Pappus brown above, purplish brown below, as long as tube of tubular corolla. Fl. and fr. Jul–Nov.

• Stream banks, bogs, forest understories, grassland slopes; ca. 4000 m. NW Yunnan.

15. Ligularia rockiana Handel-Mazzetti, Bot. Jahrb. Syst. 69: 110. 1938.

独舌橐吾 du she tuo wu

Stem erect, 50–70 cm tall, 6–8 mm in diam. at base, shortly yellowish brown pilose. Basal leaves petiolate; petiole 19–26 cm, shortly yellowish brown pilose, base sheathed; sheath usually reddish purple, entire; leaf blade peltate, broadly reniform, 9–15 × 20–30 cm, abaxially shortly pilose, adaxially glabrous, palmately veined, margin dentate, apex retuse; sinus ca. 1/3 as long as leaf blade, broad, basal lobes divergent. Middle and distal stem leaves shortly petiolate or sessile; sheath enlarged, cucullate; leaf blade smaller, reniform. Distalmost stem leaves only sheathed. Corymbs compound, not spreading, to 20 cm; branches to 15 cm, fasciated, shortly yellowish brown pilose. Capitula numerous; leaflike and supplementary bracts linear; peduncles 7–10 mm, shortly yellowish brown pilose. Involucre narrowly cylindric, 7–9 × 3–4 mm, outside shortly pilose; phyllaries 5–8, lanceolate or oblong, apex acute or obtuse; inner phyllaries brown, margin broadly membranous. Ray floret 1, yellow; lamina oblong or obovate-oblong, 5–6 × ca. 3 mm, apex obtuse. Tubular florets 6–10, 5–6 mm; tube ca. 2 mm. Achenes cylindric, to 7 mm. Pappus white to pale yellow, 3–4 mm, shorter than tubular corolla. Fl. and fr. May–Nov.

• Stream banks, bogs, forest understories, grassland slopes, gravelly slopes; 3400–3900 m. NW Yunnan.

16. Ligularia transversifolia Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 26. 1925.

横叶橐吾 heng ye tuo wu

Stem erect, 50–100 cm tall, 6–25 mm in diam. at base, densely shortly rufous pilose. Basal leaves petiolate; petiole to 30 cm, densely shortly rufous pilose, base sheathed; sheath to 11 × ca. 1.5 cm; leaf blade orbicular or orbicular-reniform, 7–24.5 × 11–38 cm, both surfaces shortly pilose, palmately veined, margin denticulate, apex rounded or retuse; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves shortly petiolate or sessile; sheath enlarged, broadly ovate, ca. 5 cm, to 13 cm wide, denticulate; leaf blade smaller, reniform. Distalmost stem leaves only broadly sheathed. Corymbs compound; branches spreading or fasciated, proximal ones to 11 cm. Capitula numerous; leaflike and supplementary bracts linear-subulate; peduncles to 15 mm. Involucre narrowly campanulate, 6–8 × ca. 6 mm, outside glabrous or glabrescent; phyllaries 5–7, oblong or oblong-lanceolate, margin membranous, apex acute. Ray florets 3–6, yellow; lamina narrowly oblong, 3–6 × 1.5–2 mm, apex 2- or 3-denticulate. Tubular florets

to 15, ca. 6 mm; tube ca. 2 mm. Pappus white or brown, as long as tube of tubular corolla. Fl. Jun–Jul.

• Stream banks, grassland slopes, alpine grasslands; 3400–4500 m. NW Yunnan.

17. Ligularia paradoxa Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 59: 140. 1922.

奇异橐吾 qi yi tuo wu

Stem erect, to 90 cm tall, ca. 6 mm in diam. at base, proximally glabrous, distally arachnoid-puberulent. Basal leaves petiolate; petiole to 32.5 cm, base narrowly sheathed; leaf blade orbicular or broadly ovate, 10–25 cm in diam., glabrous or abaxially pale green and initially hairy, palmately veined, 3–8(or 17)-palmatisect or palmatilobed; lobes 3-divided, lobules pinnatisect; segments linear-oblong, 7–15 × 3–6(–8) mm, margin revolute, apex acute. Stem leaves 2 or 3, similar but smaller, shortly petiolate, ± divided; sheath enlarged, cymbiform, glabrous, margin entire. Corymbs compound, slightly spreading; branches and peduncles shortly yellowish brown pilose. Capitula to 30; leaflike and supplementary bracts filiform, glabrous. Involucre campanulate-turbinate, 10–13 × 7–12 mm, outside shortly pilose; phyllaries 8 or 9, purple, oblong or lanceolate, 3–5 mm wide, margin membranous, apex acute. Ray florets absent. Tubular florets numerous, 6–7 mm, extending from involucre; tube 1–1.5 mm. Achenes brown, cylindric, 7–8 mm. Pappus brown, shorter than tubular corolla, usually deciduous. Fl. and fr. Sep–Oct.

• Grassy slopes, forest understories, alpine grasslands; 3400–4500 m. Yunnan.

1a. Leaves 3–8-palmatipartite, lobes 3-divided ..... 17a. var. *paradoxa*
1b. Leaves palmatilobed, lobes 17, 1.5–3 cm wide, lobed or dentate ..... 17b. var. *palmatifida*

17a. Ligularia paradoxa var. **paradoxa**

奇异橐吾(原变种) qi yi tuo wu (yuan bian zhong)

Cremanthodium pteridophyllum Y. L. Chen.

Leaves 3–8-palmatipartite; lobes 3-divided.

• Grassy slopes, forest understories, alpine grasslands; 3400–4500 m. NW Yunnan.

17b. Ligularia paradoxa var. **palmatifida** S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 39: 559. 2001.

半裂橐吾 ban lie tuo wu

Leaves palmatilobed; lobes 17, 1.5–3 cm wide, lobed or dentate.

• Yunnan (Zhongdian).

18. Ligularia purdomii (Turrill) Chittenden, Royal Hort. Soc. Dict. Gard. 3: 1165. 1951.

褐毛橐吾 he mao tuo wu

Senecio purdomii Turrill, Bull. Misc. Inform. Kew 1914: 327. 1914.

Stem erect, to 150 cm tall, 1–2 cm in diam. at base, shortly brown pilose. Basal leaves petiolate; petiole purplish red, to 50 cm, robust, to 1 cm in diam., shortly brown pilose, base narrowly long sheathed; leaf blade adaxially green, reniform or orbicular-reniform, 14–50 cm in diam. or broader than long, peltate, abaxially densely shortly pilose, adaxially glabrous, palmately veined, margin regularly dentate, apex rounded or retuse; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves similar but smaller, to 18 cm wide, shortly petiolate, apex retuse; sheath enlarged, 7–10 cm, to 10 cm in diam., shortly brown pilose. Distalmost stem leaves only broadly sheathed. Corymbs compound, to 50 cm, much branched; branches numerous, densely shortly brown pilose, each branch with 3–7 capitula; peduncles to 3 cm, shortly brown pilose. Capitula numerous; leaflike and supplementary bracts linear, hairs as on peduncles. Involucre campanulate-turbinate, 8–13 × 6–16 mm, outside shortly yellowish brown pilose, rarely glabrous; phyllaries 6–12, dark brown, oblong or lanceolate, apex acute; inner phyllaries brown membranous at margin. Florets numerous, yellow, all tubular, 7–9 mm; tube ca. 3 mm; limb ca. 2 mm wide. Achenes yellowish brown, cylindric, to 7 mm, narrowly ribbed. Pappus white or brown when mature, 3–4 mm, as long as tube of tubular corolla. Fl. Jun–Jul.

• Stream banks, swamps; 3700–4100 m. SW Gansu, SE Qinghai, NW Sichuan.

19. Ligularia yunnanensis (Franchet) C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 67. 1935.

云南橐吾 yun nan tuo wu

Senecio yunnanensis Franchet, Bull. Soc. Bot. France 39: 303. 1893; *Senecillis yunnanensis* (Franchet) Kitamura.

Stem erect, 30–56 cm tall, slender, 2.5–4 mm in diam. at base, shortly brown pilose, or proximally glabrous. Basal leaves 2, petiolate; petiole 15–41 cm, slender, glabrous, base narrowly long sheathed; sheath ca. 8 cm; leaf blade abaxially pale green, adaxially green, reniform or orbicular-reniform, 3–6.5 × 7–11 cm, glabrous, palmately veined, margin coarsely triangular-dentate, tips of teeth black mucronate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad. Stem leaves 2 or 3, similar but smaller, petiole to 21 cm, slender, base sheathed; sheath enlarged, cucullate, 2.5–4 cm, to 2 cm wide, or lower narrower. Capitula 9–14, in corymb; branches shorter, fasciated, shortly brown pilose; leaflike and supplementary bracts linear, ca. 1 cm; peduncles to 1.5 cm, densely shortly brown pilose. Involucre narrowly campanulate, 9–14 × 5–7 mm, outside glabrous; phyllaries 5–8, in 2 rows, oblong, 2–3.5 mm wide, margin membranous, apex acute or acuminate. Florets 6–20, yellow, all tubular, 7–8 mm; tube as long as limb of tubular corolla. Achenes pale brown, cylindric, 5–7 mm. Pappus white, as long as tubular corolla. Fl. and fr. May–Oct.

• Grassy slopes, forest understories, between rocks; 3100–4000 m. NW Yunnan.

20. Ligularia potaninii (C. Winkler) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 4. 1937.

浅齿橐吾 qian chi tuo wu

Senecio potaninii C. Winkler, Trudy Imp. S.-Peterburgsk.

Bot. Sada 13: 5. 1893; *Cacalia potaninii* (C. Winkler) Mattfeld; *Senecillis potaninii* (C. Winkler) Kitamura.

Stems 1 or 2, erect, to 31 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally and branches of synflorescence shortly brown pilose. Basal leaves petiolate; petiole often purplish red, to 11 cm, glabrous, base narrowly sheathed; leaf blade abaxially purplish red, broadly reniform, 4.5–6 × 9–10.5 cm, subleathery, abaxially hairy only along veins, reticulate veins prominent and white, adaxially glabrous, palmately veined, base shallowly cordate, margin undulate-crenate and ciliate, apex rounded or retuse; sinus ca. 1/4 as long as leaf blade, broad. Middle stem leaves smaller, reniform; petiole enlarged into a sheath; sheath 2.5–5 cm, to 2.5 cm wide. Distalmost stem leaves with only enlarged sheath or very rarely lanceolate, without sheath. Capitula (3–)7–9 in corymb; leaflike and supplementary bracts linear; peduncles 1–2 cm. Involucre turbinate, 1–1.1 cm, mouth ca. 1 cm in diam., outside glabrous; phyllaries 9 or 10, in 2 rows, oblong or lanceolate, purple ciliate, apex acute or acuminate; inner phyllaries membranous at margin. Florets 20–30, yellow, all tubular, 9–10 mm; tube ca. 5 mm. Achenes brown, cylindric, 5–7 mm. Pappus white, as long as tubular corolla. Fl. Jul.

• Grassy areas in swamps; ca. 4000 m. SW Gansu, N Sichuan.

21. Ligularia cymosa (Handel-Mazzetti) S. W. Liu, Acta Biol. Plateau Sin. 7: 31. 1988.

聚伞橐吾 ju san tuo wu

Cremanthodium cymosum Handel-Mazzetti, Acta Horti Gothob. 12: 305. 1938.

Stems 1 or 2, erect, 7–45 cm tall, ca. 2 mm in diam. at base, proximally glabrous, distally shortly purple pilose and white arachnoid-puberulent. Basal leaves petiolate; petiole 5–24 cm, slender, base sheathed; leaf blade reniform, (2–)4–12.5 cm wide, abaxially shortly pilose only along veins, adaxially glabrous, palmate veins prominent abaxially, margin regularly undulate-dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, narrow. Middle stem leaves smaller, reniform; petiole short, with enlarged sheaths. Distalmost stem leaves only enlarged sheathed; mouth of sheath shallowly dentate at margin. Capitula 3–6 in corymb; leaflike and supplementary bracts linear, shorter than peduncle and involucre; peduncles 4–40 mm, densely shortly purple pilose and white arachnoid-puberulent. Involucre campanulate, 8–15 mm, mouth to 1.5 cm in diam., outside glabrous; phyllaries ca. 13, in 2 rows, purplish red, oblong, petaloid, 2–4 mm wide, apex acute; inner phyllaries narrowly membranous at margin. Florets numerous, yellow, all tubular, 5–10 mm; tube 1–2 mm. Pappus white, as long as tubular corolla. Fl. Aug.

• Grasslands; ca. 4000 m. NW Sichuan, Xizang.

22. Ligularia microcephala (Handel-Mazzetti) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 13. 1925.

小头橐吾 xiao tou tuo wu

Cremanthodium microcephalum Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 174. 1920.

Stems 1 or 2, erect, often purple, to 24 cm tall, 2–4 mm in diam. at base, proximally glabrous, distally shortly brown pilose. Basal leaves petiolate; petiole to 21.5 cm, slender, glabrous, base narrowly sheathed; leaf blade abaxially pale purple, adaxially green, reniform, 1.5–4.5 × 4.5–9.5 cm, abaxially shortly pilose only along veins, adaxially glabrous, palmately veined, with conspicuous reticulate veins, margin regularly sharply dentate, apex rounded or retuse; sinus narrow, 1/3(–1/2) as long as leaf blade, basal lobes orbicular. Stem leaves 1 or 2, smaller, reniform; petiole 11–15 cm, base enlarged sheathed; sheath to 3.5 cm, as long as broad or narrower. Capitula 1–4, in corymb or solitary; leaflike bract lanceolate, as long as peduncles; supplementary bracts 3 or 4, subulate, shorter than involucre; peduncles divaricately branched, to 1 cm, densely shortly brown pilose. Involucre broadly campanulate or hemispheric, ca. 8 mm, to 2 cm wide, outside glabrous or shortly white pilose; phyllaries ca. 15, in 2 rows, dark brown, elliptic, 2–3 mm wide, margin shallowly denticulate, apex obtuse or acute; inner phyllaries membranous at margin. Florets numerous, yellow, all tubular, 5–6 mm; tube ca. 2 mm. Achenes ca. 5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Alpine grasslands, grassy slopes, rocky slopes; 3700–4800 m. NW Yunnan.

23. Ligularia dux (C. B. Clarke) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 3. 1937.

紫花橐吾 zi hua tuo wu

Stem erect, to 90 cm tall, 3–5 mm in diam. at base, proximally glabrous, distally umbrella-branched, shortly purplish brown pilose. Basal leaves petiolate; petiole 6–25 cm, slender, glabrous, base narrowly sheathed; leaf blade orbicular-reniform or reniform, 1.5–10 × (3–)6–15 cm, abaxially pilose, adaxially glabrescent, palmately veined, margin triangular-dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad, basal lobes oblong, to 10 cm, margin coarsely dentate. Stem leaves smaller, reniform, petiolate, sheath amplexicaul. Corymbs compound, spreading or narrowed; branches to 13 cm; leaflike and supplementary bracts linear, 4–10 mm. Peduncles 3–7 mm, shortly purplish brown pilose. Capitula 5–8 or more. Involucre narrowly cylindric, 8–10 × 2–3 mm, outside shortly purplish brown pilose; phyllaries 4 or 5, in 2 rows, oblong, 2–3 mm wide, apex obtuse; inner phyllaries membranous at margin. Florets 4 or 5, purplish red, all tubular, 8–9 mm; tube 3–4 mm. Achenes yellowish brown, cylindric, 5–7 mm. Pappus yellowish brown, slightly shorter than tubular corolla. Fl. and fr. Aug.

Grassy slopes, forest understories; 3200–4200 m. Xizang [NE India, Myanmar].

1a. Capitula numerous, in compound corymbs; basal leaves 6–15 cm wide ..... 23a. var. *dux*

1b. Capitula 5–8, in corymb; basal leaves 3–5 cm wide ..... 23b. var. *minima*

23a. Ligularia dux var. **dux**

紫花橐吾(原变种) zi hua tuo wu (yuan bian zhong)

Senecio dux C. B. Clarke, J. Linn. Soc., Bot. 25: 40. 1889; *Senecillis dux* (C. B. Clarke) Kitamura.

Plants to 90 cm tall. Basal leaves 4.5–10 × 6–15 cm, base cordate. Capitula numerous, in compound corymbs.

Grassy slopes, forest understories; 3200–3900 m. SE Xizang [NE India, Myanmar].

23b. Ligularia dux var. **minima** S. W. Liu, Acta Biol. Plateau Sin. 3: 69. 1984.

小紫花橐吾 xiao zi hua tuo wu

?*Ligularia tenuicaulis* C. C. Chang var. *purpuracea* S. W. Liu.

Plants 25–40 cm tall. Stem slender, 1.5–2.5 mm in diam. at base. Leaves reniform, 2–3 × 3–5 cm, base subtruncate. Capitula 5–8, in corymb.

• Grassy slopes; 3200–4200 m. Xizang (Mêdog).

24. Ligularia tenuicaulis C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 66. 1935.

纤细橐吾 xian xi tuo wu

Stem erect, 42–65 cm tall, 1.5–3 mm in diam. at base, proximally glabrous, distally and synflorescence densely shortly brown pilose. Basal leaves petiolate; petiole to 30 cm, slender, glabrous, base narrowly sheathed; leaf blade ovate-cordate or subreniform, 4.5–6 cm, base to 11 cm wide, abaxially sparsely shortly pilose, adaxially glabrous, palmate veins prominent abaxially, base cordate, margin coarsely irregularly triangular-dentate, apex acute. Middle stem leaves petiolate; petiole 5–10 mm; sheath enlarged, ovate, 17–25 × 8–10 cm; leaf blade reniform, 2–2.5 × 4–5 cm, base shallowly cordate or subtruncate, margin denticulate, apex rounded. Distalmost stem leaves ovate, base not amplexicaul. Compound corymbs spreading; branches to 6 cm; leaflike and supplementary bracts subulate, much shorter; peduncles to 2 cm, densely shortly brown pilose. Capitula 9–13. Involucre cylindric, 9–12 mm, to 4 mm wide, outside glabrous, base shortly brown pilose; phyllaries 5, in 2 rows, oblong, 1.5–3 mm wide, margin membranous, apex acute. Florets 5 or 6(–8), yellow, all tubular, 6–7 mm; tube as long as limb. Achenes brown, linear, 6–8 mm. Pappus pale brown below, brown above, as long as tubular corolla. Fl. and fr. Sep–Oct.

• Grasslands, scrub; 3200–4500 m. ?Xizang, NW Yunnan.

25. Ligularia tongkyukensis Handel-Mazzetti, J. Bot. 76: 288. 1938.

东久橐吾 dong jiu tuo wu

Stem erect, 60–90 cm tall, distally branched, densely shortly brown pilose. Basal leaves petiolate; petiole to 30 cm, slender; leaf blade abaxially pale green, adaxially dark green, broadly reniform, ca. 10 cm, to 17 cm wide, abaxially shortly brown pilose along veins, palmately veined, with 9 principal veins and slender reticulate veins, base broadly cordate, margin sharply dentate, apex rounded; basal lobes orbicular. Middle stem leaves petiolate; sheath lanceolate; leaf blade reniform, ca. 7 cm. Distalmost stem leaves bracteal, spatulate, narrowly shortly petiolate, margin entire. Compound corymbs clustered, ca. 5 cm wide; leaflike and supplementary bracts filiform; peduncles to 5 mm, shortly purplish brown pilose. Capitula numerous. Involucre brown, narrowly cylindric, ca. 1 cm, outside glabrous; phyllaries 3, linear, margin brown or purplish brown membranous, apex obtuse. Florets 3, all tubular, longer than involucre; tube as long as limb. Pappus reddish brown, slightly shorter than tubular corolla. Fl. and fr. Aug.

• Scrub; 3400–4000 m. Xizang (Nyingchi).

26. Ligularia xanthotricha (Grüning) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 4. 1937.

黄毛橐吾 huang mao tuo wu

Cacalia xanthotricha Grüning, Repert. Spec. Nov. Regni Veg. 12: 312. 1913; *Senecillis xanthotricha* (Grüning) Kitamura.

Stem erect, robust, to 150 cm tall, 1–1.5 cm in diam. at base, densely yellow shortly pilose. Basal leaves petiolate; petiole to 38 cm, shortly yellow pilose, base enlarged sheathed; leaf blade orbicular-reniform, 7–21 cm, to 50 cm wide, glabrous, palmately veined, abaxially with prominent reticulate veins, margin densely minutely denticulate, apex rounded or retuse; sinus ca. 1/3 as long as leaf blade, narrow. Middle stem leaves shortly petiolate, base enlarged sheathed; sheath broadly ovate, to 7 × ca. 4 cm, shortly yellow pilose; leaf blade reniform, 2.7–6.5 × to 13 cm. Compound corymbs ca. 38 cm; branches densely shortly yellow pilose; leaflike and supplementary bracts filiform-subulate, to 1.3 cm; peduncles 5–15 mm, shortly yellow pilose. Capitula numerous. Involucre narrowly campanulate, 6–8 mm in diam., outside shortly yellow pilose; phyllaries 8–10, narrowly lanceolate, 9–15 × 2–3(–4) mm, margin narrowly membranous, apex acuminate. Florets more than 20, yellow, all tubular, 8–9 mm; tube ca. 4 mm. Achenes brown, cylindric, 5–8 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Scrub, grasslands, stream banks; 1700–3500 m. Gansu (Tao He), Hebei, Shanxi.

27. Ligularia achyrotricha (Diels) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 4. 1937.

刚毛橐吾 gang mao tuo wu

Senecio achyrotrichus Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 105. 1905; *Cacalia achyrotricha* (Diels) Y. Ling; *Senecillis achyrotricha* (Diels) Kitamura.

Stem erect, 25–64 cm tall, to 8 mm in diam. at base, densely shortly brown pilose. Basal leaves petiolate; petiole to 27 cm, shortly brown pilose, base narrowly sheathed; sheath ca. 12 cm; leaf blade reniform, 3–10 × 7–22.5 cm, glabrous or abaxially pubescent along veins, palmately veined, margin irregularly coarsely dentate and brown ciliate, apex rounded; teeth triangular, 2–6 mm; sinus ca. 1/3 as long as leaf blade, broad, basal lobes suborbicular. Middle stem leaves smaller, shortly petiolate; sheath enlarged, brown pubescent; leaf blade reniform, ca. 6.5 × 12 cm, margin coarsely triangularly dentate, apex rounded or retuse; teeth to 7 mm. Compound corymbs spreading, to 15 cm, branched; leaflike and supplementary bracts subulate; peduncles ca. 2 cm, densely yellow pubescent. Capitula numerous. Involucre narrowly campanulate or cylin-

dric, 5–6 mm in diam., outside yellowish brown pubescent; phyllaries 8–10, in 2 rows, narrowly lanceolate, 9–10 × 1.5–2.5 mm, outside densely shortly yellow pilose, apex acuminate; inner phyllaries membranous at margin. Florets 10–16, yellow, all tubular, 7–9 mm; tube 4.5–5 mm; limb to 2 mm wide. Achenes narrowly cylindric, 7–9 mm. Pappus white or lower yellow, as long as tube of tubular corolla. Fl. and fr. Jun–Aug.

• Grassy slopes, forest margins; 3300–3700 m. S Shaanxi (Qin Ling).

28. Ligularia macrodonta Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 2. 1937.

大齿橐吾 da chi tuo wu

Stem erect, 50–80 cm tall, to 7 mm in diam. at base, glabrous or distally and sometimes at base shortly brown pilose. Basal leaves petiolate; petiole to 30 cm, slender, glabrous, base enlarged sheathed; leaf blade abaxially pale green, adaxially green, reniform, 5–16 × 8–20 cm, abaxially glabrous or pubescent along veins, adaxially glabrous, palmately veined, margin deeply coarsely dentate, apex retuse; teeth irregularly triangular-lanceolate, to 2 cm wide, apex blackish purple and mucronate, recurved; sinus ca. 1/3 as long as leaf blade, broad, basal lobes subdivergent. Middle stem leaves smaller, reniform, shortly petiolate; sheath enlarged, broadly ovate, margin entire. Distalmost stem leaves only enlarged sheathed. Compound corymbs branched; branches to 15 cm, densely shortly pilose; leaflike and supplementary bracts linear-subulate, shorter; peduncles to 1.5 cm, slender, densely shortly pilose. Capitula numerous. Involucre narrowly cylindric, ca. 1 cm, rarely to 1.3 cm, 3–4 mm wide, outside glabrous; phyllaries 5–8, in 2 rows, linear-lanceolate, 1.5–2 mm wide, purple ciliate, apex acute; inner phyllaries membranous at margin. Florets 6–8, yellow, all tubular, 8–9 mm; tube slightly longer than limb. Achenes yellowish brown, cylindric, 4–5.5 mm. Pappus white, ca. 7 mm, shorter than tubular corolla. Fl. Sep.

• Grassy slopes; 2600–4300 m. SW Gansu, Qinghai (Xionghua).

29. Ligularia duciformis (C. Winkler) Handel-Mazzetti, Symb. Sin. 7: 1135. 1936.

大黄橐吾 da huang tuo wu

Senecio duciformis C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 155. 1895; *Senecillis duciformis* (C. Winkler) Kitamura.

Stem erect, to 170 cm tall, to 1 cm in diam. at base, glabrous or distally shortly yellow pilose. Basal leaves petiolate; petiole shortly yellow pilose, to 31 cm, base enlarged sheathed; leaf blade reniform or cordate, 5–16 × 7–50 cm, glabrous, palmately veined, with 3–5 principal veins and prominent reticulate veins, margin irregularly dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves petiolate; petiole 4–9.5 cm, densely shortly yellowish green pilose; sheath much enlarged, to 5 × ca. 4 cm, shortly yellow pilose, mouth of sheath entire; leaf blade reniform, 4–10 × 8–20 cm, margin denticulate, apex retuse. Distalmost stem leaves only sheathed. Compound corymbs to 20 cm; branches spreading, pubescent; leaflike and supplementary bracts minute, linear-subulate; peduncles to 1 cm, densely shortly yellow pilose. Capitula numerous. Involucre narrowly cylindric, 8–13 × 3–4 mm, outside glabrous; phyllaries 5, in 2 rows, oblong, ciliate, apex triangular-acute; inner phyllaries broadly membranous at margin. Florets (5 or)6(or 7), yellow, all tubular, 6–9 mm, wholly extending from involucre; tube as long as limb. Achenes brown, cylindric, 5–7 mm. Pappus white or lower part yellow, as long as tube of tubular corolla. Fl. and fr. Jul–Sep.

• Stream banks, forest understories, grasslands, alpine meadows; 1900–4300 m. S Gansu, Ningxia (Jingyuan), ?Shaanxi, N to SW Sichuan, NW Yunnan.

30. Ligularia nelumbifolia (Bureau & Franchet) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 27. 1925.

莲叶橐吾 lian ye tuo wu

Senecio nelumbifolius Bureau & Franchet, J. Bot. (Morot) 5: 74. 1891; *Senecillis nelumbifolia* (Bureau & Franchet) Kitamura; *Senecio moisonii* H. Léveillé.

Stem erect, 80–100 cm tall, to 1 cm in diam. at base, distally white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole white arachnoid-puberulent, 10–50 cm, base enlarged sheathed; leaf blade peltate, reniform, 7–30 × 13–38(–80) cm, abaxially white arachnoid-puberulent, adaxially glabrous, palmately veined, abaxially with prominent reticulate veins, margin sharply dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad, basal lobes suborbicular. Distal stem leaves petiolate; petiole 5–20 cm; sheath enlarged, 4–6 × 2–2.5 cm, white arachnoid-puberulent. Compound corymbs spreading; branches numerous, divaricate, blackish purple, white arachnoid-puberulent and shortly yellow pilose; leaflike and supplementary bracts subulate, minute; peduncles blackish purple, to 1.5 cm, often curved. Capitula numerous. Involucre narrowly cylindric, 10–12 × 3–4 mm, outside glabrous; phyllaries 5–7, in 2 rows, oblong, 2.5–3 mm wide, white ciliate, apex triangular, obtuse; inner phyllaries marginally brown or yellow, broadly membranous. Florets 6–8, rarely to 12, yellow, all tubular, 7–9 mm, slightly extending from involucre; tube as long as limb. Achenes brown, cylindric. Pappus white or yellowish, 6–7 mm, slightly shorter than tubular corolla. Fl. Jul–Sep.

• Forest understories, slopes, alpine meadows; 2400–3900 m. S Gansu, W Hubei, SW and W Sichuan, NE to NW Yunnan.

31. Ligularia konkalingensis Handel-Mazzetti, Bot. Jahrb. Syst. 69: 112. 1938.

贡嘎岭橐吾 gong ga ling tuo wu

Stem erect, 60–90 cm tall, to 1 cm in diam. at base, shortly yellow pilose. Basal leaves petiolate; petiole densely shortly yellowish brown pilose, to 28 cm, base long sheathed; leaf blade orbicular-reniform, ca. 17 × to 24 cm, abaxially with prominent palmate veins and shortly pilose, adaxially glabrous, margin coarsely dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, narrow. Middle stem leaves petiolate; petiole to 7 cm; sheath enlarged, ca. 5 × 2.5 cm, densely shortly yellow pi-

lose; leaf blade smaller, reniform. Distalmost stem leaves sessile, ovate, without sheath. Compound corymbs spreading or clustered; leaflike and supplementary bracts linear, shortly pilose; peduncles to 2 cm, shortly yellow pilose. Capitula numerous. Involucre cylindric or campanulate-cylindric, 10–12 × 4–6 mm, outside densely shortly yellow pilose; phyllaries 5–7, in 2 rows, oblong-lanceolate, ca. 2 mm wide, apex acute; inner phyllaries membranous at margin. Florets 5–9, yellow, all tubular, 7–8 mm, extending from involucre; tube ca. 5 mm; limb campanulate. Achenes brown, cylindric, 6–7 mm. Pappus pale brown, as long as tube of tubular corolla. Fl. Aug–Sep.

• Alpine stream banks; 3800–4800 m. Sichuan (Batang, Gonggaling, Muli).

32. Ligularia rumicifolia S. W. Liu in C. Y. Wu, Fl. Xizang. 4: 832. 1985.

藏橐吾 zang tuo wu

Senecio rumicifolius J. R. Drummond, Bull. Misc. Inform. Kew 1911: 271. 1911, not MacOwan & Bolus (1881), nor Klatt (1888); *Cremanthodium rumicifolium* R. D. Good; *Ligularia leesicotal* Kitamura.

Stem erect, 40–100 cm tall, white lanate, 3–8 mm in diam. at base, with a circle of dense reddish brown lanate hairs. Basal leaves petiolate; petiole to 20 cm, winged or not, base slightly enlarged; leaf blade ovate-oblong, 10–19 × to 14.5 cm, both surfaces initially white lanate, glabrescent, adaxially or on both surfaces glabrescent, pinnately veined, with white prominent reticulate veins, base rounded or shallowly cordate, margin minutely denticulate, apex obtuse or rounded. Middle to distal stem leaves without petiole and sheath; leaf blade ovate or ovate-lanceolate, to 19 × 6–9 cm, base auriculate-amplexicaul or not, margin dentate, apex obtuse or acute. Distalmost stem leaves lanceolate or linear-lanceolate, to 6 cm, base not amplexicaul, margin subentire. Compound corymbs or panicles, initially clustered, later spreading; branches to 17 cm, white lanate; leaflike and supplementary bracts linear, shorter; peduncles shorter or to 3 cm, white lanate. Capitula numerous. Involucre turbinate or campanulate-turbinate, 5–9 mm, mouth to 1 cm in diam., outside green, glabrous or initially white pubescent; phyllaries 5–8, in 2 rows, dark brown, elliptic or oblong, apex acute; inner phyllaries broadly pale brown membranous at margin. Ray florets 3–7, yellow; lamina linear-oblong, 1–1.6 cm × 2–3 mm, apex rounded; tube 2–3 mm. Tubular florets numerous, 5.5–6.5 mm; tube 1–1.5 mm. Achenes pale brown, cylindric, 4–6 mm. Pappus white or pale brownish, as long as tubular corolla. Fl. and fr. Jul–Oct.

Lake shores, forest understories, scrub, slopes; 3700–4500 m. SW Sichuan, E Xizang [Nepal].

33. Ligularia songarica (Fischer) Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 2: 532. 1934.

准噶尔橐吾 zhun ga er tuo wu

Senecio songaricus Fischer in Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 52. 1841; *Senecillis songarica* (Fischer) Kitamura; *Senecio turkestanicus* C. Winkler.

Stem erect, 40–180 cm tall, white floccose-lanate or glabrous, 3–10 mm in diam. at base, with a circle of dense reddish brown lanate hairs. Basal leaves petiolate; petiole 5–30 cm, without wings, floccose-lanate or glabrous, base narrowly sheathed; leaf blade sagittate, ovate-sagittate, or oblong-sagittate, 6–14(–35) × 4–11 cm, glabrous, pinnately veined, margin minutely denticulate, apex obtuse or acute; sinus broad, basal lobes coarsely dentate. Middle stem leaves similar but smaller, shortly petiolate, without wings, white lanate in axils. Distal stem leaves sessile, ovate-lanceolate to narrowly lanceolate, apex acuminate. Compound corymbs spreading; branches to 10 cm; leaflike and supplementary bracts narrowly lanceolate to subulate, 1–3 mm; peduncles 2–7 mm, glabrous. Capitula numerous. Involucre narrowly cylindric, 6–9 × (2.5–)4 mm, outside glabrous; phyllaries 5–7, in 2 rows, oblong or ovate-oblong, apex obtuse; inner phyllaries white membranous at margin. Ray florets 3 or 4, yellow; lamina oblong, 6–10 × 2–4 mm, apex rounded, minutely denticulate; tube 3–4 mm. Tubular florets 8–13, 6–10 mm, extending from involucre; tube 2–3 mm. Achenes yellowish, oblong, 4–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug.

Stream banks, wet grasslands; 500–1100 m. Xinjiang (Tian Shan) [E Kazakhstan, Kyrgyzstan].

34. Ligularia thomsonii (C. B. Clarke) Pojarkova, Spisok Rast. Gerb. Fl. S.S.S.R. Bot. Inst. Vsesojuzn. Akad. Nauk 11: 165. 1949.

西域橐吾 xi yu tuo wu

Senecio thomsonii C. B. Clarke, Compos. Ind. 205. 1876; *Ligularia bungei* (Franchet) M. Popov; *L. thyrsoidea* (Ledebour) Candolle var. *alpina* Bunge; *S. bungei* Franchet.

Stem erect, 25–200 cm tall, white floccose-lanate, 5–10 mm in diam. at base, with a circle of dense reddish brown lanate hairs. Basal leaves petiolate; petiole 8–30 cm, white lanate or glabrous, base narrowly sheathed; leaf blade triangular- or ovate-cordate, 4–26 × 4–22 cm, abaxially sparsely white lanate, adaxially glabrous, veins palmate-pinnate, base cordate or hastate, margin minutely denticulate, apex obtuse; basal lobes suborbicular, slightly divergent. Middle to distal stem leaves shortly petiolate; petiole to 4 cm, base slightly enlarged; leaf blade smaller than basal leaves, ovate-cordate to narrowly ovate. Distal stem leaves narrowly lanceolate, 2–5 cm × 3–10 mm. Corymbs paniculate; branches to 7 cm, each branch with 2–4 capitula; leaflike and supplementary bracts subulate, 4–10 mm; peduncles 5–20 mm. Capitula numerous. Involucre narrowly cylindric or campanulate, 7–13 × 3–6 mm, outside glabrous; phyllaries 5–7, in 2 rows, dark brown, narrowly oblong or lanceolate, 2–4 mm wide, margin membranous, apex acute. Ray florets 1–3(or 4), yellow; lamina narrowly oblong, to 1.8 cm × 3–4 mm, apex subentire; tube ca. 5 mm. Tubular florets 7–11, ca. 9 mm, extending from involucre; tube ca. 3 mm. Achenes yellowish. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

Grasslands, forest margins; 1500–3800 m. Xinjiang (Tian Shan) [Afghanistan, Kashmir, E Kazakhstan, Kyrgyzstan, Nepal, Pakistan, Tajikistan, Uzbekistan].

35. Ligularia schischkinii N. I. Rubtzov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 7: 138. 1938.

高山橐吾 gao shan tuo wu

Stem erect, 5–17 cm tall, white floccose-lanate, 1.5–3 mm in diam. at base, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole 6–8 cm, white lanate, base narrowly sheathed; leaf blade broadly ovate or orbicular, 1.5–3.5 × 1.5–4 cm, abaxially sparsely lanate, pinnately veined, base cordate, margin entire, undulate, or dentate, apex obtuse. Middle to distal stem leaves shortly petiolate or sessile, narrowly ovate to lanceolate. Distal stem leaves linear-lanceolate. Capitula 1 or 2, often solitary. Involucre broadly campanulate or hemispheric, 0.9–1.3 × 1–1.5 cm, outside lanate at base; phyllaries 10–12, in 2 rows, lanceolate or linear, margin dark brown, apex acute or acuminate. Ray florets 10–14, yellow; lamina oblong or broadly elliptic, 1.4–2.5 cm, apex truncate or 3-lobed; tube 3–4 mm. Tubular florets numerous, 7–8 mm. Achenes yellowish white, cylindric, 4–6.5 mm. Pappus white, as long as tubular corolla. Fl. Jul.

Alpine meadows; 2300–3200 m. Xinjiang [Kazakhstan (Tarbagatay Shan)].

36. Ligularia hamiica C. H. An, Fl. Xinjiang. 5: 478. 1999.

哈密橐吾 ha mi tuo wu

Stem erect, ca. 35 cm tall, glabrous. Basal leaves petiolate; petiole ca. 15 cm; leaf blade broadly ovate-reniform, 5–7 × ca. 7 cm, pinnately veined, base cordate, margin dentate, apex obtuse. Middle stem leaves petiolate; petiole 2–4 cm, base enlarged into lamellate auricle; leaf blade ovate-orbicular to broadly ovate, 5–7 × 5–6 cm, base cordate or truncate, margin dentate, apex obtuse. Distal stem leaves narrowly triangular-ovate or oblong, 5–6 × 3–3.5 cm. Capitula solitary or in subcorymb or basipetal raceme, nodding; peduncles 1–10 cm. Involucre hemispheric, 1.8–2 × ca. 2.5 cm; phyllaries in 2 rows, oblong-lanceolate, margin densely shortly tomentose, apex acuminate. Ray florets numerous, yellow; lamina narrowly elliptic, ca. 20 × 5 mm, throat of tubular corolla with 4–6 yellow, flat hairs; tube ca. 2 mm. Tubular florets numerous, 8–9 mm. Achenes cylindric, ca. 6 mm. Pappus white, as long as tubular corolla. Fl. Jun–Jul.

• Xinjiang (Hami).

One of us (Illarionova) treats *Ligularia hamiica* as synonymous with *L. tianschanica*.

37. Ligularia tulupanica C. H. An, Fl. Xinjiang. 5: 478. 1999.

土鲁番橐吾 tu lu fan tuo wu

Stem erect, 20–40 cm tall, glabrous, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole 7–10 cm, leaf blade broadly ovate or ovate-cordate, 3–4 × 3–6 cm, pinnately veined, base cordate, margin dentate, apex obtuse or rounded. Stem leaves sessile, ovate, base cordate, margin dentate, apex obtuse. Distal stem leaves ovate, lanceolate, or linear. Capitula 1 or 2, nodding. Involucre hemispheric, 1.3–1.5 × 2.4–2.6 cm; phyllaries in 2 rows, oblong-lanceolate to linear, 2–5 mm wide, margin shortly tomentose, apex acuminate. Ray florets numerous, yellow; lamina oblong, 1.5–2 cm × 5–7 mm, throat of tubular corolla glabrous; tube ca. 3 mm. Tubular florets numerous, 8–9 mm, tube 3–3.5 mm. Achenes cylindric, ca. 6 mm. Pappus white, as long as tubular corolla.

• Xinjiang (Hami, Qitai).

38. Ligularia xinjiangensis Chang Y. Yang & S. L. Keng, J. Aug. 1st Agric. Coll. 18(2): 1. 1995.

新疆橐吾 xin jiang tuo wu

Stem erect, 35–40 cm tall, glabrous, ca. 1 cm in diam. at base, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole longer than leaf blade, glabrous, base narrowly sheathed; leaf blade orbicular-ovate, orbicular-cordate, or orbicular, 2–7 × 2–8 cm, green, pinnately veined, glabrous, base cordate, margin irregularly sharply dentate, apex obtuse or rounded. Distal stem leaves shortly petiolate, triangular, 5–10 × 3–5 cm, base auriculate-amplexicaul; distalmost stem leaves bracteal. Capitula 5, in subcorymb; leaflike bracts triangular, supplementary bracts 1–3, subulate; peduncles 3–8 cm, upper floccose-lanate. Involucre hemispheric or cupular, ca. 1.4 × 2.5–2.7 cm, outside glabrous, only base pubescent; phyllaries 12 or 13, in 2 rows, lanceolate or ovate-oblong, apex acute or acuminate; inner phyllaries broadly white membranous at margin. Ray florets 13–15, yellow; lamina oblong, ca. 16 × 6 mm, apex acute; tube 3–4 mm. Tubular florets numerous, 8–9 mm; tube ca. 3 mm. Achenes brown, cylindric, ca. 5 mm, ?hairy between ribs. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Jul.

• Subalpine meadows; 2400–2800 m. Xinjiang.

One of us (Illarionova) treats *Ligularia xinjiangensis* as synonymous with *L. tianschanica*.

39. Ligularia tianschanica Chang Y. Yang & S. L. Keng, J. Aug. 1st Agric. Coll. 18(2): 1. 1995.

天山橐吾 tian shan tuo wu

Stem erect, 20–40 cm tall, glabrous, 4–10 mm in diam. at base, with a densely reddish brown lanate circle. Basal and proximal stem leaves petiolate; petiole longer than leaf blade, 8–12 cm, glabrous, base narrowly sheathed; leaf blade orbicular-reniform, 1.8–4 × 3–4.5 cm, green, glabrous, pinnately veined, base cordate, margin irregularly sharply dentate, apex obtuse. Distal stem leaves shortly petiolate; leaf blade ovate or triangular, base auriculate-amplexicaul; distalmost leaves sessile, bracteal. Capitula 1–5, in subcorymb; leaflike bracts triangular; supplementary bracts 1–3, subulate; peduncles 1.5–8 cm, upper floccose-lanate. Involucre campanulate or hemispheric, 1–2 × 1.5–2.5 cm, outside glabrous, only base pubescent; phyllaries 12 or 13, in 2 rows, lanceolate or ovate-oblong, apex acute or acuminate; inner phyllaries broadly white membranous at margin. Ray florets 10–15, yellow; lamina oblong, ca. 20 × 5 mm, apex acute; tube 3–4 mm. Tubular florets numerous, ca. 8 mm; tube 2–3 mm. Achenes brown, cylindric, 5–6 mm, glabrous. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Jul.

• Subalpine meadows; 2400–2700 m. Xinjiang.

One of us (Illarionova) treats *Ligularia hamiica* and *L. xinjiangensis* as synonymous with *L. tianschanica*.

40. Ligularia thyrsoidea (Ledebour) Candolle, Prodr. 6: 315. 1838.

塔序橐吾 ta xu tuo wu

Cineraria thyrsoidea Ledebour, Icon. Pl. 2: 18. 1830; *Ligularia knorringiana* Pojarkova; *Senecillis thyrsoidea* (Ledebour) Kitamura; *Senecio sibiricus* Linnaeus f.

Stem erect, 30–125 cm tall, initially floccose-lanate, glabrescent, 5–7 mm in diam. at base, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole sometimes purplish red, 10–26 cm, base narrowly sheathed; leaf blade abaxially pale green,.adaxially green, triangular, sagittate, or triangular-ovate, 9–14 × 9–11 cm, glabrous, pinnately veined, base cordate, margin irregularly dentate, apex obtuse; basal lobes slightly divergent. Middle to distal stem leaves shortly petiolate or sessile, triangular-ovate to linear-lanceolate, apex acuminate. Distal stem leaves with undeveloped capitula in axil. Compound corymbs pyramidal, paniculate, 5–25 cm, to 14 cm wide, thyrsoid, proximal branches to 10 cm, each branch with corymb; leaflike and supplementary bracts subulate, 1.5–7 mm; peduncles 3–10 mm. Capitula numerous (10–80). Involucre cupular, 5–12 × 6–15 mm, outside convex, glabrous; phyllaries 8–12, in 2 rows, ovate or oblong, 2–5 mm wide, apex acute; inner phyllaries broadly white membranous at margin. Ray florets 5–12, yellow; lamina oblong, 1–1.4 cm × 2–3 mm, apex acute; tube 3.5–4 mm. Tubular florets numerous, 6–7 mm; tube ca. 3 mm. Achenes yellowish, cylindric, 3.5–4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

Wet grasslands, stream banks; 500–2000 m. Xinjiang [Kazakhstan, Kyrgyzstan, W Mongolia, SW Russia (Siberia)].

41. Ligularia narynensis (C. Winkler) O. Fedtschenko & B. Fedtschenko, Consp. Fl. Turkestan. 4: 212. 1911.

山地橐吾 shan di tuo wu

Senecio narynensis C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 319. 1890; *Ligularia robusta* (Ledebour) Candolle var. *kareliniana* (Trautvetter) O. Fedtschenko & B. Fedtschenko; *Senecillis narynensis* (C. Winkler) Kitamura; *Senecio robustus* (Candolle) Schultz Bipontinus var. *karelinianus* Trautvetter.

Stem erect, 9–70 cm tall, floccose-lanate, 2–6 mm in diam. at base, with a densely reddish brown lanate circle. Basal leaves petiolate; petiole 2–15 cm, floccose-lanate, base narrowly sheathed; leaf blade adaxially green, ovate-cordate, orbicular-cordate, triangular-cordate, or oblong-cordate, 1.4–15 × 1.6–10 cm, abaxially floccose-lanate, adaxially glabrous, pinnately veined, base cordate, margin undulate or sharply dentate, apex obtuse or acute, mucronate. Middle to distal stem leaves shortly petiolate or sessile, narrowly ovate to lanceolate. Distal stem leaves linear-lanceolate, often with undeveloped capitula in axil. Capitula 1–15, in corymb or rarely solitary; leaflike and supplementary bracts linear-lanceolate, to 2.2 cm; peduncles 0.8–10 cm. Involucre hemispheric or cupular, 8–13 × 11–20 mm, outside glabrous; phyllaries (8–)10–15, in 2 rows, dark brown, lanceolate, oblong, or elliptic, 2–7 mm wide, apex acute or acuminate; inner phyllaries white membranous at margin. Ray florets 9–15, yellow; lamina oblong or broadly elliptic, 1.1–2.5 cm × 2–7 mm, apex acute or truncate; tube 3–4 mm. Tubular florets numerous, 8–9 mm, higher than involucre; tube ca. 3 mm. Achenes yellowish white or purplish brown, cylindric, 4–7 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug.

Grassy slopes, forest understories, alpine meadows; 600–3200 m. Xinjiang [E Kazakhstan, Kyrgyzstan].

42. Ligularia kunlunshanica C. H. An, Fl. Xinjiang. 5: 477. 1999.

昆仑山橐吾 kun lun shan tuo wu

Plants white floccose-lanate. Stem erect, to 70 cm tall, ca. 4 mm in diam. at base, with a densely reddish brown lanate circle. Basal and proximal stem leaves petiolate; petiole 10–15 cm, base narrowly sheathed; leaf blade oblong or elliptic, 4–12 × 2–7 cm, pinnately veined, base oblique, both sides laterally unequal, margin irregularly sparsely dentate, apex obtuse. Distal stem leaves sessile, bracteal, oblong, broadly lanceolate, or linear. Capitula 10, in corymb-raceme; supplementary bracts subulate; peduncles 6–12 cm. Involucre campanulate or cupular, 1–1.5 × 1.5–2 cm; phyllaries in 2 rows, linear-lanceolate, apex acuminate; inner phyllaries broadly white membranous at margin. Ray florets numerous, yellow; lamina obovate-oblong, 1.5–1.8 cm × ca. 4 mm, apex acute; tube ca. 4 mm. Tubular florets numerous, ca. 7 mm. Achenes cylindric, 3–3.5 mm. Pappus white, as long as tubular corolla. Fl. Jun.

• Subalpine meadows; 2400–2700 m. Xinjiang.

43. Ligularia myriocephala Y. Ling ex S. W. Liu, Acta Biol. Plateau Sin. 3: 67. 1984.

千花橐吾 qian hua tuo wu

Stem erect, to 100 cm tall, 1–1.5 cm in diam. at base, proximally glabrous, distally umbellate-branched, white arachnoid-puberulent. Basal leaves petiolate; petiole 35–40 cm, upper winged, base narrowly sheathed; leaf blade oblong, 22–25 × 12–18 cm, abaxially shortly pilose, adaxially glabrous, pinnately veined, base cuneate, margin regularly dentate, apex subrounded. Middle stem leaves similar but smaller, petiolate; sheath enlarged, 8–10 cm, cymbiform-amplexicaul. Distal stem leaves sessile, lanceolate. Capitula numerous, small, in large, compound corymbs to 40 cm, branches numerous, densely shortly brown pilose; leaflike and supplementary bracts lanceolate or linear; peduncles short, densely shortly brown pilose. Involucre turbinate, 4–6 mm, mouth ca. 5 mm in diam., outside densely shortly brown pilose, base acute; phyllaries 5, in 2 rows, ovate-oblong, ca. 2 mm wide, margin broadly brown membranous, apex acute. Florets 5, all tubular, wholly extending from involucre, 5–6 mm; tube 1.5–2 mm. Achenes dark brown, cylindric, 4–6 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Grasslands, forest margins; 2600–4300 m. Xizang (Cona).

44. Ligularia discoidea S. W. Liu, Acta Biol. Plateau Sin. 3: 66. 1984.

盘状橐吾 pan zhuang tuo wu

Stem erect, 35–40 cm tall, 2.5–3 mm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose and white arachnoid-puberulent. Basal leaves oblong-obovate or oblong, 4–6.5 × 3–4 cm, glabrous, pinnately veined, base cuneate, narrowed into a winged petiole, margin irregularly coarsely dentate, apex acute; teeth triangular, curved apically. Middle to distal stem leaves similar to basal leaves but sessile, to 13 × 3–4.5 cm; sheath 2.5–5 cm. Distalmost stem leaves oblong, tubular-amplexicaul, apex caudate-acuminate. Capitula 4–8, in corymb; leaflike and supplementary bracts linear; peduncles 1–3.5 cm, densely shortly yellowish brown pilose and white arachnoid-puberulent. Involucre broadly turbinate, 9–11 mm, mouth 1–1.5 cm in diam., outside glabrous; phyllaries 10–12, in 2 rows, linear-oblong, ca. 2 mm wide, brown ciliate, apex acuminate; inner phyllaries dark brown membranous at margin. Outer florets female, narrowly tubular, 2–5-divided, segments unequal, with 1 or 2 sterile stamens, anthers ovoid. Central florets bisexual, yellow, tubular, ca. 6 mm; tube ca. 1 mm. Achenes dark brown, cylindric, ca. 3 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Aug.

● Scrub; ca. 4300 m. Xizang (Nyingchi).

45. Ligularia atroviolacea (Franchet) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 109. 1938.

黑紫橐吾 hei zi tuo wu

Senecio atroviolaceus Franchet, Bull. Soc. Bot. France 39: 303. 1893; *Cremanthodium atroviolaceum* (Franchet) R. D. Good; *Senecillis atroviolacea* (Franchet) Kitamura; *Senecio oreotrephes* W. W. Smith.

Stem erect, 25–60 cm tall, 3–5 mm in diam. at base, densely long blackish purple pilose, intermixed white arachnoid-puberulent in synflorescence. Basal leaves petiolate; petiole 7–15 cm, densely long blackish purple pilose, base narrowly sheathing; leaf blade ovate-cordate, 5–9 × 3.5–7 cm, abaxially shortly pilose, densely so along veins, adaxially glabrescent, pinnately veined, lateral veins 6–10 pairs, abaxially with conspicuous slender reticulate veins, base cordate, margin minutely denticulate, long blackish purple pilose between teeth, apex obtuse; sinus 1/4–1/3 as long as blade, narrow, basal lobes oblong, convergent. Middle stem leaves often solitary, similar but smaller, shortly petiolate; sheath enlarged, 3–4 × ca. 1.5 cm, densely long blackish purple pilose. Capitula 4–10, in corymb; leaflike and supplementary bracts subulate, shorter; peduncles 3–15 mm, densely long blackish purple pilose. Involucre narrowly campanulate or turbinate, 6–10 mm, mouth to 1 cm in diam., outside long blackish purple pilose; phyllaries 10–12, in 2 rows; outer phyllaries lanceolate and narrow; inner phyllaries oblong and ca. 2.5 mm wide, margin narrowly brown membranous, apex acute. Florets numerous, all tubular, yellow, 6–7 mm; tube ca. 3 mm. Achenes pale brown, cylindric, ca. 5 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Aug–Dec.

● Forest understories, grasslands; 3000–4000 m. SW Sichuan, NW Yunnan.

46. Ligularia microcardia Handel-Mazzetti, Bot. Jahrb. Syst. 69: 109. 1938.

心叶橐吾 xin ye tuo wu

Stem erect, to 45 cm tall, 3–4 mm in diam. at base, densely shortly yellow pilose, proximal hairs black, distal hairs yellow. Basal leaves petiolate; petiole to 12 cm, slender, densely shortly pilose; sheath 4–4.5 cm, densely shortly pilose, mouth of sheath entire; leaf blade ovate-cordate or ovate, 4–9.5 cm, to 11.5 cm wide at base, abaxially sometimes shortly pilose, adaxially glabrous, pinnately veined, base cordate, margin regularly denticulate, between teeth pubescent, apex obtuse; sinus 1/5–1/4 as long as leaf blade, basal lobes orbicular. Middle to distal stem leaves similar but smaller, shortly petiolate; sheath enlarged, cymbiform. Capitula 2–6, in corymb; leaflike bracts linear; supplementary bracts absent; peduncles 0.5–2 cm, densely shortly yellow pilose. Involucre broadly turbinate, 8–10 mm, mouth ca. 1 cm in diam., outside densely shortly yellow pilose; phyllaries ca. 13, in 2 rows, oblong, ca. 3 mm wide, apex obtuse; inner phyllaries broadly brown membranous at margin. Florets numerous, higher than involucre, all tubular, yellow, 5.5–6.5 mm; tube 1–1.5 mm; limb cylindric. Achenes dark brown, fusiform, ca. 4 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Sep–Oct.

● Stream banks, grassy slopes; 3300–4000 m. S and SW Sichuan.

47. Ligularia lapathifolia (Franchet) Handel-Mazzetti, Vegetationsbilder 22(Heft 8): t. 45a. 1932.

牛旁叶橐吾 niu pang ye tuo wu

Senecio lapathifolius Franchet, Bull. Soc. Bot. France 39: 306. 1893; *Senecillis lapathifolia* (Franchet) Kitamura; *Senecio tongtchouanensis* H. Léveillé.

Stem erect, to 120 cm tall, 8–15 mm in diam. at base, proximally glabrous, distally and synflorescence initially shortly pilose and white arachnoid-puberulent, glabrescent. Basal leaves petiolate; petiole 7–25 cm, white arachnoid-puberulent, base sheathed; leaf blade ovate or ovate-oblong, 19–40.5 × 8.5–23 cm, both surfaces sparsely white arachnoid-puberulent or glabrescent, pinnately veined, midvein strong, to 1.2 cm wide, lateral veins spreading, base truncate or cuneate, margin regularly denticulate, between teeth ciliate, apex obtuse. Middle to distal stem leaves smaller distally, sessile, sheath amplexicaul; leaf blade ovate-oblong or ovate-lanceolate, to 20 × 9 cm. Compound corymb branched; branches to 23 cm, spreading or fasciated; leaflike and supplementary bracts smaller, linear-subulate; peduncles 0.5–4 cm. Capitula 6–23, rarely more (to 40). Involucre hemispheric or broadly campanulate, 1–1.2 × ca. 2 cm, outside white arachnoid-puberulent; phyllaries 8–14, in 2 rows, ovate-lanceolate or lanceolate, to ca. 7 mm wide, subleathery, apex acute, often curved; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina linear-oblong, 1.5–2 cm × 3–4 mm, apex acute; tube ca. 7 mm. Tubular florets numerous, 1–1.1 cm; tube ca. 5 mm; limb narrowed at base. Achenes brown, cylindric, 3–6 mm. Pappus reddish brown or yellowish, as long as tubular corolla. Fl. and fr. Jul–Oct.

● Forest understories, grassy slopes, scrub; 1800–3300 m. SW Sichuan, NW Yunnan.

48. Ligularia cymbulifera (W. W. Smith) Handel-Mazzetti, Symb. Sin. 7: 1133. 1936.

舟叶橐吾 zhou ye tuo wu

Senecio cymbulifer W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 115. 1913; *Ligularia crassa* Handel-Mazzetti; *Senecillis cymbulifera* (W. W. Smith) Kitamura.

Stem erect, 80–120 cm tall, to 2.5 cm in diam. at base, shortly pilose and white arachnoid-puberulent. Basal leaves petiolate; petiole ca. 15 cm, winged; wings to 4 cm wide, entire; leaf blade elliptic or ovate-oblong, rarely obovate, 15–60 × to 45 cm, pinnately veined, midvein strong, white arachnoid-puberulent, base shallowly cordate, margin minutely denticulate, apex rounded. Middle stem leaves sessile, cymbiform, to 20 cm, both surfaces white arachnoid-puberulent, sheath amplexicaul. Distalmost stem leaves sheathlike. Compound corymb much branched, to 40 cm, white arachnoid-puberulent and shortly pilose; leaflike and supplementary bracts smaller, linear; peduncles 2–15(–22) mm. Capitula numerous. Involucre campanulate, 8–10 mm, mouth to 1 cm in diam., outside white arachnoid-puberulent or glabrous; phyllaries 7–10, in 2 rows, ovate-lanceolate or lanceolate, margin brown membranous, apex acute. Ray florets yellow; lamina linear, 1–1.4 cm × 1.5–2 mm; tube 4–5 mm. Tubular florets numerous, deep yellow, 6–7 mm; tube ca. 2 mm. Achenes blackish gray, narrowly cylindric, 3–6 mm. Pappus white or yellowish, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Forest margins, grassy slopes, alpine scrub, alpine meadows, stream banks; 2900–4800 m. SW and W Sichuan, S Xizang (Yadong), NW Yunnan.

49. Ligularia zhouquensis W. D. Peng & Z. X. Peng, Acta Phytotax. Sin. 33: 612. 1995.

舟曲橐吾 zhou qu tuo wu

Stem erect, 70–85 cm tall, 5–10 mm in diam. at base, distally white arachnoid-puberulent. Basal leaves obovate, small; sheath ca. 7 × 1 cm. Stem leaves 3 or 4, obovate to elliptic, 12–20 × 4.5–7.5 cm, white arachnoid-puberulent, pinnately veined, base cuneate, sheath amplexicaul, margin remotely denticulate, apex rounded. Distal stem leaves smaller, elliptic to narrowly elliptic, base not amplexicaul, apex acuminate. Compound corymbs paniculate, 23–28 cm, white arachnoid-puberulent and shortly brown pilose; leaflike bracts linear to linear-lanceolate; supplementary bracts 2 or 3, smaller, linear; peduncles 1.5–3 cm. Capitula numerous. Involucre turbinate, ca. 7 × 6 mm, outside dark green, base sparsely white arachnoid-puberulent; phyllaries 10–12, in 2 rows, linear or oblanceolate, margin membranous, apex acute to acuminate. Outer florets female, 5–7, yellow, similar to tubular florets, limb 2–4-lobed to -divided, lobes 0.5–4 mm, unequal; tube 2–4 mm. Tubular florets 12–15, yellow, ca. 6 mm; tube ca. 2.5 mm. Achenes cylindric, with 7–10 ribs. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Alpine meadows; 2800–3600 m. SW Gansu.

50. Ligularia euryphylla (C. Winkler) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 108. 1938.

广叶橐吾 guang ye tuo wu

Senecio euryphyllus C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 156. 1895; *Senecillis euryphylla* (C. Winkler) Kitamura.

Stem erect, to 100 cm tall, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 30–40 cm, often winged, base sheathed; leaf blade ovate-lanceolate, ca. 20 × 15–20 cm, both surfaces shortly white pilose or abaxially intermixed arachnoid-puberulent, adaxially glabrous, pinnately veined, base hastate or cordate, rarely subtruncate, margin irregularly coarsely dentate, apex acuminate. Middle stem leaves petiolate; petiole winged; leaf blade cordate, 20–35 × ca. 9 cm, base sheathed, amplexicaul, margin sharply dentate. Capitula 12–15, in corymb; peduncles long, glabrous or arachnoid-puberulent; supplementary bracts 3–7, linear. Involucre campanulate, ca. 10 × 8 mm; phyllaries 8 or 9, in 2 rows, margin membranous, apex black. Ray florets yellow; lamina slightly longer than involucre, apex 3-denticulate. Tubular florets numerous. Achenes obovoid, ribbed. Pappus pale red. Fl. and fr. Aug.

• Grasslands; ca. 4300 m. Sichuan (Batang, Kangding, Litang).

51. Ligularia tongolensis (Franchet) Handel-Mazzetti, Symb. Sin. 7: 1136. 1936.

东俄洛橐吾 dong e luo tuo wu

Senecio tongolensis Franchet, Bull. Soc. Bot. France 39: 305. 1893; *Senecillis tongolensis* (Franchet) Kitamura; *Senecio monbeigii* H. Léveillé.

Stem erect, 20–100 cm tall, ca. 5 mm in diam. at base, white arachnoid-puberulent. Basal leaves petiolate; petiole 6–25 cm, shortly pilose, base sheathed; leaf blade ovate-cordate or ovate-oblong, 3–17 × 2.5–12 cm, shortly pilose, pinnately veined, base shallowly cordate, rarely subtruncate, margin denticulate, apex obtuse. Middle to distal stem leaves similar but smaller, smaller distally, shortly petiolate; sheath enlarged, to 10 cm, shortly pilose. Capitula 1–20, in corymb or solitary; peduncles 1–7 cm, arachnoid-puberulent and shortly pilose; leaflike and supplementary bracts linear, shorter. Involucre campanulate, 5–10 × 5–6(–7) mm, outside glabrous; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, to 3 mm wide, apex acute; inner phyllaries brown membranous at margin. Ray florets 5 or 6, yellow; lamina oblong, 7–17 × 1.5–2 mm; tube ca. 3 mm. Tubular florets numerous, ca. 7 mm, extending from involucre; tube ca. 3 mm. Achenes pale brown, cylindric, ca. 5 mm. Pappus pale brown, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Forest margins, forest understories, wet valleys, scrub, alpine meadows; 2100–4000 m. SW and W Sichuan, SE Xizang, NW Yunnan.

52. Ligularia schmidtii (Maximowicz) Makino, Bot. Mag. (Tokyo) 17: 191. 1903.

合苞橐吾 he bao tuo wu

Senecillis schmidtii Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 16: 222. 1871; *Cyathocephalum schmidtii* (Maximowicz) Nakai; *Senecio schmidtii* (Maximowicz) Franchet & Savatier.

Plants grayish green. Stem erect, 50–200 cm tall, 2.5–7 mm in diam. at base, glabrous. Basal leaves petiolate; leaf blade broadly ovate or oblong, 10–30 × 5–22 cm, glabrous, pinnately veined, base rounded, margin irregularly undulately dentate, apex obtuse or acute. Middle to distal stem leaves shortly petiolate or sessile, oblong or ovate-oblong, to 13 × 4 cm, smaller distally. Synflorescence racemose, 6–13(–18) cm; peduncles 3–15 cm; leaflike and supplementary bracts smaller. Capitula numerous. Involucre campanulate, 6–7 × ca. 5 mm, outside glabrous; phyllaries united, apex 2–5-dentate, tips of teeth acute or rounded. Ray florets 2–6, yellow; lamina oblong, 1.3–2.2 cm × 2–6 mm, apex acute; tube 4–5 mm. Tubular florets numerous, 7–10 mm; tube 2–3 mm. Achenes brown, cylindric, 7–8 mm. Pappus reddish brown, as long as tube of tubular corolla. Fl. and fr. Jun–Sep.

Forest understories, grassy slopes, scrub; 100–1500 m. S Heilongjiang [Korea, Russia (Far East)].

53. Ligularia biceps Kitagawa, J. Jap. Bot. 17: 239. 1941.

无缨橐吾 wu ying tuo wu

Plants grayish green. Stem erect, to 50 cm tall, glabrous. Basal leaves petiolate; petiole to 25 cm, glabrous, middle to distal petioles broadly winged; leaf blade ovate to orbicular, to 28 × 23 cm, glabrous, pinnately veined, with conspicuous reticulate veins, base cordate, margin undulately dentate or entire, apex rounded. Middle to distal stem leaves lax, similar but smaller, sessile. Distalmost stem leaves bracteal. Capitula 1–9, often in corymb. Involucre blackish gray, campanulate, or cupular in fruit, 1–1.2 cm, outside glabrous; phyllaries spreading, leathery, below middle united, distally 3–5-lobed; lobes ovate or triangular, apex rounded, mucronate. Ray florets 6–13, yellow; lamina broadly elliptic, to 3 × 1.1 cm, apex entire or denticulate. Tubular ca. 1 cm; tube ca. 3 mm. Achenes brown, 6–10 mm. Pappus absent. Fl. and fr. Jul.

• ?Grassy slopes. Liaoning (Motian Ling).

54. Ligularia mongolica (Turczaninow) Candolle, Prodr. 6: 315. 1838.

全缘橐吾 quan yuan tuo wu

Cineraria mongolica Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 199. 1832; *Ligularia mongolica* var. *taquetii* (H. Léveillé & Vaniot) H. Koyama; *L. putjatae* (C. Winkler) Handel-Mazzetti; *L. taquetii* (H. Léveillé & Vaniot) Nakai; *Senecillis mongolica* (Turczaninow) Kitamura; *Senecio mongolicus* (Turczaninow) Schultz Bipontinus; *S. putjatae* C. Winkler; *S. taquetii* H. Léveillé & Vaniot.

Plants grayish green. Stem erect, 30–110 cm tall, 2.5–5 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 35 cm, glabrous, base narrowly sheathed; leaf blade ovate, oblong, or elliptic, 6–25 × 4–12 cm, glabrous, pinnately veined, base cuneate, narrowed into a petiole, margin entire, apex obtuse. Middle to distal stem leaves sessile, oblong or ovate-lanceolate, erect, adnate, base semiamplexicaul. Synflorescences racemose, clustered, subcapitate, 2–4 cm, or proximally remote, to 16 cm; leaflike and supplementary bracts linear-subulate, less than 1 cm; peduncles 3–5 mm, slender. Capitula numerous. Involucre narrowly campanulate or cylindric, 8–12 × 4–5 mm, outside glabrous; phyllaries 5 or 6, in 2 rows, oblong, to 4 mm wide, apex obtuse or acute; inner phyllaries membranous at margin. Ray florets 1–4, yellow; lamina oblong, 1–1.2 cm × to 6 mm, apex rounded; tube ca. 6 mm. Tubular florets 5–10, 8–10 mm; tube 4–5 mm; limb base cuneate, narrowed. Achenes brown, cuneate-cylindric, 4–7 mm. Pappus reddish brown, as long as or shorter than tube of tubular corolla. Fl. and fr. Jun–Aug.

Swamp meadows, slopes, scrub, canopy gaps in forests; below 1500 m. N Hebei, NE Heilongjiang, Nei Mongol [Korea, Mongolia, Russia].

55. Ligularia macrophylla (Ledebour) Candolle, Prodr. 6: 316. 1838.

大叶橐吾 da ye tuo wu

Cineraria macrophylla Ledebour, Fl. Altaic. 4: 108. 1833; *Ligularia ledebourii* (Schultz Bipontinus) Bergman; *Senecillis macrophylla* (Ledebour) Kitamura; *Senecio ledebourii* Schultz Bipontinus.

Plants grayish green. Stem erect, 35–110(–180) cm tall, 8–15 mm in diam. at base, proximally glabrous, distally and synflorescence shortly pilose. Basal leaves petiolate; petiole often purplish red, 5–20 cm, glabrous, narrowly winged, base sheathed; leaf blade ovate-oblong or oblong, 6–16(–45) × 4.5–9(–28) cm, glabrous, pinnately veined, base cuneate, narrowed into a petiole, margin undulately denticulate, apex obtuse. Stem leaves sessile, erect, ovate-oblong to lanceolate, to 12 × 5 cm, tubular-amplexicaul or semiamplexicaul at base. Synflorescence paniculate, 5–40 cm, proximally branched; leaflike and supplementary bracts linear-subulate, 3–8 mm; peduncles 1–3 mm, slender. Capitula numerous. Involucre narrowly turbinate or cylindric, 3.5–5(–6) × 2–3(–5) mm or mouth to 6 mm in diam., outside glabrous or white puberulent; phyllaries 4 or 5, in 2 rows, obovate or oblong, 1.5–3 mm wide, apex obtuse or rounded; inner phyllaries membranous at margin. Ray florets 1–3, yellow; lamina oblong, 6–8 × 2–3 mm, apex rounded; tube ca. 4 mm. Tubular florets 2–7, extending from involucre, 5–7 mm; tube 2–2.5 mm. Achenes yellowish, cylindric, 3–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug. $2n = 58$.

Stream banks, swamps, grasslands on shaded slopes, forest margins; 700–2900 m. Xinjiang (Altay, Tian Shan) [Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan].

56. Ligularia heterophylla Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 53. 1869.

异叶橐吾 yi ye tuo wu

Plants grayish green. Stem erect, 20–200 cm tall, 4–15 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole 5–60 cm, glabrous, narrowly winged, base sheathed; leaf blade ovate-oblong or oblong, 5–45 × 5–35 cm, glabrous, pinnately veined, base cuneate, narrowed into a petiole, margin undulately denticulate, apex obtuse. Proximal stem leaves petiolate; petiole 4–8 cm, glabrous, broadly winged, base enlarged sheathed; leaf blade elliptic, oblong, or

orbicular, 8–17 × 6–10.5 cm, glabrous, pinnately veined, base broadly cuneate or rounded, narrowed into a petiole, margin undulately shallowly dentate or irregularly sharply dentate, tips of teeth curved mucronate, apex obtuse. Middle to distal stem leaves sessile, oblong or elliptic, smaller distally, proximal leaves to 17 × 8.5 cm, tubular-amplexicaul or semiamplexicaul at base. Synflorescence racemose-paniculate, ca. 30 cm, rarely proximally branches fewer and shorter, with a raceme; branches 1–3(–7) cm; leaflike and supplementary bracts linear-subulate or filiform, to 1 cm; peduncles 2–4 mm. Capitula numerous. Involucre cupular or campanulate, 6–8 × 5–8 mm, outside glabrous or sparsely white puberulent; phyllaries 6–8(–10), in 2 rows, lanceolate or oblong, 2–3.5 mm wide, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets (4 or)5–7, yellow; lamina narrowly oblong or oblong, 7–10 × 2–4 mm, apex acute or obtuse; tube ca. 3 mm. Tubular florets 10–14(–16), slightly higher than involucre, 6–7 mm; tube ca. 2 mm. Achenes yellowish, cylindric, 4–7 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug. $2n = 60$.

Slopes, grasslands, stream banks, swamps; 2200–2500 m. Xinjiang (Tian Shan) [S Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan].

57. Ligularia lingiana S. W. Liu, Bull. Bot. Res., Harbin 5(4): 72. 1985.

君范橐吾 jun fan tuo wu

Plants grayish green. Stem erect, to 120 cm tall, 3–4 mm in diam. at base, glabrous. Basal leaves not seen. Middle stem leaves sessile; leaf blade elliptic or oblong, 10–15 × 6–10.5 cm, leathery, glabrous, pinnately veined, midvein strong, with conspicuous prominent reticulate veins on both surfaces, base cuneate, semiamplexicaul, margin undulately shallowly dentate, apex rounded. Distal stem leaves sessile, smaller, oblong, with conspicuous reticulate veins, apex acute or acuminate. Synflorescence racemose, lax, to 15 cm; leaflike bracts reddish yellow or yellowish brown when dry, ovate-oblong to lanceolate, 2–5 × 1.5–2.5 cm, smaller distally, membranous, with conspicuous reticulate veins, apex acuminate; peduncles to 2 cm, often curved. Capitula 6, nodding; supplementary bracts linear-lanceolate. Involucre broadly campanulate, 1–1.2 × ca. 1 cm, base subtruncate; phyllaries 8–10, in 2 rows, dark brown, lanceolate or oblong, apex acute; inner phyllaries broader, ca. 5 mm wide, margin membranous. Florets numerous, all tubular, yellow, 6–7 mm; tube ca. 2 mm. Achenes pale brown, oblong, 4.5–5 mm, with 4 ribs. Pappus white, as long as tubular corolla. Fl. and fr. Aug.

• Scrub, forest margins; ca. 3600 m. Sichuan (Muli).

58. Ligularia melanocephala (Franchet) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 119. 1938.

黑苞橐吾 hei bao tuo wu

Senecio melanocephalus Franchet, Bull. Soc. Bot. France 39: 294. 1893; *Senecillis melanocephala* (Franchet) Kitamura.

Plants grayish green. Stem erect, to 100 cm tall, 6–8 mm in diam. at base, proximally glabrous, distally and synflorescence shortly brown pilose. Basal leaves shortly petiolate; petiole broadly winged, base enlarged sheathed; leaf blade oblong, ovate, or broadly ovate, 14–28 × 9.5–11 cm, herbaceous, glabrous, pinnately veined, with prominent reticulate veins on both surfaces, base cordate or broadly cuneate, narrowed into a petiole, margin denticulate, apex obtuse. Middle to distal stem leaves sessile, oblong to lanceolate, 14–27 × 8–10 cm, base auriculate-amplexicaul, apex obtuse or acute. Synflorescence racemose, 30–40 cm, lax; leaflike bracts linear, to 3.5 cm, smaller distally; peduncles 5–30 mm. Capitula numerous; supplementary bracts subulate. Involucre blackish gray, turbinate, rarely subcampanulate, 5–8 × ca. 5 mm, outside glabrous; phyllaries 7 or 8, in 2 rows, ovate-lanceolate or lanceolate, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets 8–12, yellow; lamina oblong or elliptic, 4–8 × 2–3.5 mm, 2- or 3-dentate, apex rounded; tube ca. 2 mm. Tubular florets numerous, 5–6 mm, higher than involucre; tube 1.5–2 mm. Achenes reddish brown, cylindric, to 7 mm, prominently ribbed. Pappus yellowish white, as long as tubular corolla. Fl. and fr. Aug–Sep.

• Forest margins, forest understories, grassy slopes; 3400–4000 m. Sichuan (Daocheng, Muli), NW Yunnan.

59. Ligularia dictyoneura (Franchet) Handel-Mazzetti, Vegetationsbilder 22(Heft 8): 6. 1932.

网脉橐吾 wang mai tuo wu

Senecio dictyoneurus Franchet, Bull. Soc. Bot. France 39: 294. 1893; *Ligularia platyphylla* Handel-Mazzetti; *Senecillis dictyoneura* (Franchet) Kitamura.

Plants grayish green. Stem erect, purplish red, 33–124 cm tall, 2.5–4 mm in diam. at base, solid, glabrous. Basal leaves petiolate; petiole 8–22 cm, glabrous, below rounded, above flat, middle to distal petioles narrowly winged; leaf blade oblong, ovate, or suborbicular, 8–30 × 5–21 cm, glabrous, pinnately veined, midvein robust, to 5 mm wide, with prominent reticulate lateral veins on both surfaces, base cordate or slightly subtruncate, margin dentate or subentire, apex rounded. Middle to distal stem leaves subsessile, obovate to ovate, 7–16 × 4–11 cm, base semiamplexicaul or tubular-amplexicaul, margin dentate, apex obtuse. Distalmost stem leaves sessile, ovate-lanceolate to linear. Synflorescence racemose, to 30 cm, initially densely clustered, elongating in fruit, lax; leaflike and supplementary bracts linear, less than 1 cm; peduncles unequal, to 6.5 cm, densely shortly yellowish brown pilose. Capitula numerous. Involucre turbinate or subcampanulate, 6–9 × 4–5 mm, outside dark brown, glabrous; phyllaries 6–8, in 2 rows, oblong, 3–4 mm wide, brown ciliate, apex broadly triangular, acute, or shortly mucronate; inner phyllaries broadly membranous at margin. Ray florets 4–6, yellow; lamina oblong, 6–8(–20) × 3–4 mm, apex rounded; tube ca. 3 mm. Tubular florets numerous, 5–6 mm, higher than involucre; tube 2.5–3 mm. Achenes dark brown, cylindric, 3.5–5.5 mm. Pappus yellowish white, as long as tubular corolla. Fl. Jun–Aug. $2n = 58$*.

• Stream banks, forest understories, grassy slopes, scrub; 1900–3600 m. SW Sichuan, Xizang, NW Yunnan.

60. Ligularia brassicoides Handel-Mazzetti, Bot. Jahrb. Syst. 69: 118. 1938.

芥形橐吾 jie xing tuo wu

Plants grayish green. Stem erect, 45–70 cm tall, ca. 7 mm in diam. at base, hollow, glabrous, except white arachnoid-puberulent in synflorescence. Basal leaves petiolate; petiole to 15 cm, glabrous, base sheathed, upper winged; leaf blade oblong or ovate, 17–30 × 6.5–17 cm, glabrous, pinnately veined, midvein robust, with white prominent reticulate veins on both surfaces, base cuneate, narrowed into a petiole, margin denticulate, apex obtuse. Middle to distal stem leaves sessile, oblong, to 14 × 4 cm, smaller distally, reticulate veins conspicuous, base semiamplexicaul or tubular-amplexicaul, apex obtuse. Synflorescence racemose, to 26 cm, initially densely clustered, elongating in fruit; leaflike bracts linear, shorter than peduncle, supplementary bracts subulate, shorter; peduncles 4–5 mm. Capitula numerous. Involucre shallowly campanulate, 6–8 × to 6 mm wide, outside shortly pilose; phyllaries 6–8, in 2 rows, black, ovate or oblong, rarely glabrous, apex triangular; inner phyllaries densely white ciliate and brown membranous at margin. Ray florets 5 or 6, yellow; lamina oblong, 8–10 × ca. 3 mm. Tubular florets numerous, ca. 7 mm; tube slightly shorter than limb. Pappus white, as long as tubular corolla. Fl. Jul.

• Grassy slopes; 2600–3100 m. SW and W Sichuan.

61. Ligularia altaica Candolle, Prodr. 6: 315. 1838.

阿勒泰橐吾 a le tai tuo wu

Ligularia glauca O. Hoffmann var. *altaica* (Candolle) Krylov; *Senecillis altaica* (Candolle) Kitamura; *Senecio altaicus* (Candolle) Schultz Bipontinus.

Plants grayish green. Stem erect, 10–150 cm tall, 4–10 mm in diam. at base, glabrous. Basal leaves petiolate; petiole 13–30 cm, glabrous, base narrowly sheathed, upper narrowly winged; leaf blade oblong, ovate-oblong, or elliptic, 8–50 × 3–35 cm, glabrous, pinnately veined, base cuneate, narrowed into a petiole, margin entire, apex obtuse or rounded. Stem leaves similar, but sessile, smaller distally, base semiamplexicaul, proximal leaves to 13.5 × 4 cm. Synflorescence racemose, 6–20 cm, glabrous; leaflike and supplementary bracts linear-subulate, less than 4 mm; peduncles to 1 cm. Capitula 5–17(–35). Involucre campanulate or subcupular, 6–10 × 5–7 mm, outside glabrous; phyllaries 7–9, in 2 rows, oblong or lanceolate, 1.5–3 mm wide, glabrous, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets 4 or 5, yellow; lamina obovate or oblong, 6–7 × 3–4 mm, denticulate, apex rounded; tube ca. 4 mm. Tubular florets numerous (10–20), extending from involucre, ca. 7 mm; tube ca. 7 mm; limb narrowly cuneate. Achenes yellowish brown, cylindric, 4–7 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug.

Grassy slopes, forest margins; 1100–3000 m. Xinjiang (Altay) [Kazakhstan, Mongolia, Russia (Siberia)].

62. Ligularia alpigena Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 12: 313. 1950.

帕米尔橐吾 pa mi er tuo wu

Ligularia heterophylla Ruprecht var. *alpina* Ruprecht; *L. heterophylla* var. *subramosa* Ruprecht.

Plants grayish green. Stem erect, 22–140 cm tall, 3–10 mm in diam. at base, glabrous except synflorescence shortly pilose. Basal leaves petiolate; petiole purplish red, 2.5–25 cm, glabrous, base sheathed, upper part narrowly winged; leaf blade oblong or broadly elliptic, 4.5–20 × 2.3–10.5 cm, glabrous, pinnately veined, abaxially with prominent veins, base cuneate, narrowed into a petiole, margin irregularly dentate, apex rounded or acute. Middle to distal stem leaves similar, but sessile, to 12 × 7 cm, smaller distally, base semiamplexicaul. Synflorescence racemose, rarely paniculate, 4–6(–45) cm, distal ones clustered, proximal ones branched, lax; branches 1.5–12 cm, each with 2–23 capitula; leaflike and supplementary bracts linear-subulate, 5–7 mm; peduncles 2–4 mm. Capitula numerous. Involucre campanulate or subcupular, 6–7 × 5–6 mm, outside densely shortly yellow pilose; phyllaries 6–8, in 2 rows, oblong or ovate, 3–5 mm wide, apex acute or obtuse; inner phyllaries membranous at margin. Ray florets yellow; lamina obovate or oblong, 7–10 × 3–4 mm, apex obtuse; tube ca. 4 mm. Tubular florets numerous, 6–7 mm; tube 2–2.5 mm. Achenes yellowish, cylindric, 4–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug. $2n = 58$.

Alpine meadows, grassy slopes; 1900–4500 m. Xinjiang (Pamir, Tian Shan) [NE Afghanistan, Kyrgyzstan, N Pakistan, Tajikistan, Uzbekistan].

63. Ligularia longifolia Handel-Mazzetti, Bot. Jahrb. Syst. 69: 122. 1938.

长叶橐吾 chang ye tuo wu

Ligularia ebracteata Handel-Mazzetti; *L. semavensis* Handel-Mazzetti.

Stem erect, 83–200 cm tall, ca. 1 cm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole to 57 cm, glabrous, base sheathed, upper part winged; leaf blade lanceolate, 14–37 × 6.5–9 cm, thick, glabrous, pinnately veined, base rounded or subtruncate, margin irregularly dentate, apex obtuse. Stem leaves fewer, sessile, oblong or lanceolate, to 7(–10) cm, smaller distally, semiamplexicaul or sheath amplexicaul. Synflorescence racemose, 5–19 cm, distally or wholly (initially) densely clustered, proximally lax; leaflike bracts linear-lanceolate, to 2.5 cm; supplementary bracts linear; peduncles 5–20 mm. Capitula numerous. Involucre broadly turbinate, 9–12 mm × to 1.5 cm, outside glabrous; phyllaries 13–15, in 2 rows, reddish brown or brown, lanceolate or narrowly lanceolate, apex acuminate; inner phyllaries broadly membranous at margin. Ray florets 6 or 7, yellow; lamina oblong, 1–1.5 cm × 3–5 mm, apex rounded; tube ca. 3 mm. Tubular florets numerous, 6–7 mm; tube ca. 2.5 mm. Pappus rufous, as long as tubular corolla. Fl. and fr. Aug–Sep.

• Grassy areas in swamps; 1900–3100 m. SW Sichuan, S to W Yunnan.

64. Ligularia chalybea S. W. Liu, Bull. Bot. Res., Harbin 5(4): 73. 1985.

灰苞橐吾 hui bao tuo wu

Plants grayish green. Stem erect, 35–45 cm tall, 2–4 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 4–11 cm, winged; wings to 6 mm wide, mar-

gin entire, shortly ciliate; leaf blade ovate or ovate-oblong, rarely spatulate, 7–21.5 × 3–8 cm, thin, abaxially white pubescent along veins, adaxially glabrous, pinnately veined, base abruptly narrowed into a petiole, margin sparsely denticulate or dentate, apex obtuse or rounded. Middle to distal stem leaves sessile, oblong, 8–13 × to 5 cm, tubular-amplexicaul, margin denticulate, apex obtuse or acuminate. Distalmost stem leaves bracteal, ovate-lanceolate, 4–5 cm, apex acuminate. Synflorescence racemose, to 13 cm; leaflike bracts linear, to 1.5 cm; peduncles 2–4 mm. Capitula 6–17. Involucre turbinate, 7–9 mm, mouth to 9 mm in diam., outside glabrous; phyllaries 7 or 8, in 2 rows, blackish gray, oblong or lanceolate, submembranous, apex obtuse or acuminate. Florets numerous, all tubular, blackish gray, 4.5–5 mm; tube ca. 1.5 mm. Pappus upper part white, lower part yellowish brown, as long as tubular corolla. Fl. Aug.

• Alpine meadows; ca. 4700 m. SW Sichuan.

65. Ligularia pleurocaulis (Franchet) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 149. 1925.

侧茎橐吾 ce jing tuo wu

Senecio pleurocaulis Franchet, J. Bot. (Morot) 8: 365. 1894, based on *S. tatsienensis* Franchet, Bull. Soc. Bot. France 39: 293. 1893, not Bureau & Franchet (1891); *Cremanthodium pleurocaule* (Franchet) R. D. Good; *C. pleurocaule* f. *franchetii* R. D. Good.

Plants grayish green. Stem erect, 25–100 cm tall, 4–10 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent. Basal leaves subsessile; sheath often purplish red; leaf blade linear-oblong or broadly elliptic, 8–30 × 0.7–7 cm, glabrous, pinnate-parallel or parallel veined, base narrowed, margin entire, apex acute. Stem leaves sessile, smaller, elliptic to linear, base semiamplexicaul or not. Synflorescence racemose, to 20 cm, often lax; leaflike bracts lanceolate to linear, to 8 cm, sometimes longer than peduncle; peduncles 0.5–3(–10.5) cm. Capitula numerous, inclined to one side of racemose axis; supplementary bracts linear-subulate. Involucre turbinate, 5–14 × 5–15(–20) mm, outside glabrous, base acute; phyllaries 7–9, in 2 rows, ovate or lanceolate, 2–7 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets yellow; lamina broadly elliptic or ovate-oblong, 7–14 × 3–6 mm, apex acute; tube ca. 2 mm. Tubular florets numerous, 5–6 mm; tube ca. 1 mm. Achenes brown, cuneate-cylindric, 2.5–3.5 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Nov.

• Slopes, stream banks, scrub, alpine meadows; 3000–4700 m. SW and W Sichuan, Xizang, NW Yunnan.

66. Ligularia tangutorum Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 362. 1961.

唐古特橐吾 tang gu te tuo wu

Ligularia potaninii Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 12: 314. 1950, not (C. Winkler) Y. Ling (1937).

Plants grayish green. Stem erect, 40–100 cm tall, 2–9 mm in diam. at base, glabrous or distalmost shortly pilose. Basal leaves petiolate; petiole 3–15 cm, proximally purplish red, distally broadly winged; leaf blade broadly ovate or elliptic, 6–21 × 3–13 cm, glabrous, pinnately veined, abaxially with strong midvein, base subtruncate or broadly cuneate, abruptly narrowed into a broadly winged petiole or only distally winged, margin denticulate or coarsely undulate-dentate, apex acute. Middle to distal stem leaves erect, elliptic or oblong, 4–8 × to 4.5 cm, base amplexicaul. Synflorescence racemose, to 15 cm, lax; leaflike and supplementary bracts linear-lanceolate. Capitula numerous. Involucre turbinate, 6–8 mm × to 1 cm, outside glabrescent; phyllaries 8–10, in 2 rows, oblong or narrowly lanceolate, apex obtuse to acute. Ray florets 6–10, yellow; lamina oblong, ca. 1 cm. Tubular florets numerous, 6–7 mm. Achenes yellowish, cylindric, ca. 4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug. $2n = 58$*.

• Shaded slopes, scrub, forest understories; 2700–4000 m. NW Gansu, Qinghai, Sichuan.

67. Ligularia virgaurea (Maximowicz) Mattfeld ex Rehder & Kobuski, J. Arnold Arbor. 14: 40. 1933.

黄帚橐吾 huang zhou tuo wu

Plants grayish green. Stem erect, 15–80 cm tall, 2–9 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 21.5 cm, winged or only upper winged; wings entire or dentate, broad or narrow, glabrous; sheath often purplish red; leaf blade ovate, elliptic, or oblong-lanceolate, 3–15 × 1.3–11 cm, glabrous, pinnately or sometimes subparallel veined, base cuneate, gradually attenuate, margin entire, sometimes revolute, apex obtuse or acute. Stem leaves sessile, smaller, ovate or ovate-lanceolate to linear, longer than internodes, rarely distally shorter, often tubular-amplexicaul, apex acute to acuminate. Synflorescence racemose, 4.5–22 cm, clustered or distally clustered, proximally lax; leaflike bracts linear-lanceolate to linear, to 6 cm, smaller distally; peduncles 3–10(–20) mm, white arachnoid-puberulent. Capitula numerous, sometimes solitary or few; supplementary bracts filiform. Involucre turbinate or cupular, 7–10 × 6–9 mm, rarely wider, in solitary capitulum, outside glabrous or densely pilose; phyllaries 10–14, in 2 rows, oblong or narrowly lanceolate, 1.5–5 mm wide, attenuate to caudate, margin broadly or narrowly membranous, apex obtuse to acuminate. Ray florets 5–14, yellow; lamina linear, 8–22 × 1.5–2.5 mm, apex acute; tube ca. 4 mm. Tubular florets numerous, 7–8 mm; tube ca. 3 mm; limb cuneate. Achenes yellowish, cylindric, 3.5–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug. $2n = 58, 87$.

Slopes, stream banks, scrub, swamp meadows, alpine meadows; 2400–4700 m. Gansu, Qinghai, Sichuan, E and NE Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

1a. Capitula solitary or few, in lax raceme ..... 67c. var. *oligocephala*
1b. Capitula numerous, in dense raceme.
2a. Involucre glabrous ..... 67a. var. *virgaurea*
2b. Involucre outside densely shortly yellow pilose ..... 67b. var. *pilosa*

67a. Ligularia virgaurea var. **virgaurea**

黄帚橐吾(原变种) huang zhou tuo wu (yuan bian zhong)

Senecio virgaurea Maximowicz, Bull. Acad. Imp. Sci.

Saint-Pétersbourg 27: 484. 1882; *Cremanthodium plantaginifolium* (Franchet) R. D. Good; *C. plantaginifolium* subsp. *franchetii* R. D. Good; *C. plantaginifolium* f. *lagotis* (W. W. Smith) R. D. Good; *C. virgaurea* (Maximowicz) Handel-Mazzetti; *Ligularia plantaginifolia* (Franchet) Mattfeld; *Senecillis virgaurea* (Maximowicz) Kitamura; *Senecio lagotis* W. W. Smith; *S. plantaginifolius* Franchet.

Involucre outside glabrous.

Shaded slopes, stream banks, scrub, swamp meadows, alpine meadows; 2400–4700 m. Gansu, Qinghai, Sichuan, NE Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

67b. Ligularia virgaurea var. **pilosa** S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 38: 288. 2000.

毛黄帚橐吾 mao huang zhou tuo wu

Involucre outside densely shortly yellow pilose.

• Grassy slopes; 3800–4500 m. Sichuan (Garzê), E Xizang.

67c. Ligularia virgaurea var. **oligocephala** (R. D. Good) S. W. Liu, Fl. Qinghai. 3: 427. 1996.

疏序黄帚橐吾 shu xu huang zhou tuo wu

Cremanthodium plantaginifolium subsp. *oligocephalum* R. D. Good, J. Linn. Soc., Bot. 48: 292. 1929.

Plants dwarf. Capitula usually solitary or few, in lax raceme.

• Grassy slopes; 3200–4500 m. SW Gansu, Qinghai.

68. Ligularia liatroides (C. Winkler) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 121. 1938.

缘毛橐吾 yuan mao tuo wu

Plants grayish green. Stem erect, to 100 cm tall, 5–8 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent. Basal leaves petiolate; petiole to 5 cm, glabrous, entirely winged, base sheathed; leaf blade oblong or ovate-lanceolate, rarely elliptic, 8–22 × 4.5–8 cm, glabrous, or initially white pubescent along veins, or puberulent and sometimes shortly yellowish brown pilose, pinnately veined, abaxially with prominent reticulate veins, base cuneate, narrowed into a winged petiole, margin dentate, apex obtuse or acute. Middle to distal stem leaves sessile, ovate-lanceolate to linear, smaller distally, base semiamplexicaul, margin entire or denticulate, apex acuminate. Synflorescence racemose, to 40 cm, clustered; leaflike bracts linear-lanceolate to linear, proximally to 4.5 cm, smaller distally; peduncles 3–7 mm. Capitula numerous; supplementary bracts subulate. Involucre turbinate, 7–10 × ca. 5 mm, outside white pubescent or glabrescent, or puberulent and sometimes shortly yellowish brown pilose; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, ca. 3 mm wide, margin membranous and densely white ciliate, apex acuminate. Ray florets 5 or 6, yellow; lamina linear, 6–8 × 1–1.5 mm, apex obtuse; tube ca. 4 mm. Tubular florets numerous, ca. 7 mm; tube ca. 3 mm. Achenes yellowish, cylindric, 3–5 mm, with prominent ribs. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug. $2n = 58$*.

• Stream banks, swamps, scrub-covered meadows, alpine meadows; 2900–4500 m. SW Qinghai, Sichuan, NE Xizang.

1a. Leaves and involucre initially white pubescent ..... 68a. var. *liatroides*

1b. Leaves and involucre white pubescent and shortly yellowish brown pilose ..... 68b. var. *shifangensis*

68a. Ligularia liatroides var. **liatroides**

缘毛橐吾(原变种) yuan mao tuo wu (yuan bian zhong)

Senecio liatroides C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 8. 1893; *Cremanthodium plantaginifolium* (Franchet) R. D. Good f. *winkleri* R. D. Good; *Senecillis liatroides* (C. Winkler) Kitamura.

Leaves and involucre white pubescent.

• Stream banks, swamps, scrub-covered meadows, alpine meadows; 2900–4500 m. SW Qinghai, N, SW, and W Sichuan, NE Xizang.

68b. Ligularia liatroides var. **shifangensis** (G. H. Chen & W. J. Zhang) S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 39: 560. 2001.

什邡缘毛橐吾 shi fang yuan mao tuo wu

Ligularia shifangensis G. H. Chen & W. J. Zhang, Acta Phytotax. Sin. 35: 181. 1997.

Leaves and involucre white pubescent and shortly yellowish brown pilose.

• 3200–3700 m. Sichuan (Pengxian, Shifang).

69. Ligularia eriocaulis M. Zhang & L. S. Xu, Acta Bot. Yunnan. 19: 241. 1997.

毛茎橐吾 mao jing tuo wu

Plants grayish green. Stem erect, 30–55 cm tall, 4–6 mm in diam. at base, proximally glabrescent, distally and synflorescence densely white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 2–16 cm, glabrous or sparsely arachnoid-puberulent, base sheathed, entirely winged at middle to distally; leaf blade ovate-oblong or oblanceolate, 8–28 × 3–6 cm, sparsely white puberulent and shortly yellowish brown pilose on both surfaces or adaxially more densely so, pinnate-parallel veined, base cuneate, margin denticulate, apex acute. Stem leaves 1–3, sessile, tubular, 2.5–7 cm, margin entire or irregularly denticulate. Synflorescence racemose, 5–15 cm, lax; leaflike bracts linear-lanceolate to linear, proximal ones to 3.5 cm, densely arachnoid-puberulent, smaller distally. Capitula 2–10; supplementary bracts linear to subulate, shorter than involucre, arachnoid-puberulent. Involucre broadly campanulate, 8–13 mm, mouth 7–16 mm in diam., outside white puberulent or shortly yellowish brown pilose; phyllaries 10–12, in 2 rows, lanceolate or ovate-lanceolate, 1.5–4 mm wide, margin membranous and sparsely white ciliate, apex acuminate, acute, or rounded. Ray florets 10 or 11, yellow; lamina oblong, 9–13 × 2–3.5 mm, apex acute or rounded; tube 1.5–2.5 mm. Tubular florets numerous, 4–5 mm; tube 1–1.5 × ca. 3 mm. Achenes oblanceolate (immature). Pappus white, as long as tubular corolla. Fl. Aug, fr. Aug–Sep.

• Stream banks, forest understories, alpine meadows; 3500–4000 m. Gansu (Têwo), Qinghai (Yushu), Sichuan (Jiulong, Muli), Yunnan (Zhongdian).

70. Ligularia melanothyrsa Handel-Mazzetti, Bot. Jahrb. Syst. 69: 119. 1938.

黑穗橐吾 hei sui tuo wu

Stem scapelike, erect, 55–120 cm tall, white lanate, to 1 cm in diam. at base, with a dense longer white lanate circle. Leaves all basal, petiolate; petiole 15–23 cm, base white lanate sheathed, distally narrowly winged; leaf blade ovate-oblong, 19–23 × 12–18 cm, glabrescent, pinnately veined, base cordate or rarely subtruncate, abruptly narrowed into a petiole, margin undulately dentate, apex obtuse, mucronate. Scape with a linear bracteal leaf. Synflorescence paniculate-racemose, to 50 cm, densely white lanate; leaflike and supplementary bracts longer, to 3.5 cm, narrower, white lanate; peduncles slender, proximal ones with 7 capitula. Capitula numerous. Involucre narrowly campanulate, 6–8 × ca. 5 mm, outside white puberulent; phyllaries 7 or 8, in 2 rows, oblong, 1.5–3 mm wide, apex triangular, obtuse; inner phyllaries brown membranous at margin. Ray florets yellow; lamina oblong, to 8 × 2–3 mm. Tubular florets numerous, 7–8 mm; tube ca. 1/4 as long as limb. Pappus white, as long as tubular corolla. Fl. Jul, fr. Aug.

• Wet scrub; 3200–4300 m. SW Sichuan.

71. Ligularia vellerea (Franchet) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 12. 1925.

棉毛橐吾 mian mao tuo wu

Senecio vellereus Franchet, Bull. Soc. Bot. France 39: 299. 1893; *Ligularia vellerea* var. *gracilior* Handel-Mazzetti; *Senecillis vellerea* (Franchet) Kitamura; *Senecio primulifolius* H. Léveillé.

Stem scapelike, erect, 15–63 cm tall, sparsely white puberulent, 4–5 mm in diam. at base, with a densely long white lanate circle. Leaves all basal, petiolate; petiole to 23 cm, base white lanate sheathed, distally narrowly entirely winged; leaf blade ovate, elliptic, or suborbicular, 2.5–15 × 3.5–12 cm, abaxially white lanate, adaxially glabrous, pinnately veined, lateral veins 12 pairs, base shallowly cordate, truncate, or cuneate, margin regularly denticulate, apex acute. Scape without bracteal leaf. Synflorescence racemose, 4.5–15 cm, clustered or lax, white lanate; leaflike and supplementary bracts to 3 cm; peduncles to 1 cm. Capitula numerous. Involucre campanulate, 10–12 × 8–10 mm, outside sparsely white puberulent; phyllaries 10, in 2 rows, lanceolate or rarely ovate, apex acute, mucronate; inner phyllaries membranous at margin. Ray florets 5–7, yellow; lamina oblong, 10–18 × ca. 3 mm, apex acute; tube ca. 5 mm. Tubular florets numerous, 7–8 mm; tube ca. 2 mm. Achenes yellowish, narrowly oblanceolate, 5–7 mm. Pappus pale yellow, as long as tubular corolla. Fl. and fr. Jun–Sep. $2n = 58$*.

• Stream banks, forest understories, grassy slopes; 2100–4600 m. SW Sichuan, NW Yunnan.

72. Ligularia jamesii (Hemsley) Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 25: 697. 1907.

长白山橐吾 chang bai shan tuo wu

Senecio jamesii Hemsley in Forbes & Hemsley, J. Linn. Soc., Bot. 23: 453. 1888; *Senecillis jamesii* (Hemsley) Kitamura.

Stem erect, 30–60 cm tall, 4–5 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole to 29 cm, slender, glabrous, base narrowly sheathed; leaf blade triangular-hastate, 3.5–9 cm, base 7–10 cm wide, abaxially glabrous, adaxially shortly yellow pilose, palmate-pinnately veined, margin sharply dentate, apex acute or acuminate; sinus ca. 1/2 as long as leaf blade, broad, basal lobes lanceolate, to 6 cm, segments to 2.5 cm, divergent, margin entire or 2- or 3-divided. Middle stem leaves shortly petiolate; sheath enlarged, to 4 cm, amplexicaul; leaf blade smaller, ovate-sagittate. Distal stem leaves numerous, sessile, bracteal, lanceolate, to 3 cm, margin subentire. Capitulum solitary, 5–7 cm in diam.; supplementary bracts linear-lanceolate. Involucre broadly campanulate, 15–17 × to 1.5 cm, outside white arachnoid-puberulent; phyllaries ca. 13, in 2 rows, lanceolate, ca. 3 mm wide, margin brown membranous, apex acuminate. Ray florets 13–16, yellow; lamina linear-lanceolate, to 4 cm × 3–4 mm, apex acuminate, 2- or 3-lobed; tube 5–6 mm. Tubular florets numerous, 1–1.1 cm; tube ca. 5 mm. Achenes dark brown, cylindric, 5–7 mm. Pappus pale yellow, as long as tubular corolla. Fl. and fr. Jul–Aug.

Forest understories, scrub, alpine meadows; 300–2500 m. Jilin, Liaoning, Nei Mongol [Korea].

73. Ligularia fangiana Handel-Mazzetti, Bot. Jahrb. Syst. 69: 124. 1938.

植扶橐吾 zhi fu tuo wu

Stem erect, often purplish red, to 150 cm tall, to 1.5 cm in diam. at base, hollow, proximally glabrous, distally shortly brown pilose and white arachnoid-puberulent. Rosette of leaves not seen. Proximal stem leaves petiolate; petiole to 24 cm, white arachnoid-puberulent; leaf blade oblong or ovate-oblong, 35–40 × 25–30 cm, abaxially pubescent, adaxially glabrous, pinnately veined, lateral veins more than 27 pairs, prominent on both surfaces, base subtruncate, margin regularly dentate, apex rounded. Middle to distal stem leaves petiolate; petiole to 10 cm, without sheath; leaf blade smaller, oblong or ovate-oblong. Synflorescence racemose, to 80 cm, distally clustered, proximally lax; leaflike bracts linear, white arachnoid-puberulent, proximal ones to 5.5 cm × ca. 1 mm, smaller distally; peduncles unequal, proximally to 5 cm, with 5 capitula, distal ones with 1 capitulum. Capitula numerous, nodding; supplementary bracts linear. Involucre campanulate or turbinate, 8–10 × 5–7 mm, outside blackish gray, white arachnoid-puberulent; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, apex acute or acuminate; inner phyllaries white membranous at margin. Ray florets 3–5, yellow; lamina oblanceolate, 5–9 × ca. 2 mm; tube ca. 6 mm. Tubular florets numerous, higher than involucre, 6–7 mm; tube as long as limb. Achenes brown, oblong, ca. 5 mm. Pappus pale yellow, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Grassy slopes; below 3600 m. S and SW Sichuan.

74. Ligularia jaluensis Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 420. 1901.

复序橐吾 fu xu tuo wu

Ligularia deltoidea Nakai; *L. jaluensis* var. *rumicifolia* Komarov; *L. leucocoma* Nakai; *L. pulchra* Nakai; *Senecillis jaluensis* (Komarov) Kitamura.

Stem erect, to 200 cm tall, ca. 1 cm in diam. at base, proximally glabrous, distally shortly brown pilose and white arachnoid-puberulent. Basal leaves petiolate; petiole to 40 cm, shortly pilose, narrowly, entirely winged, base sheathed; leaf blade triangular or ovate-triangular, 8–37 × 7–35 cm, abaxially shortly pilose only along veins, adaxially glabrous, pinnately veined, midvein robust, lateral and reticulate veins abaxially prominent, base cordate or subtruncate, margin shallowly triangular-dentate and ciliate, apex acute. Middle to distal stem leaves smaller, shortly petiolate; petiole winged, base sheathed; leaf blade triangular or oblong. Synflorescence paniculate-racemose or racemose, to 50 cm, branched, lower branches to 22 cm; leaflike bracts linear, ca. 5 mm; peduncles 1–1.5 cm, shortly pilose. Capitula numerous; supplementary bracts subulate or absent. Involucre campanulate or cupular, 1–1.1 cm × 8–15 mm, glabrous; phyllaries 8–12, in 2 rows, oblong, 3–4 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets 5–8, yellow; lamina elliptic, 1.3–1.8 cm, to 6.5 mm wide, apex acute; tube ca. 5 mm. Tubular florets numerous, 8–9 mm; tube 2–2.5 mm. Achenes yellowish, cylindric, 4–6 mm. Pappus white, as long as tubular corolla. Fl. Jul–Sep.

Meadows, forest margins; 400–1000 m. SE Heilongjiang, Jilin (Changbai Shan), Liaoning [Korea, Russia (Far East)].

75. Ligularia tenuipes (Franchet) Diels, Bot. Jahrb. Syst. 29: 621. 1901.

蔟梗橐吾 cu geng tuo wu

Senecio tenuipes Franchet, Bull. Soc. Bot. France 39: 297. 1893; *Senecillis tenuipes* (Franchet) Kitamura.

Stem erect, to 100 cm tall, 6–10 mm in diam. at base, shortly brown pilose and white arachnoid-puberulent. Basal leaves petiolate; petiole to 45 cm, white puberulent, base sheathed; leaf blade cordate or broadly ovate-cordate, 9.5–16 × 14–22 cm, thin, abaxially sparsely shortly pilose or pubescent only along veins, adaxially glabrous, pinnately veined, base cordate, margin regularly dentate and ciliate, apex rounded or rarely mucronate; sinus ca. 1/4 as long as leaf blade. Middle stem leaves smaller, shortly petiolate; petiole winged; sheath slightly enlarged, semiamplexicaul. Distal stem leaves sessile, ovate-lanceolate, to 7 cm. Synflorescence racemose, to 59 cm; leaflike bracts narrowly lanceolate to linear, 1.5–4 mm, margin dentate, apex acuminate; peduncles often 2–4, crowded or solitary, proximal ones to 9.5 cm, with 2–4 capitula. Capitula numerous; supplementary bracts linear to linear-lanceolate. Involucre turbinate, 5–11 × 5–7 mm, outside shortly pilose; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, apex acute or acuminate; inner phyllaries brown membranous at margin. Ray florets 4 or 5, yellow; lamina linear, 9–15 × 1–1.5 mm, apex acute; tube 4–6 mm. Tubular florets numerous, 8–10 mm; tube 4–5 mm. Pappus dirty brown, slightly longer than tube of tubular corolla. Fl. Jul–Sep.

• Stream banks, wet slopes, grassy slopes; 2200–3200 m. ?Guizhou, W Hubei, ?Shaanxi, Sichuan.

76. Ligularia petiolaris Handel-Mazzetti, J. Bot. 76: 288. 1938.

裸柱橐吾 luo zhu tuo wu

Stem erect, ca. 30 cm tall, robust, hollow, sparsely arachnoid-pubescent. Petiole as long as leaf blade, unwinged, base sheathed; leaf blade dark green, ovate-cordate, ca. 16 × 12 cm, abaxially shortly brown pilose, adaxially sparsely pubescent, pinnately veined, abaxially with tenuous prominent reticulate veins, margin dentate, apex acute, or rounded in narrow basal leaves. Distal stem leaves smaller, transversely elliptic, margin dentate, apex entirely long caudate-mucronate. Synflorescence initially racemose, clustered, ca. 8 cm, pubescent; leaflike bracts linear; peduncles ca. 2 mm. Capitula numerous; supplementary bracts filiform. Involucre campanulate, ca. 8 mm, outside and margin shortly pilose; phyllaries 5, in 2 rows, oblong-lanceolate, apex acute; inner phyllaries membranous at margin. Outer florets female, 1 or 2, corolla absent; style naked. Tubular florets 5. Pappus white, shorter than tubular corolla. Fl. Jul, fr. Aug.

• Scrub; ca. 3600 m. SE Xizang (Nangxian).

77. Ligularia lankongensis (Franchet) Handel-Mazzetti, Symb. Sin. 7: 1139. 1936.

洱源橐吾 er yuan tuo wu

Senecio lankongensis Franchet, Bull. Soc. Bot. France 39: 301. 1893; *Ligularia lankongensis* var. *laxa* (Franchet) Handel-Mazzetti; *L. lankongensis* var. *minor* Lauener & D. K. Ferguson; *Senecillis lankongensis* (Franchet) Kitamura; *Senecio iochanensis* H. Léveillé; *S. lankongensis* var. *laxus* Franchet.

Stem erect, ca. 50 cm tall, ca. 6 mm in diam. at base, densely white arachnoid-puberulent. Basal leaves petiolate; petiole to 23 cm, white arachnoid-puberulent, base sheathed; leaf blade triangular or ovate, 19.5–24 × ca. 16 cm, abaxially grayish white arachnoid-puberulent, adaxially glabrous, pinnately veined, base subtruncate, margin regularly denticulate, apex obtuse. Proximal stem leaves scalelike, ovate, ca. 3 cm, middle to distally grayish white puberulent. Middle stem leaves sessile, similar but smaller. Distalmost stem leaves sagittate or ovate-lanceolate, including petiole to 8 cm, base cuneate, narrowed into a broadly winged petiole, margin minutely denticulate, apex caudate-acuminate. Synflorescence racemose, 9–25 cm, clustered or lax, proximal capitula often undeveloped; leaflike and supplementary bracts linear; peduncles ca. 1 cm, white puberulent. Capitula numerous. Involucre broadly and shallowly campanulate, 7–12 mm, mouth to 1.2 cm in diam., outside grayish white puberulent; phyllaries 8 or 9, in 2 rows, linear-oblong, ca. 2 mm wide. Ray florets 7, yellow; lamina oblong, 10–13 × 3–5 mm, apex obtuse; tube ca. 3 mm. Tubular florets numerous, ca. 7 mm; tube ca. 2 mm; limb narrow, base cuneate. Achenes yellowish, cylindric, 4.5–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Apr–Sep.

• Slopes, scrub, forest understories; 2100–3800 m. SW Sichuan, NE to NW Yunnan.

78. Ligularia nyingchiensis S. W. Liu, Acta Biol. Plateau Sin. 3: 68. 1984.

林芝橐吾 lin zhi tuo wu

Stem erect, to 100 cm tall, ca. 1 cm in diam. at base, white pubescent. Rosette of leaves not seen. Proximal stem leaves petiolate; petiole 5.5–10 cm, narrowly winged, base sheathed; leaf blade ovate-cordate, 13–16.5 × 11–13 cm, abaxially grayish white pubescent, adaxially glabrous, pinnately veined, base cordate, margin regularly obtusely crenate, apex rounded. Distal stem leaves sessile or shortly petiolate, ovate to narrowly ovate, to 7 × 4 cm, apex caudate-acuminate. Synflorescence racemose, to 24 cm; leaflike and supplementary bracts linear, to 2 cm; peduncles 5–8 mm, shortly white pilose. Capitula numerous. Involucre shallowly campanulate, 5–6 × 6–8 mm, outside white pubescent; phyllaries ca. 8, in 2 rows, black, oblong or lanceolate, 2–3 mm wide, apex acute or acuminate. Florets all tubular; outer florets female, 1–3(or 4), narrowly cylindric, shorter than central florets, 4–5 mm, corolla deeply 2-divided, labiate, one of lobes sometimes shorter or 2-divided. Central florets numerous, yellow, higher than involucre, ca. 6 mm; tube ca. 2 mm. Pappus pale yellow, as long as tubular corolla. Fl. Jun–Jul, fr. Jul–Aug.

• Alpine meadows; ca. 4400 m. Xizang (Nyingchi), Yunnan (Lijiang).

79. Ligularia pterodonta C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 65. 1935.

宽翅橐吾 kuan chi tuo wu

Stem erect, ca. 62 cm tall, ca. 6 mm in diam. at base, shortly pale yellow pilose. Basal leaves petiolate; petiole 22–26 cm, distalmost winged; wings 4.5–5 cm wide, base enlarged sheathed, margin regularly triangularly dentate; leaf blade ovate-cordate, 13–15 × 14–16 cm, glabrous, pinnately veined, base cordate, margin densely dentate, apex acute. Middle to distal stem leaves similar but smaller. Synflorescence racemose, ca. 13 cm; leaflike bracts lanceolate, 2–2.5 cm × 2–3.2 mm; peduncles ca. 1 cm. Capitula numerous; supplementary bracts short. Involucre broadly campanulate, ca. 1 cm, outside shortly pilose; phyllaries ca. 8, in 2 rows, apex acute; outer phyllaries linear, 2–2.5 mm wide; inner phyllaries 3–4 mm wide, margin broadly membranous. Ray florets ca. 8, yellow; lamina ca. 28 × 5 mm, apex obtuse; tube ca. 5 mm. Tubular florets numerous, ca. 10.5 mm; tube ca. 4.5 mm; limb campanulate, ca. 2.5 mm wide. Achenes oblong, ca. 4.5 mm. Pappus reddish brown, ca. 4 mm, as long as tube of tubular corolla. Fl. and fr. Sep.

• Margins of scrub; ca. 4000 m. Xizang (Zayü).

80. Ligularia latipes S. W. Liu, Bull. Bot. Res., Harbin 5(4): 71. 1985.

阔柄橐吾 kuo bing tuo wu

Stem erect, to 70 cm tall, 5–8 mm in diam. at base, proximally glabrous, distally and synflorescence purplish red, shortly blackish purple pilose. Basal leaves petiolate; petiole 4–8 cm, winged; wings to 2 cm wide, margin entire or dentate; base enlarged sheathed; sheath to 11 × 4 cm, glabrous, margin entire or dentate; leaf blade cordate or ovate-cordate, 3.5–15 × 5.5–11 cm, pinnately veined, base cordate, margin sinuate-dentate, apex rounded; basal lobes orbicular. Middle stem leaves smaller, shortly petiolate, enlarged sheathed; leaf blade ovate. Synflorescence paniculate-racemose, to 10 cm, lax, proximal branches with 3 or 4 capitula; leaflike bracts linear, shorter; peduncles to 1.5 cm. Capitula numerous; supplementary bracts subulate, shorter than involucre. Involucre narrowly campanulate or cylindric, 6–8 × 4–5 mm, outside purplish red, glabrous; phyllaries 5–8, in 2 rows, oblong, white ciliate, margin membranous and pale colored, apex obtuse, triangular. Ray florets ?yellow, not seen. Tubular florets 10–15, 8–9 mm, tube slightly longer than broadly campanulate limb. Achenes dark brown, narrowly oblanceolate, 5–6 mm, attenuate at apex. Pappus rufous, 6–7 mm, slightly shorter than tubular corolla. Fl. and fr. Aug–Sep.

• Grassy slopes; ca. 2600 m. N Sichuan.

81. Ligularia alatipes Handel-Mazzetti, Bot. Jahrb. Syst. 69: 132. 1938.

翅柄橐吾 chi bing tuo wu

Stem erect, to 150 cm tall, 1–1.5 cm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly yellow pilose. Basal leaves petiolate; petiole to 32.5 cm, winged; wings to 5 mm wide; base sheathed, margin entire; leaf blade ovate-cordate, 7–40 cm, proximally 10–17 cm wide, glabrous or abaxially pubescent along veins, pinnately veined, base cordate, margin regularly denticulate, ciliate, apex obtuse; sinus broad and shallow, ca. 1/10 as long as leaf blade, basal lobes orbicular. Middle stem leaves similar, but shortly petiolate; petiole winged; wings denticulate; sheath to 10 cm, upper margin dentate. Distalmost stem leaves bracteal, with enlarged sheathed petiole; leaf blade ovate or reniform, to 6 × 7 cm, margin dentate; pinnately or palmate-pinnately veined. Synflorescence racemose, to 35 cm; leaflike bracts ovate-lanceolate, proximal ones to 7.5 × 2.5 cm, smaller distally, dentate or reniform with sheathed petiole; peduncles slender, proximally to 11 cm, shorter distally, white arachnoid-puberulent. Capitula numerous; supplementary bracts narrowly lanceolate, 1–1.5 cm, longer than involucre, entire or dentate. Involucre broadly campanulate, 8–11 × ca. 10 mm, outside glabrous or white arachnoid-puberulent; phyllaries 10 or 11, in 2 rows, oblong, 4–5 mm wide, margin broadly brown membranous, apex broadly triangular. Ray florets yellow; lamina linear, 30–40 × 2–3 mm, apex acute; tube ca. 5 mm. Tubular florets numerous, ca. 8 mm; tube ca. 4 mm; limb broadly campanulate. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

• Grassy slopes; 2700–3600 m. SW Sichuan, NW Yunnan.

82. Ligularia botryodes (C. Winkler) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 126. 1938.

总状橐吾 zong zhuang tuo wu

Senecio botryodes C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 154. 1895; *Senecillis botryodes* (C. Winkler) Kitamura.

Stem erect, 50–70 cm tall, 3–4 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent. Basal leaves petiolate; petiole to 25 cm, base sheathed,

proximally glabrous, distally narrowly winged, white arachnoid-puberulent; leaf blade ovate-cordate, triangular-cordate, or suborbicular, 2.5–12 × 4–15 cm, thin, glabrous, pinnately veined, base shallowly cordate or cordate, margin regularly denticulate, apex rounded or acute; basal lobes triangular. Middle stem leaves shortly petiolate, base enlarged sheathed; leaf blade cordate or ovate-cordate, 2–7 × 4–7 cm. Distalmost stem leaves sessile, lanceolate. Synflorescence racemose, 12–26 cm, lax; leaflike bracts ovate, to 25 × ca. 8 mm, smaller distally, membranous, with prominent reticulate veins on both surfaces, margin denticulate, apex acuminate; peduncles 5–8 mm, slender, white arachnoid-puberulent. Capitula numerous; supplementary bracts narrowly ovate or lanceolate, as long as involucre, membranous, margin denticulate or entire. Involucre campanulate, 6–8 × 5–6 mm, outside white arachnoid-puberulent; phyllaries 7–9, in 2 rows, oblong, 2–3 mm wide, brown ciliate, apex triangular; inner phyllaries broadly membranous at margin. Ray florets 5 or 6, yellow; lamina oblong, 2–3 × ca. 1 mm; tube ca. 4 mm, slender. Tubular florets numerous, 7–8 mm; tube 2–3 mm. Pappus white, as long as tubular corolla. Fl. Jul–Sep. $2n = 58$.

Grassy slopes, forest understories; 3100–4000 m. SW Gansu, ?Shaanxi, N and NW Sichuan [Nepal].

83. Ligularia sagitta (Maximowicz) Mattfeld ex Rehder & Kobuski, J. Arnold Arbor. 14: 40. 1933.

箭叶橐吾 jian ye tuo wu

Senecio sagitta Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 483. 1882; *Ligularia kansuensis* Handel-Mazzetti; *L. ovato-oblonga* (Kitamura) Kitamura; *L. sagitta* var. *ovato-oblonga* (Kitamura) Kitamura; *Senecillis ovato-oblonga* Kitamura; *S. sagitta* (Maximowicz) Kitamura; *Senecio microdontus* Bureau & Franchet (1891), not Baker (1881).

Stem erect, 25–70 cm tall, to 1 cm in diam. at base, glabrous or distally and synflorescence initially white arachnoid-puberulent, glabrescent. Basal leaves petiolate; petiole 4–8 cm, white arachnoid-puberulent, narrowly winged, wing margin entire or denticulate, base sheathed; leaf blade sagittate, hastate, or ovate-oblong to oblong-sagittate, 2–20 cm, 1.5–20 cm wide at base, abaxially white arachnoid-puberulent or glabrescent, adaxially glabrous, pinnately veined, margin dentate, apex obtuse or acute; sinus 1/4–1/3 as long as leaf blade, broad, basal lobes divergent or not, outer margin coarsely dentate. Middle stem leaves shortly petiolate, sheath amplexicaul; leaf blade smaller, sagittate or ovate. Distalmost stem leaves bracteal, lanceolate to narrowly lanceolate. Synflorescence racemose, 6.5–40 cm, lax; leaflike bracts ovate-lanceolate or narrowly lanceolate to linear, 6–15 × ca. 7 mm or rarely longer and wider, to 6.5 cm, herbaceous, apex acuminate; peduncles 5–70 mm, slender. Capitula numerous; supplementary bracts linear. Involucre campanulate or narrowly campanulate, 7–10 × 4–8 mm, outside glabrous; phyllaries 7–10, in 2 rows, oblong or lanceolate, apex acute or acuminate; inner phyllaries membranous at margin. Ray florets 5–9, yellow; lamina oblong, 5–12 × ca. 3 mm, apex obtuse; tube ca. 5 mm. Tubular florets numerous, 7–8 mm; limb extending from involucre; tube 3–4 mm. Achenes brown, cylindric, 3.5–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep. $2n = 58$.

Stream banks, grassy slopes, forest margins, forest understories, scrub; 1300–4000 m. Gansu, Hebei, Heilongjiang, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [E Himalaya (Gyong), Mongolia].

84. Ligularia platyglossa (Franchet) Handel-Mazzetti, Symb. Sin. 7: 1137. 1936.

宽舌橐吾 kuan she tuo wu

Senecio platyglossus Franchet, Bull. Soc. Bot. France 39: 293. 1893; *Ligularia kanaitzensis* (Franchet) Handel-Mazzetti var. *ruficeps* Handel-Mazzetti; *L. potaninii* Pojarkova var. *yunnanensis* Pojarkova; *Senecillis platyglossa* (Franchet) Kitamura.

Stem erect, 30–100 cm tall, 5–8 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly pilose. Basal leaves petiolate; petiole 10–30 cm, narrowly, entirely winged, base sheathed; leaf blade ovate or ovate-cordate, 11–40 × 6–20 cm, glabrous, pinnately veined, base shallowly cordate, truncate, or broadly cuneate, margin undulate-dentate, apex obtuse. Stem leaves sessile, without sheath, erect, ovate-oblong or ovate-lanceolate, 2–16 cm, smaller distally, margin dentate, apex acute. Synflorescence racemose, 15–50 cm, proximally sometimes shortly branched; leaflike bracts narrowly lanceolate or linear to filiform, to 5.5 cm; peduncles 4–30 mm, shortly pilose. Capitula numerous; supplementary bracts linear. Involucre broadly turbinate, 7–10 mm, mouth to 1.5 cm in diam., outside glabrous; phyllaries 8–11, in 2 rows, ovate-lanceolate to narrowly lanceolate, 1.5–4(–5) mm, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 1–2 cm × 2–4.5 mm, apex acute; tube ca. 5 mm. Tubular florets numerous, 6–8 mm; tube ca. 2 mm. Achenes brown, cylindric, 4–6 mm. Pappus reddish brown or yellowish white initially, slightly shorter than tubular corolla. Fl. and fr. Jul–Nov.

• Stream banks, grassy slopes, forest understories; 1200–3800 m. NE and NW Yunnan.

85. Ligularia kanaitzensis (Franchet) Handel-Mazzetti, Vegetationsbilder 22(Heft 8): 13. 1932.

干崖子橐吾 gan ya zi tuo wu

Stem erect, 30–160 cm tall, 4–15 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 9–30 cm, glabrous, narrowly winged, gradually enlarged toward base into a sheath; sheath 7–11 cm, to 2 cm wide, oppositely amplexicaul, mouth of sheath spreading toward outside, forming an oblique petiole; leaf blade ovate-oblong or ovate-triangular, 4–25 × 3–20 cm, glabrous, pinnately veined, base shallowly cordate or truncate, margin regularly dentate, apex acute. Stem leaves sessile, erect, adnate, ovate-lanceolate, to 9 cm, smaller distally, tubular-amplexicaul. Synflorescence racemose, 15–40 cm; leaflike bracts narrowly lanceolate or rhombic, 2–3.3 cm × 3–4 mm, subentire or dentate, narrowed at base; peduncles 5–20 mm, smaller distally. Capitula numerous; supplementary bracts linear-lanceolate, 8–12 mm. Involucre campanulate, 8–10 × 5–8 mm, outside glabrous; phyllaries 8, in 2 rows, oblong, 2–3 mm wide, apex acute

or obtuse; inner phyllaries broadly membranous at margin. Ray florets 5–7, yellow; lamina oblong or obovate-oblong, 1.4–1.8 cm × 3–4.5 mm, apex obtuse; tube ca. 4 mm. Tubular florets numerous, 7–8 mm; tube ca. 3 mm. Achenes brown, cylindric, ca. 5 mm. Pappus yellow, as long as tubular corolla. Fl. and fr. Jul–Oct. $2n = 58$*.

• Grassy slopes, swamps, scrub, grasslands in valleys; 2400–4300 m. N Sichuan, NW and W Yunnan.

1a. Leaflike bract narrowly lanceolate, sessile, margin entire ..... 85a. var. *kanaitzensis*
1b. Leaflike bract rhombic, shortly petiolate, margin dentate ..... 85b. var. *subnudicaulis*

85a. Ligularia kanaitzensis var. **kanaitzensis**

干崖子橐吾(原变种) gan ya zi tuo wu (yuan bian zhong)

Senecio kanaitzensis Franchet, Bull. Soc. Bot. France 39: 298. 1893; *Ligularia mosoynensis* (Franchet) Handel-Mazzetti; *Senecillis kanaitzensis* (Franchet) Kitamura; *S. mosoynensis* (Franchet) Kitamura; *Senecio jeffreyanus* Diels; *S. mosoynensis* Franchet.

Leaflike bracts sessile, narrowly lanceolate, margin entire.

• Grassy slopes, swamps, scrub; 2400–4300 m. SW Sichuan (Muli), W Yunnan.

85b. Ligularia kanaitzensis var. **subnudicaulis** (Handel-Mazzetti) S. W. Liu, Fl. Reipubl. Popularis Sin. 77(2): 92. 1989.

菱苞橐吾 ling bao tuo wu

Ligularia subnudicaulis Handel-Mazzetti, Bot. Jahrb. Syst. 69: 73. 1938.

Leaflike bracts shortly petiolate, purplish red when dry, rhombic, margin dentate.

• Grasslands in valleys, scrub; 2400–3700 m. NW Yunnan.

86. Ligularia lidjiangensis Handel-Mazzetti, Bot. Jahrb. Syst. 69: 134. 1938.

丽江橐吾 li jiang tuo wu

Stem erect, 36–45 cm tall, 5–10 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly pilose. Basal leaves petiolate; petiole to 18 cm, glabrous; wings 2–4 mm wide; sheath ca. 5.5 cm; leaf blade ovate-cordate, 13–15 × 10–11 cm, glabrous, pinnately veined, lateral veins 8–10 pairs, base shallowly cordate or rarely subtruncate, margin regularly denticulate, apex acute or obtuse. Proximal stem leaves 2 or 3, similar to basal leaves but smaller; petiole winged; sheath ovate, subopposite, 4–8 × to 2 cm, mouth of sheath spreading toward outside, forming an oblique petiole. Middle to distal stem leaves erect, ovate-lanceolate, to 7 × 1 cm, smaller distally, base semiamplexicaul or not, margin denticulate, apex acute. Synflorescence racemose, 10–12 cm, clustered initially; leaflike bracts ovate-lanceolate or narrowly lanceolate, to 3 cm × 3–6 mm, denticulate, narrowed at base into a short petiole; peduncles ca. 5 mm, slender. Capitula numerous; supplementary bracts linear-lanceolate, 8–10 mm. Involucre cupular, 5–8 mm, mouth ca. 1 cm in diam., outside glabrous; phyllaries in 2 rows, broadly obovate or elliptic, 3–4 mm wide, apex brown, broadly triangular, acute and recurved mucronate; inner phyllaries broadly membranous at margin. Ray florets 5–10, yellow; lamina oblong, 1.3–1.5 cm × 2–4.5 mm, apex obtuse; tube ca. 3 mm. Tubular florets numerous, 6–7 mm; tube ca. 4 mm. Achenes cylindric, ca. 4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Aug–Sep.

• Stream banks, grassy slopes; 2600–3300 m. NW Yunnan.

87. Ligularia ghatsukupa Kitamura, Acta Phytotax. Geobot. 15: 73. 1953.

粗茎橐吾 cu jing tuo wu

Stem erect, 15–120 cm tall, to 2.8 cm in diam. at base, hollow, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 4–20 × 1–3 cm, base semiamplexicaul; leaf blade ovate-oblong or broadly ovate, 8–20 × 4–20 cm, both surfaces initially white arachnoid-puberulent, pinnately veined, with robust midvein to 2 cm wide, with prominent reticulate veins, base truncate or oblique, margin irregularly dentate, apex rounded. Middle stem leaves sessile or shortly petiolate, base semi- or auriculate-amplexicaul; leaf blade ovate or oblong, to 15 × 12 cm. Distalmost stem leaves smaller, sessile, ovate-lanceolate. Synflorescence racemose, clustered initially, elongating in fruit, to 40 cm; leaflike bracts linear-lanceolate, to 2 cm, apex acuminate; peduncles unequal, smaller distally, proximal peduncles to 8 cm, distal peduncles curved. Capitula numerous; supplementary bracts linear. Involucre broadly campanulate or hemispheric, 1.5–2 × to 2.5 cm, outside glabrous or sparsely white arachnoid-puberulent; phyllaries 8–13, in 2 rows, oblong or lanceolate, 3–8 mm wide, apex acute. Ray florets 6–8, yellow; lamina ovate-oblong or elliptic, to 16 × ca. 6.5 mm; tube ca. 4 mm. Tubular florets numerous, ca. 1 cm; tube ca. 3 mm. Achenes brown, cylindric, 4–8 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Lake shores, gravelly areas on high mountains; 4700–5000 m. C and S Xizang.

88. Ligularia tsangchanensis (Franchet) Handel-Mazzetti, Symb. Sin. 7: 1140. 1936.

苍山橐吾 cang shan tuo wu

Senecio tsangchanensis Franchet, Bull. Soc. Bot. France 39: 299. 1893; *Senecillis tsangchanensis* (Franchet) Kitamura; *Senecio remipes* W. W. Smith.

Stem erect, 15–120 cm tall, 3–8 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 10–20 cm, base sheathed; wing margin entire or denticulate; leaf blade ovate-oblong or ovate, rarely orbicular, 3.5–18 × 3–14 cm, glabrous, pinnately veined, base truncate or broadly cuneate, margin dentate, apex acute, mucronate. Middle to distal stem leaves sessile, oblong, 7–20 × 3–9 cm, base semiamplexicaul. Distalmost stem leaves smaller, lanceolate. Synflorescence racemose, 7–25 cm, proximally sometimes branched; leaflike bracts linear-lanceolate to linear, to 3 cm; peduncles 1–1.5 cm. Capitula numerous; supplementary bracts linear. Involucre campanulate, 7–9 × 4–7 mm, out-

side green, glabrous; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, apex dark brown, triangular or acuminate. Ray florets yellow; lamina oblong, 8–12 × 2–3 mm; tube 3–4 mm. Tubular florets numerous, 6–7 mm; tube ca. 2.5 mm. Achenes greenish brown, cuneate-cylindric, 5–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Sep. $2n = 58$*.

• Grassy slopes, forest understories, scrub, alpine meadows; 2800–4100 m. SW Sichuan, SE Xizang, NW Yunnan.

89. Ligularia muliensis Handel-Mazzetti, Bot. Jahrb. Syst. 69: 117. 1938.

木里橐吾 mu li tuo wu

Stem erect, 28–32 cm tall, 4–6 mm in diam. at base, proximally glabrous, distally and synflorescence shortly yellowish brown pilose. Rosette of leaves not seen. Stem leaves oblong or ovate-oblong, 7–15 × 4.5–6 cm, smaller distally, glabrous or abaxially shortly pilose along veins, pinnately veined, base cuneate or rounded, margin denticulate, apex rounded; proximal stem leaves shortly petiolate, sheath amplexicaul; distal stem leaves sessile, base semiamplexicaul. Synflorescence racemose, 7–22 cm; leaflike bracts linear (except lower one ovate); peduncles 1–5 cm. Capitula 4–13; supplementary bracts linear. Involucre green or blackish purple, campanulate, 8–10 × 6–7 mm, outside shortly pilose; phyllaries 8–12, in 2 rows, lanceolate, apex acuminate; inner phyllaries membranous at margin. Ray florets 8–10, yellow; lamina linear-oblong, ca. 10 × 2 mm, apex obtuse. Tubular florets numerous, 6.5–7 mm; tube 2.5–3 mm. Achenes cylindric, ca. 5 mm. Pappus white, shorter than tubular corolla. Fl. and fr. Jul–Oct.

• Grassy slopes, forest understories, scrub; 3800–4200 m. SW Sichuan, NW Yunnan.

90. Ligularia sibirica (Linnaeus) Cassini in F. Cuvier, Dict. Sci. Nat. 26: 402. 1823.

橐吾 tuo wu

Othonna sibirica Linnaeus, Sp. Pl. 2: 924. 1753; *Cineraria sibirica* (Linnaeus) Linnaeus; *Hoppea sibirica* (Linnaeus) Reichenbach; *Ligularia arctica* Pojarkova; *L. bucovinensis* Nakai; *L. longipes* Pojarkova (1961), not C. C. Chang (1951); *L. pojarkovana* S. W. Liu & T. N. Ho; *L. sibirica* var. *alpestris* Turczaninow; *L. sibirica* subsp. *arctica* (Pojarkova) V. G. Sergienko; *L. sibirica* var. *gigantea* Sergievskaya; *L. sibirica* var. *glaberrima* Candolle; *L. sibirica* var. *gracilis* Sergievskaya; *L. sibirica* var. *vulgaris* Candolle; *L. ucrainica* Minderova; *Senecillis sibirica* (Linnaeus) Simonkai; *Senecio cacaliifolius* Schultz Bipontinus.

Stem erect, 20–200 cm tall, 2–11 mm in diam. at base, proximally glabrous, distally and synflorescence shortly yellowish brown pilose. Basal leaves petiolate; petiole 14–39 cm, glabrous, base sheathed; leaf blade ovate-cordate, triangular-cordate, reniform-cordate, or broadly cordate, 3.5–32 × 4.5–29 cm, glabrous, palmately veined, base cordate, margin regularly dentate, apex rounded or obtuse; sinus 1/4–1/3 as long as leaf blade, basal lobes oblong or suborbicular. Middle stem leaves similar, but shortly petiolate; petiole 3–14 cm; sheath enlarged, 3–6 cm. Distalmost stem leaves with only dentate sheaths. Synflorescence racemose, 4.5–42 cm, often clustered; leaflike bracts ovate or ovate-lanceolate, proximally to 3 × 0.8–2 cm, smaller distally, margin entire or denticulate, herbaceous; peduncles 4–12 mm, rarely proximally to 8 cm. Capitula numerous; supplementary bracts narrowly lanceolate, glabrous, margin entire, submembranous. Involucre sometimes purplish red, broadly campanulate, campanulate, or campanulate-turbinate, 7–11 × 6–11 mm, outside glabrous, base rounded; phyllaries 7–12, in 2 rows, lanceolate or oblong, 7–11 mm, margin membranous, apex acute, obtuse-triangular, or acuminate. Ray florets 5–8(–11), yellow; lamina oblanceolate or oblong, 1–2.2 cm × 3–5 mm, apex obtuse; tube 5–10 mm. Tubular florets numerous, 8–13 mm; tube 4–7 mm. Achenes brown, cylindric, 4–7 mm. Pappus yellowish, as long as tubular corolla. Fl. and fr. Jul–Oct. $2n = 60$.

Swamps, wet grasslands, stream banks; below 2200 m. Heilongjiang, Jilin, Nei Mongol [Mongolia, Russia; Europe].

91. Ligularia cyathiceps Handel-Mazzetti, Bot. Jahrb. Syst. 69: 135. 1938.

浅苞橐吾 qian bao tuo wu

Stem erect, 57–90 cm tall, 3.5–6 mm in diam. at base, proximally glabrous, distally sparsely white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 20–49 cm, shortly yellowish brown pilose, abaxially with prominent palmate veins, base narrowly long sheathed; leaf blade broadly ovate or reniform, 8.5–13 × 10.5–22 cm, abaxially shortly pilose, adaxially glabrous, margin coarsely dentate, apex rounded, mucronate; sinus ca. 1/3 as long as leaf blade, broad; basal lobes oblong, 6–8 × 6.5–9 cm. Middle stem leaves shortly petiolate; sheath enlarged, densely shortly pilose; leaf blade reniform-cordate, to 8 × 14 cm. Synflorescence racemose, 10–40 cm, lax, spreading; leaflike bracts purplish red, yellowish red when dry, ovate-lanceolate, to 3 × ca. 1 cm, smaller distally, membranous, apex caudate-acuminate; peduncles unequal, proximal peduncles to 5 cm, shorter distally, shortly yellow pilose. Capitula numerous; supplementary bracts ovate-lanceolate, as long as involucre, submembranous. Involucre shallowly cupular, 7–8 × 8–10 mm, base truncate, outside sparsely shortly pilose; phyllaries 9–13, in 2 rows, broadly oblong, to 4 mm, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 8–10 × 2–3.5 mm; tube ca. 3 mm. Tubular florets numerous, 6.5–8 mm; tube 2–3 mm; limb cuneate. Achenes brown, cylindric, 4–6 mm. Pappus yellowish, as long as tubular corolla. Fl. Jul–Aug.

• Stream banks, valleys, grassy slopes; 3000–4000 m. NW Yunnan.

92. Ligularia leveillei (Vaniot) Handel-Mazzetti, Symb. Sin. 7: 1136. 1936.

贵州橐吾 gui zhou tuo wu

Senecio leveillei Vaniot, Bull. Acad. Int. Géogr. Bot. 11: 346. 1902; *Senecillis leveillei* (Vaniot) Kitamura.

Stem erect, ca. 60 cm tall, ca. 4 mm in diam. at base, proximally glabrous, distally and synflorescence shortly brown pilose. Rosette of leaves not seen. Proximal stem leaves petiolate; petiole to 20 cm, glabrous, base sheathed; leaf blade reniform or cordate, 3–3.5 × 5–5.5 cm, subleathery, glabrous, pal-

mately veined, margin triangular-dentate, apex rounded or acute; sinus ca. 1/3 as long as leaf blade, broad, basal lobes orbicular. Middle stem leaves shortly petiolate; sheath enlarged, ca. 3 cm; leaf blade smaller, reniform or cordate. Distal stem leaves smaller, sessile, shortly sheathed. Synflorescence paniculate-racemose, ca. 10 cm, proximally branched; leaflike and supplementary bracts linear, 4–6 mm, glabrous; peduncles 3–7 mm. Capitula numerous. Involucre broadly campanulate or cupular, 7–9 mm, mouth to 1 cm in diam., outside glabrous; phyllaries 8, in 2 rows, oblong or ovate-oblong, 3–4 mm, nitid, apex obtuse or acute; inner phyllaries broadly membranous at margin. Tubular florets 6–7 mm; tube ca. 2 mm; limb campanulate. Pappus brown, slightly shorter than tubular corolla. Fl. Aug.

• Grasslands; 2000–2200 m. C Guizhou.

93. Ligularia nanchuanica S. W. Liu, Bull. Bot. Res., Harbin 5(4): 70. 1985.

南川橐吾 nan chuan tuo wu

Stem erect, to 120 cm tall, ca. 6 mm in diam. at base, proximally glabrous, distally often purplish red, densely shortly yellow pilose. Basal leaves petiolate; petiole 30–40 cm, slender, glabrous, base narrowly sheathed; sheath to 5 cm, glabrous; leaf blade ovate-cordate or ovate-reniform, 4–9 × 5–11 cm, abaxially densely shortly yellow pilose, adaxially glabrous, palmately veined, margin undulate-dentate, apex rounded or acute, mucronate; sinus ca. 1/3 as long as leaf blade, narrow, basal lobes suborbicular, 4–6 cm, margin coarsely dentate. Middle to distal stem leaves similar but shortly petiolate or sessile; sheath enlarged. Synflorescence paniculate-racemose, to 53 cm, proximally branched; branches ascending, shortly yellow pilose, basal ones to 18 cm, with small capitula; leaflike bracts linear-lanceolate, to 2 cm, smaller distally; peduncles 3–9 mm, shortly yellow pilose. Capitula numerous. Involucre narrowly campanulate, 8–11 × 4–5 mm, outside densely shortly yellow pilose; phyllaries 8, in 2 rows, lanceolate or narrowly lanceolate, 1.5–3 mm wide, margin narrowly membranous, apex acute or acuminate. Tubular florets 7–8 mm; tube ca. 3 mm. Pappus yellow, slightly shorter than tubular corolla. Fl. Aug. $2n = 58$*.

• Grasslands; 1300–2000 m. Chongqing (Nanchuan).

94. Ligularia hookeri (C. B. Clarke) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 127. 1938.

细茎橐吾 xi jing tuo wu

Cremanthodium hookeri C. B. Clarke, Compos. Ind. 169. 1876; *C. hookeri* f. *angustiligulatum* R. D. Good; *C. hookeri* f. *irregulare* R. D. Good; *C. hookeri* subsp. *polycephalum* R. D. Good; *C. hookeri* f. *regulare* R. D. Good; *Ligularia evaginata* C. C. Chang; *L. hookeri* var. *polycephala* (R. D. Good) Handel-Mazzetti; *Senecio calthifolius* J. D. Hooker (1881), not (Maximowicz) Maximowicz (1871); *S. feddei* H. Léveillé; *S. ficarifolius* H. Léveillé & Vaniot; *S. nimborum* Franchet; *S. saccosoflabellatus* H. Léveillé; *S. sikkimensis* Franchet.

Stem erect, 17–40 cm tall, slender, 1.5–2 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly pilose. Basal leaves petiolate; petiole 5–10 cm, slender, glabrous, base sheathed; leaf blade cordate-sagittate or reniform, 7–24 × 15–55 mm, glabrous, palmately veined, abaxially with conspicuous reticulate veins, margin triangularly or coarsely dentate, between teeth shortly pilose, apex rounded; sinus 1/3–1/2 as long as leaf blade, broad; basal lobes oblong, divergent or not. Middle stem leaf solitary, shortly petiolate; sheath slightly enlarged, 1.5–2.5 cm, glabrous; leaf blade reniform, as large as basal leaves. Distalmost stem leaf solitary, bracteal, cymbiform, to 2.5 cm, margin dentate. Capitula solitary or 2–7(–16), in raceme; leaflike bracts narrowly lanceolate; peduncles to 3.5 cm, slender, arachnoid-puberulent and shortly pilose; supplementary bracts filiform. Involucre campanulate or broadly campanulate, 8–11 × 6–8(–10) mm, outside glabrous; phyllaries 8–10, in 2 rows, oblong, to 3 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina linear, 1–1.5 cm × 1.5–2 mm, apex acute; tube 3–5 mm. Tubular florets numerous, 7–8 mm; tube 3.5–4 mm. Achenes brown, cylindric, 4.5–6 mm. Pappus brown or pale brown, as long as tubular corolla. Fl. and fr. May–Sep. $2n = 58$.

Grassy slopes, scrub, forest understories, stream banks, alpine meadows; 3000–4500 m. Shaanxi (Taibai Shan), Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

95. Ligularia parvifolia C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 64. 1935.

小叶橐吾 xiao ye tuo wu

Stem erect, to 100 cm tall, 2–4 mm in diam. at base, slender, glabrous. Basal leaves petiolate; petiole to 25 cm, slender, glabrous, base narrowly sheathed; leaf blade hastate or triangular, 1.7–3.5 × 2–5.5 cm, glabrous, palmately veined, base truncate or rarely shallowly cordate, margin revolute, obtusely denticulate, apex obtuse or rounded, mucronate. Middle to distal stem leaves 2–4, shortly petiolate or sessile; sheath enlarged amplexicaul; leaf blade smaller, triangular to lanceolate. Synflorescence racemose, 8–15 cm; leaflike and supplementary bracts narrowly linear, 5–20 mm; peduncles 5–55 mm, slender, smaller distally. Capitula 3–6. Involucre campanulate, 1–1.3 × to 1 cm, outside glabrous; phyllaries 7–10, in 2 rows, oblong, 2–3 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets 5–8, yellow; lamina oblong, 1.2–2 × to 5 mm, apex obtuse; tube to 1 cm. Tubular florets numerous, 8–11 mm; tube 4–7 mm, slender; limb ca. 2 mm wide. Pappus rufous, 6–8 mm, shorter than tubular corolla. Fl. Jul.

• Stream banks, swamps; 1900–2300 m. Yunnan (Kunming).

96. Ligularia lamarum (Diels) C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 65. 1935.

沼生橐吾 zhao sheng tuo wu

Senecio lamarum Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 508. 1922; *Ligularia angustiligulata* C. C. Chang.

Stem erect, 37–52 cm tall, slender, 2–4 mm in diam. at base, proximally glabrous, distally and synflorescence shortly pilose. Basal leaves petiolate; petiole 8.5–29 cm, slender, glabrous, base sheathed; leaf blade triangular-sagittate or ovate-

cordate, 3–9 × 2.2–12.5 cm, glabrous, palmately veined, margin dentate and ciliate, apex acute; sinus 1/4–1/3 as long as leaf blade, broad; basal lobes triangular, apex obtuse or acute. Middle to distal stem leaves shortly petiolate; sheath enlarged, amplexicaul; leaf blade smaller, cordate or ovate-cordate. Synflorescence racemose, 10–16 cm, clustered, spicate or lax; leaflike bracts linear, to 1.7 cm; peduncles 3–4(–8) mm, slender, shortly brown pilose. Capitula numerous; supplementary bracts subulate. Involucre campanulate-turbinate, 6–9 × 3–5 mm, outside glabrous; phyllaries 6–8, in 2 rows, oblong, apex acute; inner phyllaries membranous at margin. Ray florets 5–8, yellow; lamina oblong, 7–10 mm, ca. 1.5 mm wide, apex obtuse; tube 3–4 mm. Tubular florets numerous, 5–7 mm; tube 2–3 mm; limb broadly campanulate, ca. 2 mm wide. Achenes brown, cylindric, 4–5 mm. Pappus yellowish, slightly shorter than tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

Swamps, wet grasslands, scrub, forest understories; 3300–5300 m. SW Gansu, W Sichuan, SE Xizang, NW Yunnan [NE Myanmar].

97. Ligularia subspicata (Bureau & Franchet) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 127. 1938.

穗序橐吾 sui xu tuo wu

Senecio subspicatus Bureau & Franchet, J. Bot. (Morot) 5: 75. 1891; *Ligularia nudicaulis* C. C. Chang; *Senecillis subspicata* (Bureau & Franchet) Kitamura; *Senecio fibrillosus* Dunn.

Stem erect, 50–100 cm tall, slender, 3–4 mm in diam. at base, proximally glabrous, distally and synflorescence white puberulent. Basal leaves petiolate; petiole 5–30 cm, slender, glabrous, base sheathed; leaf blade ovate-cordate, hastate, or sagittate, 3.2–10.5 × 4–15 cm, abaxially pubescent, adaxially glabrous, palmately veined, margin triangular- or sharply dentate and ciliate, apex obtuse or rounded, mucronate; sinus 1/4–1/3 as long as leaf blade, broad; basal lobes oblong, margin coarsely dentate, sometimes divergent. Middle stem leaves similar but smaller, shortly petiolate; sheath narrow, usually not amplexicaul. Distal stem leaves sessile, smaller. Synflorescence racemose, to 30 cm, proximally branched; leaflike bracts linear-lanceolate, 6–35 mm, margin entire; peduncles 2–8 mm. Capitula numerous; supplementary bracts linear. Involucre campanulate, 4–10 mm, mouth 4–8 mm in diam., outside glabrous; phyllaries 6 or 7, in 2 rows, oblong or lanceolate, 2–3 mm wide, apex triangular or acute; inner phyllaries membranous at margin. Florets all tubular, numerous, yellow, 6–7 mm; tube as long as limb. Pappus white, slightly shorter than tubular corolla. Fl. Jul–Sep, fr. Aug–Sep.

• Stream banks, forest margins, forest understories, alpine scrub; 2800–5300 m. SW and W Sichuan, NW Yunnan.

98. Ligularia wilsoniana (Hemsley) Greenman in L. H. Bailey, Stand. Cycl. Hort. 6: 3153. 1917.

川鄂橐吾 chuan e tuo wu

Senecio wilsonianus Hemsley, Gard. Chron., ser. 3, 38: 212. 1905; *Ligularia polycephala* (Hemsley) Nakai; *L. sibirica* (Linnaeus) Cassini var. *polycephala* (Hemsley) Diels; *Senecillis wilsoniana* (Hemsley) Kitamura; *Senecio cacaliifolius* Schultz Bipontinus var. *polycephalus* (Hemsley) Franchet; *S. ligularia* J. D. Hooker var. *polycephalus* Hemsley.

Stem erect, robust, 60–120 cm tall, to 1 cm in diam. at base, shortly pilose. Basal leaves petiolate; petiole 19–51 cm, robust, shortly pilose, base sheathed; leaf blade reniform, 6.5–13 × 11–24 cm, abaxially densely shortly pilose, adaxially glabrous, palmately veined, abaxially with prominent reticulate veins, base cordate, margin densely sharply dentate, apex rounded; sinus ca. 1/3 as long as leaf blade, broad. Middle stem leaves similar but smaller. Distal stem leaves reduced. Synflorescence racemose, 15–34 cm; leaflike bracts filiform; peduncles 1–1.5 cm. Capitula numerous; supplementary bracts subulate. Involucre campanulate to broadly turbinate, 7–8 × 6–7 mm, outside glabrous; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, 2–4 mm wide, apex acute or triangular; inner phyllaries membranous at margin. Ray florets 5 or 6, yellow; lamina oblong, 7–9 × 3–4 mm, apex rounded. Tubular florets numerous, 6–7 mm; tube 2.5–3 mm. Pappus white, as long as tubular corolla. Fl. Jul–Sep.

• Grassy slopes, forest understories; 1600–2100 m. W Hubei, E Sichuan.

99. Ligularia atkinsonii (C. B. Clarke) S. W. Liu, Acta Biol. Plateau Sin. 7: 31. 1988.

亚东橐吾 ya dong tuo wu

Senecio atkinsonii C. B. Clarke, Compos. Ind. 207. 1876; *S. cacaliifolius* Schultz Bipontinus var. *atkinsonii* (C. B. Clarke) Franchet; *S. ligularia* J. D. Hooker var. *atkinsonii* (C. B. Clarke) J. D. Hooker.

Stem erect, 60–83 cm tall, 5–9 mm in diam. at base, proximally glabrous, distally and synflorescence shortly brown pilose and white puberulent. Basal leaves petiolate; petiole 38–45 cm, slender, glabrous, base narrowly sheathed; leaf blade abaxially pale green, adaxially dark green, reniform or cordate-ovate, 7–11 × 8–16 cm, abaxially shortly pilose along veins, adaxially glabrous, palmately veined, base broadly cordate or sagittate, margin irregularly triangularly dentate and ciliate, apex rounded; sinus ca. 1/3 as long as leaf blade. Middle to distal stem leaves similar but smaller, petiolate; petiole to 12 cm; sheath ca. 7 × 1 cm. Synflorescence racemose, 9–30 cm; leaflike bracts linear, shorter than peduncle or proximal ones linear-lanceolate, longer; peduncles 5–11 mm, equal or proximal peduncles longer. Capitula numerous; supplementary bracts linear, as long as involucre. Involucre campanulate, 7–11 × ca. 5(–7) mm, outside glabrous; phyllaries 8 or 9, in 2 rows, oblong or lanceolate, 1.5–2.5 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina narrowly oblong, 8–10 × ca. 2 mm, apex rounded or subtruncate. Tubular florets 10–13, 6–7 mm; tube 2–3 mm; limb to 2 mm wide. Pappus white, slightly shorter than tubular corolla. Fl. Jun–Jul.

Stream banks, forest understories; 3000–3500 m. S Xizang [Bhutan, India (Sikkim)].

100. Ligularia pubifolia S. W. Liu, Acta Biol. Plateau Sin. 7: 32. 1988.

毛叶橐吾 mao ye tuo wu

Stem erect, to 100 cm tall, 5–6 mm in diam. at base, proximally glabrous, distally shortly pilose. Basal leaves petiolate; petiole 20–29 cm, slender, glabrous, base sheathed; leaf blade reniform, 4.5–5.5 × 6–10 cm, abaxially densely shortly white pilose, adaxially glabrous, palmately veined, margin triangular-dentate, apex obtuse or rounded; sinus ca. 3/5 as long as leaf blade, broad. Stem leaves 2 or 3, petiolate and sheathed; sheath enlarged, 4–8 × 2.5–4 cm, conspicuously parallel-veined and shortly white pilose, margin entire; petiole 1–9 cm, slender; leaf blade reniform, smaller than basal leaves, abaxially shortly white pilose, adaxially glabrous, apex acute. Synflorescence racemose, 30–35 cm, with 1 or 2 branches at base; leaflike bracts ovate-lanceolate, 2.5–4 × 1–1.3 cm, denticulate, smaller distally, linear; peduncles 3–35 mm, shortly pilose. Capitula numerous; supplementary bracts linear. Involucre campanulate, 6–9 × 5–8 mm, outside shortly pilose, base subtruncate; phyllaries 12 or 13, in 2 rows, oblong, 1.5–2.5 mm wide, margin brown membranous, apex acute or acuminate. Ray florets yellow; lamina linear-oblong, 8–9 × ca. 1 mm; tube ca. 4 mm. Tubular florets numerous, 7–8 mm; limb campanulate, as long as tube. Achenes cylindric, ca. 5 mm. Pappus pale yellowish brown, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Alpine scrub; ca. 3600 m. Xizang (Bomi).

101. Ligularia phyllocolea Handel-Mazzetti, Bot. Jahrb. Syst. 69: 138. 1938.

叶状鞘橐吾 ye zhuang qiao tuo wu

Ligularia longipes C. C. Chang.

Stem erect, 100–120 cm tall, 1–1.2 cm in diam. at base, densely shortly brown pilose. Basal leaves petiolate; petiole to 63 cm, slender, glabrous, middle to distal half entirely winged, base sheathed; leaf blade ovate-cordate, 18–40 × 16–30 cm, glabrous or abaxially sparsely arachnoid-puberulent, palmately veined, base cordate, margin densely sharply dentate, apex acute or obtuse. Middle stem leaves similar but smaller, shortly petiolate and winged; wing margin entire, undulate; sheath much enlarged, to 6 × ca. 3 cm, margin laciniate-dentate or sometimes entire. Distalmost stem leaves sessile; sheath enlarged, suborbicular, margin laciniate-dentate; leaf blade ovate, ca. 3 cm, margin laciniate-dentate. Synflorescence racemose, to 65 cm; leaflike bracts ovate-lanceolate to linear-lanceolate, proximal ones to 6.5 cm, smaller distally, margin laciniate-dentate or entire, apex acuminate; peduncles 3–15 mm, slender, densely shortly yellowish brown pilose. Capitula numerous; supplementary bracts linear-lanceolate. Involucre narrowly campanulate, 1–1.4 cm × ca. 5 mm, outside glabrous; phyllaries 6–8, in 2 rows, oblong, 2–3 mm wide, apex acuminate; inner phyllaries membranous at margin. Ray florets 4–6, yellow; lamina linear-oblong, 1–1.8 cm × 2–3 mm, apex obtuse; tube 7–9 mm. Tubular florets numerous, 1.1–1.3 cm, extending from involucre; tube 6–8 mm, slender. Pappus yellow, ca. 4 mm, ca. 1/2 as long as tube of tubular corolla. Fl. and fr. Aug–Sep.

Stream banks, forests; 2100–3400 m. W Yunnan [E Myanmar].

102. Ligularia changiana S. W. Liu ex Y. L. Chen & Z. Yu Li in W. T. Wang et al., Vasc. Pl. Hengduan Mts. 2: 2071. 1994.

长毛橐吾 chang mao tuo wu

Ligularia heterophylla C. C. Chang, Acta Phytotax. Sin. 1: 314. 1951, not Ruprecht (1869); *L. phyllocolea* Handel-Mazzetti var. *villosa* Handel-Mazzetti; *L. villosa* (Handel-Mazzetti) S. W. Liu (1988), not Ecklon & Zeyher (1834–1835).

Stem erect, 74–125 cm tall, 4–8 mm in diam. at base, densely reddish brown pilose. Basal leaves petiolate; petiole 22–30 cm, densely reddish brown pilose, base narrowly sheathed; leaf blade hastate or triangular-hastate, 6–18 × 10–18 cm, abaxially densely brown pilose, adaxially deciduously shortly scabrous-pilose, palmately veined, margin irregularly dentate, apex acute or subrounded; sinus ca. 1/3 as long as leaf blade, broad; basal lobes suborbicular, slightly divergent. Middle stem leaves numerous, dense, shortly petiolate; sheath enlarged, densely reddish brown pilose; leaf blade triangular-cordate, 5.5–11 × 7.5–12 cm, margin denticulate, apex acuminate; sinus broad, basal lobes divergent. Distal stem leaves sessile, ovate, abaxially brown pilose, adaxially scabrous, base semiamplexicaul. Synflorescence racemose, 22–45 cm, reddish brown pilose; leaflike bracts ovate to lanceolate, 8–30 mm, proximal ones larger, sessile, distal ones smaller, shortly petiolate; peduncles to 1 cm. Capitula numerous; supplementary bracts linear-lanceolate. Involucre narrowly campanulate, 7–12 × 3–5 mm, outside glabrous; phyllaries 6–8, in 2 rows, oblong or narrowly oblong, 1.5–2.5 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets 2 or 3, yellow; lamina oblanceolate, 1–1.2 cm × 3–4 mm, apex obtuse; tube 5–6 mm. Tubular florets numerous, 1–1.1 cm; tube 5–6 mm. Pappus yellow, as long as or slightly shorter than tube of tubular corolla. Fl. Jul–Aug.

• Alpine meadows; 2900–3100 m. W Yunnan.

103. Ligularia latihastata (W. W. Smith) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 101. 1923.

宽戟橐吾 kuan ji tuo wu

Senecio latihastatus W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 116. 1913; *Ligularia brachyphylla* Handel-Mazzetti; *Senecillis latihastata* (W. W. Smith) Kitamura.

Stem erect, 35–60 cm tall, 3.5–5 mm in diam. at base, proximally glabrous, distally and synflorescence white puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole 15–35 cm, glabrous, base narrowly sheathed, distally narrowly winged; leaf blade broadly hastate or triangular-hastate, 4–11 × 9–15 cm, glabrous, palmately veined, margin regularly dentate, apex rounded or triangular-acute; sinus broad; basal lobes divergent, 2.5–5 cm, outer margin coarsely dentate. Middle stem leaves petiolate or sessile; sheath enlarged, to 7 cm, margin dentate or rarely entire; leaf blade smaller, triangular- or cordate-hastate. Distal stem leaves sheathlike, broadly ovate to ovate-lanceolate, margin dentate. Synflorescence racemose, 10–30 cm, clustered or lax; leaflike bracts ovate to lanceolate, proximal ones to 5 cm, smaller upward, margin dentate, apex acute; peduncles to 1.3 cm. Capitula 7–24; supplementary bracts narrowly lanceolate, margin dentate. Involucre broadly

campanulate, 9–11 × 8–12 mm, outside glabrous; phyllaries 8–10, in 2 rows, oblong, 3–5 mm wide, apex triangular-acute, mucronate; inner phyllaries broadly brown membranous at margin. Ray florets yellow; lamina linear-oblong or linear-lanceolate to linear, 2.5–4 cm × 2–5 mm, apex acute or acuminate; tube ca. 7 mm. Tubular florets numerous, 1–1.2 cm, extending from involucre; tube 6–7 mm. Achenes cylindric, ca. 6 mm. Pappus pale brown or reddish brown in fruit, as long as tube of tubular corolla. Fl. and fr. Jul–Oct. $2n = 58$*.

• Stream banks, grassy areas in swamps, forest understories, grasslands; 2400–4000 m. SW Sichuan (Muli), NW Yunnan.

104. Ligularia caloxantha (Diels) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 101. 1923.

黄亮橐吾 huang liang tuo wu

Senecio caloxanthus Diels, Notes Roy. Bot. Gard. Edinburgh 5: 194. 1912; *Senecillis caloxantha* (Diels) Kitamura.

Stem erect, 40–115 cm tall, 4–6 mm in diam. at base, proximally glabrous, distally and synflorescence shortly yellow pilose. Basal leaves petiolate; petiole to 45 cm, glabrous, base sheathed, distally narrowly winged; leaf blade triangular- or ovate-cordate, (4.5–)6–14 × (3.5–)8–18 cm, glabrous, palmately veined, base cordate, margin regularly dentate, apex obtuse or acute; sinus ca. 1/3 as long as leaf blade; basal lobes slightly divergent, oblong, outer margin coarsely dentate. Middle stem leaves petiolate or sessile, small; petiole winged; sheath enlarged, tubular or leaflike, suborbicular, base sometimes auriculate, margin dentate; leaf blade ovate-triangular or triangular, to 9 × 11 cm. Distal stem leaves sessile, ovate or orbicular. Synflorescence racemose, 9–30 cm, lax; leaflike bracts ovate-lanceolate, proximal ones to 4 × 3 cm, smaller distally, margin dentate, apex acuminate; peduncles erect, 5–10 mm, slender, sometimes proximal ones to 8 cm. Capitula 10–25; supplementary bracts narrowly lanceolate, margin dentate. Involucre broadly campanulate, 9–11 × 5–9 mm, outside glabrous; phyllaries 8–10, in 2 rows, oblong, 2–4 mm wide, apex triangular-acute; inner phyllaries broadly brown membranous at margin. Ray florets yellow; lamina oblanceolate, 1.2–2 cm × 3–6 mm, apex obtuse; tube 5–6 mm. Tubular florets numerous, 1–1.1 cm; tube ca. 5 mm. Achenes brown, oblong, 5–6 mm. Pappus pale yellow, as long as tube of tubular corolla. Fl. Jul–Oct.

• Stream banks, grassy slopes, alpine grasslands at montane summits; 1600–4000 m. S Sichuan, NE to NW Yunnan.

105. Ligularia odontomanes Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 12. 1925.

马蹄叶橐吾 ma ti ye tuo wu

Plants long yellowish red pilose. Stem erect, to 60 cm tall, ca. 3 mm in diam. at base. Basal leaves petiolate; petiole 7–16 cm, slender, long yellowish red pilose, base narrowly sheathed; leaf blade horseshoe-shaped, 3–20 × 4–9 cm, abaxially densely hairy, adaxially glabrous or sparsely hairy, palmately veined, base deeply cordate, margin regularly dentate and ciliate, apex rounded, triangular-mucronate; sinus ca. 1/2 as long as leaf blade, narrow; basal lobes not divergent, margin laciniate-dentate. Middle to distal stem leaves sessile; sheath enlarged, cymbiform or suborbicular, amplexicaul, margin dentate; leaf blade triangular-reniform, 3–4 cm, to 6 cm wide, apex acute. Synflorescence racemose, short, clustered; leaflike bracts ovate, 1.5–1.8 × ca. 1 cm, margin laciniate-dentate and ciliate; peduncles 3–12 mm. Capitula 5–10; supplementary bracts narrowly ovate, longer than involucre, shortly petiolate, margin laciniate-dentate and ciliate. Involucre narrowly campanulate, ca. 10 × 5 mm, outside glabrous; phyllaries 7 or 8, in 2 rows, narrowly oblong, 2–3 mm wide, apex triangular-acute; inner phyllaries membranous at margin. Ray florets 5, yellow; lamina linear-oblong, 1.3–2 cm × ca. 4 mm, apex obtuse; tube ca. 6 mm. Tubular florets numerous, 11–11.5 mm; tube 5–6 mm. Pappus reddish yellow, ca. 5 mm, shorter than tube of tubular corolla. Fl. Jul–Aug.

• Forest margins, grassy slopes; 2500–2800 m. S Sichuan.

106. Ligularia fischeri (Ledebour) Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 11: 95. 1838.

蹄叶橐吾 ti ye tuo wu

Cineraria fischeri Ledebour, Index Sem. Horti Dorpat. 1820: 17. 1820; *C. speciosa* Schrader ex Link; *Hoppea speciosa* (Schrader ex Link) Reichenbach; *Ligularia sibirica* (Linnaeus) Cassini var. *speciosa* (Schrader ex Link) Candolle; *L. speciosa* (Schrader ex Link) Fischer & C. A. Meyer; ?*L. splendens* (H. Léveillé & Vaniot) Nakai; *Senecillis fischeri* (Ledebour) Kitamura; *Senecio cacaliifolius* Schultz Bipontinus var. *speciosus* (Schrader ex Link) Franchet; ?*S. splendens* H. Léveillé & Vaniot.

Stem erect, 80–200 cm tall, 5–10 mm in diam. at base, proximally glabrous or shortly yellowish brown pilose, distally and synflorescence densely shortly yellowish brown pilose. Basal leaves petiolate; petiole 18–59 cm, shortly brown pilose, base sheathed; leaf blade abaxially pale green, adaxially green, reniform, 8–30 × 13–40 cm, abaxially shortly brown pilose, adaxially glabrous, palmately veined, with 5–7 prominent principal veins, margin regularly dentate, apex rounded, sometimes mucronate; sinus ca. 1/3 as long as leaf blade, broad; basal lobes suborbicular, not divergent. Middle to distal stem leaves shortly petiolate; sheath enlarged; leaf blade reniform, 4.5–5.5 × 5–6 cm. Synflorescence racemose, 27–75 cm; proximal leaflike bracts ovate or ovate-lanceolate, to 6 × 2 cm, smaller distally, herbaceous, margin dentate, apex mucronate; distal leaflike bracts lanceolate; peduncles: proximal ones to 9 cm, smaller distally, slender. Capitula numerous; supplementary bracts narrowly lanceolate to linear. Involucre campanulate, 7–20 × 5–14 mm, outside shortly brown pilose; phyllaries 8–14, in 2 rows, oblong, 3–5 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets 5–9, yellow; lamina oblong, 1.5–2.5 cm × to 6 mm wide, apex obtuse; tube 5–11 mm. Tubular florets numerous, 8–17 mm; tube 5–9 mm. Achenes dark brown, fusiform-cylindric, 6–8 mm. Pappus yellowish brown, shorter than tubular corolla. Fl. and fr. Jul–Oct, $2n = 60$.

Stream banks, swamp meadows, grassy slopes, scrub, forest margins; below 2500 m. Anhui, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Shaanxi, Sichuan, Zhejiang [Bhutan, India, Japan, Kashmir, Korea, Mongolia, Myanmar, Nepal, Russia (Far East, E Siberia)].

One of us (Illarionova) treats *Ligularia splendens* (syn. *Senecio splendens*) as a distinct species. *Ligularia splendens* is similar to *L. fischeri* but differs in having leaflike bracts ovate around the whole synflorescence and glabrous phyllaries. According to Illarionova, *Ligularia fischeri* is distributed only in NE China (Heilongjiang, Jilin, Nei Mongol), Mongolia, and Russia (Far East, E Siberia).

107. Ligularia chekiangensis Kitamura, J. Jap. Bot. 21: 53. 1947.

浙江橐吾 zhe jiang tuo wu

Stem erect, to 100 cm tall, distally shortly pilose. Basal leaves petiolate; petiole to 21 cm, shortly pilose, base narrowly sheathed; leaf blade abaxially pale green, adaxially green, cordate, ca. 8.5 × 13 cm, abaxially shortly pilose along veins, margin mucronate-dentate. Proximal stem leaves petiolate; petiole to 21 cm; leaf blade cordate, to 18 cm, base cordate-sagittate. Middle to distal stem leaves small, shortly petiolate; leaf blade reniform-cordate. Distalmost stem leaves bracteal, lanceolate. Synflorescence racemose, narrow; leaflike bracts lanceolate; peduncles shorter. Capitula numerous. Involucre tubular, ca. 1.6 × 1.2–1.4 cm; phyllaries 8, in 2 rows, lanceolate, apex densely ciliate. Florets 27 or 28, all tubular, 1.4–1.7 cm; tube 6.5–9 mm. Pappus dirty brown, to 9 mm, as long as tube of tubular corolla. Fl. and fr. unknown.

• Forest understories, grassy slopes; ca. 1100 m. ?Anhui, Zhejiang (W Tianmu Shan).

108. Ligularia anoleuca Handel-Mazzetti, Bot. Jahrb. Syst. 69: 136. 1938.

白序橐吾 bai xu tuo wu

Stem erect, to 90 cm tall, to 1.2 cm in diam. at base, proximally glabrescent, distally and synflorescence densely white arachnoid-puberulent. Basal leaves petiolate; petiole to 36 cm, white arachnoid-puberulent, base narrowly sheathed, not winged or distally narrowly winged; wing margin dentate; leaf blade reniform, 13–14 × 17.5–20 cm, abaxially sparsely arachnoid-puberulent along veins, adaxially glabrous, palmately veined, with 9 principal veins, abaxially conspicuously prominent, margin minutely sharply dentate, apex rounded or obtuse; sinus ca. 1/3 as long as leaf blade, broad; basal lobes suborbicular, outer margin coarsely dentate. Middle to distal stem leaves similar but smaller, shortly winged petiolate; wing margin dentate; sheath enlarged, 3–5 cm, margin entire or dentate. Synflorescence racemose, 15–20 cm, distally clustered, proximally lax; leaflike bracts spatulate, proximal ones to 6 cm, smaller distally, submembranous, shortly petiolate, margin dentate, apex acuminate; peduncles: proximal ones to 6 cm, smaller distally, slender. Capitula numerous; supplementary bracts narrowly lanceolate, as long as or slightly longer than involucre. Involucre broadly campanulate, 1–1.5 × 1.5–2 cm, outside shortly pilose; phyllaries 10–14, in 2 rows, oblong, 3–4 mm wide, apex broadly triangular; inner phyllaries broadly brown membranous at margin. Ray florets 5 or 6, yellow; lamina linear, 1.5–2 cm × ca. 2 mm, apex obtuse; tube 6–7 mm. Tubular florets numerous, 1–1.2 cm, extending from involucre; tube 6–7 mm. Pappus yellow, as long as tubular corolla. Fl. Aug.

• Grassy slopes; 3400–3500 m. NW Yunnan.

109. Ligularia sachalinensis Nakai, J. Jap. Bot. 20: 140. 1944.

黑龙江橐吾 hei long jiang tuo wu

Ligularia fischeri (Ledebour) Turczaninow f. *diabolica* Kitamura.

Stem erect, 60–150 cm tall, 4–7 mm in diam. at base, distally and synflorescence shortly yellowish brown pilose, sometimes intermixed white arachnoid-puberulent. Basal leaves petiolate; petiole 9–53 cm, shortly yellowish brown pilose, base sheathed; leaf blade reniform or reniform-cordate, 3–30 × 5–45 cm, abaxially densely shortly yellowish brown pilose or hairy only along veins, adaxially glabrous, palmately veined, margin regularly dentate, apex rounded or acute; sinus 1/5–1/4 as long as leaf blade, broad; basal lobes oblong or suborbicular, divergent, outer margin coarsely dentate. Middle to distal stem leaves similar but smaller, shortly petiolate to sessile; sheath enlarged, shortly yellowish brown pilose, margin entire. Synflorescence racemose, 8–35 cm; proximalmost leaflike bracts (2–5 at base of synflorescence) ovate, distal ones lanceolate to linear, 9–25 × to 15 mm, herbaceous, margin dentate and ciliate, apex acuminate; peduncles 2–12 cm, smaller distally. Capitula numerous; supplementary bracts linear. Involucre campanulate, 1–1.1 cm × 5–7 mm, outside shortly yellowish brown pilose; phyllaries 6–8, in 2 rows, oblong, 2–3 mm wide, apex triangular; inner phyllaries membranous at margin. Ray florets 2–6, yellow; lamina oblong, 1.2–1.8 cm × 2–4 mm, apex rounded or acute. Tubular florets numerous, 1–1.1 cm; tube 5–6 mm. Achenes dark brown, fusiform-cylindric, 5–8 mm. Pappus yellowish brown, shorter than tubular corolla. Fl. Jul–Aug.

Grassy slopes, meadows, swamp meadows, scrub, forest margins; below 1200 m. Heilongjiang [Russia (Far East)].

110. Ligularia veitchiana (Hemsley) Greenman in L. H. Bailey, Stand. Cycl. Hort. 6: 3153. 1917.

离舌橐吾 li she tuo wu

Senecio veitchianus Hemsley, Gard. Chron., ser. 3, 38: 212. 1905; *Senecillis veitchiana* (Hemsley) Kitamura.

Stem erect, 60–200 cm tall, 4–9 mm in diam. at base, proximally glabrous, distally and synflorescence white arachnoid-puberulent and shortly yellowish brown pilose, later white arachnoid hairs deciduous. Basal leaves petiolate; petiole 15–104 cm, solid, base narrowly sheathed; leaf blade triangular- or ovate-cordate, sometimes subreniform, 7–24 × 12–35 cm, glabrous, or abaxially shortly white pilose along veins, palmately veined, base subhastate, margin regularly sharply dentate, apex rounded or obtuse; sinus ca. 1/3 as long as leaf blade, broad; basal lobes oblong or suborbicular, divergent. Middle to distal stem leaves similar but smaller, shortly petiolate to sessile; sheath enlarged, margin entire. Synflorescence racemose, 13–40 cm; leaflike bracts at middle of peduncle, surrounding involucre, pale reddish brown when dry, broadly ovate to ovate-lanceolate, 8–30 × to 20 mm, smaller distally, submembranous, glabrous, margin entire or middle to distal half dentate, apex long acuminate; peduncles 5–35 mm. Capitula numerous; supplementary bracts narrowly lanceolate to linear. Involucre campanulate or tubular-campanulate, 8–10(–15) × 5–8 mm, outside shortly pilose; phyllaries 7–9, in 2 rows, oblong, 2–3 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets

6–10, yellow; lamina narrowly oblanceolate, 1.3–2.5 cm × ca. 2 mm, apex rounded; tube 5–11 mm. Tubular florets numerous, 9–15 mm; tube 5–8 mm. Pappus yellowish white, sometimes dirty white, ca. 1/2 as long as or equal to tube of tubular corolla. Fl. Jul–Sep, fr. Aug–Sep.

• Stream banks, grassy slopes, forest understories; 1100–3300 m. SW Gansu, Guizhou, ?Henan, W Hubei, S Shaanxi, Sichuan, NW Yunnan.

111. Ligularia ianthochaeta C. C. Chang, Acta Phytotax. Sin. 1: 321. 1950.

岷县橐吾 min xian tuo wu

Stem erect, to 45 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose. Basal leaves petiolate; petiole purplish red, ca. 13 cm × 1.5 mm, shortly pilose, base narrowly sheathed; leaf blade orbicular-cordate or subreniform, 8–8.5 × 7–8.5 cm, glabrous, palmately veined, margin coarsely dentate, apex rounded or truncate; sinus 1/3–1/2 as long as leaf blade, broad. Stem leaves similar but smaller, shortly petiolate. Distalmost stem leaves ovate, margin entire. Synflorescence racemose, ca. 6 cm, proximally branched; leaflike bracts lanceolate, shortly pilose; peduncles to 2.5 cm, shortly purplish red pilose. Capitula few; supplementary bracts narrowly lanceolate to linear, ca. 5 mm. Involucre campanulate, ca. 1 cm, outside shortly pilose; phyllaries 6–9, in 2 rows, 1.5–2.5 mm wide, apex triangular; inner phyllaries broadly membranous at margin. Florets 8, all tubular, 6–7 mm, higher than involucre; tube as long as limb. Achenes (immature) cylindric. Pappus yellowish brown, as long as tube of tubular corolla. Fl. Jul.

• Grassy slopes; ca. 2400 m. Gansu (Minxian).

112. Ligularia intermedia Nakai, Bot. Mag. (Tokyo) 31: 125. 1917.

狭苞橐吾 xia bao tuo wu

Ligularia intermedia var. *oligantha* Nakai; *L. sibirica* (Linnaeus) Cassini subsp. *intermedia* (Nakai) Kitamura; *L. sinica* Kitagawa; *Senecillis intermedia* (Nakai) Kitamura.

Stem erect, to 100 cm tall, to 1 cm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 16–43 cm, glabrous, base narrowly sheathed; leaf blade cordate or reniform, 8–16 × 12–23.5 cm, glabrous, palmately veined, margin regularly sharply triangular-dentate, apex obtuse or mucronate; sinus ca. 1/3 as long as leaf blade, broad. Middle to distal stem leaves similar but smaller, shortly petiolate or sessile; sheath slightly enlarged. Distalmost stem leaves bracteal, ovate-lanceolate. Synflorescence racemose, 22–25 cm; leaflike bracts linear or linear-lanceolate, proximal ones to 3 cm, smaller distally; peduncles 3–10 mm, glabrescent. Capitula numerous; supplementary bracts linear. Involucre campanulate, 8–11 × 4–5 mm, outside glabrous; phyllaries 6–8, in 2 rows, oblong, ca. 3 mm wide, margin membranous, apex triangular-acute. Ray florets 4–6, yellow; lamina oblong, 1.7–2 cm × ca. 3 mm, apex obtuse; tube ca. 7 mm. Tubular florets 7–12, extending from involucre, 1–1.1 cm; tube ca. 6 mm, base slightly thick. Achenes cylindric, 5–7 mm. Pappus purplish brown, sometimes white, shorter than tube of tubular corolla. Fl. and fr. Jul–Oct.

Stream banks, grassy slopes, forest understories, alpine meadows; 100–3400 m. Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, NE and NW Yunnan [Korea].

113. Ligularia hopeiensis Nakai, J. Jap. Bot. 16: 76. 1940.

河北橐吾 he bei tuo wu

Stem erect, to 100 cm tall, ca. 1 cm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose. Rosette of leaves early deciduous. Stem leaves 3, proximal leaves petiolate; petiole to 80 cm, base sheathed; leaf blade reniform, ca. 30 × 50 cm, palmately veined, margin dentate. Middle stem leaves with petiole to 37 cm; leaf blade reniform, ca. 7 × 15.5 cm, abaxially shortly pilose, adaxially glabrous, margin dentate. Distalmost stem leaves smaller; leaf blade ca. 3.7 × 6 cm. Synflorescence racemose, to 18 cm; leaflike bracts linear; peduncles 5–10 mm, shortly pilose. Capitula numerous. Involucre campanulate, ca. 1.3 cm, outside shortly pilose; phyllaries 7 or 8, in 2 rows, 1.5–2 mm wide, apex acute. Florets all tubular, 8 or 9; tube 4–5 mm. Achenes ca. 5 mm. Pappus early deciduous. Fl. and fr. unknown.

• Hebei (Xiaowutai Shan).

114. Ligularia chimiliensis C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 61. 1935.

缅甸橐吾 mian dian tuo wu

Ligularia pianmaensis Y. L. Chen ex T. L. Ming.

Stem erect, 25–70 cm tall, 3–5 mm in diam. at base, glabrescent. Basal leaves petiolate; petiole to 25.5 cm, slender, glabrous, base narrowly sheathed; leaf blade cordate-hastate or ovate-sagittate, rarely reniform, 4.2–11 × 8–10 cm, abaxially shortly pilose, adaxially glabrous, palmately veined, base broadly cordate, margin regularly coarsely dentate, apex acute or subrounded; sinus ca. 1/3 as long as leaf blade, broad; basal lobes orbicular or oblong. Middle stem leaves sessile, cordate, 4–7 × 5–9 cm, apex acute; sheath enlarged, 2–3 cm. Distalmost stem leaves only with enlarged sheaths. Synflorescence racemose, to 10 cm; leaflike bracts smaller distally, proximal ones lanceolate, to 4 cm, middle to distal ones linear; peduncles to 3 cm, shortly yellowish brown pilose. Capitula numerous; supplementary bracts linear, 6–10 mm. Involucre campanulate, 8–10 × 5–7 mm, outside glabrous; phyllaries 7–10, in 2 rows, oblong, 2–4 mm wide, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 8–10 × 2–6 mm, apex rounded, denticulate; tube 3.5–5 mm. Tubular florets 7–10 mm; tube 3.5–5 mm. Achenes cylindric, 5–6 mm. Pappus pale yellowish brown, as long as tube of tubular corolla. Fl. and fr. Aug.

Grassy slopes; ca. 3600 m. ?Xizang, W Yunnan [NE Myanmar].

Ligularia pianmaensis, according to the original description (Fl. Yunnan. 13: 833. 2004), is similar to *L. chimiliensis*, but differs in having fewer (7–9) capitula and ovate leaflike bracts 1–5.5 × 0.5–2.5 cm.

115. Ligularia longihastata Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 11. 1925.

长戟橐吾 chang ji tuo wu

Stem erect, to 56 cm tall, ca. 4 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent and shortly yellowish brown pilose. Basal leaves petiolate; petiole to 30 cm, glabrous, base sheathed, apically narrowly winged; leaf blade narrowly triangular-hastate or ovate-cordate, 4–8.5 × 5–9 cm, abaxially shortly yellowish brown pilose only along veins, adaxially shortly yellowish brown pilose, palmately veined, margin denticulate, rarely crenate, apex acuminate or acute, rarely retuse; sinus 1/4–1/3 as long as leaf blade, broad; basal lobes divergent. Middle stem leaves smaller, cordate-reniform, shortly petiolate; sheath slightly enlarged, to 6 cm. Distalmost stem leaves sessile, broadly triangular; sheath enlarged. Synflorescence racemose, to 7 cm; leaflike bracts linear-lanceolate; peduncles 7–15 mm, shortly yellowish brown pilose. Capitula numerous. Involucre campanulate, 1–1.2 cm × 7–9 mm, outside glabrous; phyllaries 8 or 9, in 2 rows, lanceolate, 2–4 mm wide, margin membranous, apex acuminate. Ray florets yellow; lamina linear, 1.5–2(–3) cm × 1.5–2 mm, apex 3-lobed; tube ca. 5 mm. Tubular florets ca. 9 mm; tube ca. 4 mm; limb ca. 2 mm wide. Pappus pale yellow, as long as tube of tubular corolla. Fl. Jul–Aug.

• Grassy slopes; 3400–3800 m. NW Yunnan.

116. Ligularia ruficoma (Franchet) Handel-Mazzetti, Bot. Jahrb. Syst. 69: 134. 1938.

节毛橐吾 jie mao tuo wu

Senecio ruficomus Franchet, Bull. Soc. Bot. France 39: 298. 1893; *Senecillis ruficoma* (Franchet) Kitamura.

Stem erect, 35–50(–75) cm tall, 3–4 mm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose. Basal leaves petiolate; petiole 8–15 cm, base sheathed, abaxially glabrous, adaxially shortly pilose; leaf blade triangular-sagittate or cordate, 3–10.5 × 4.5–9 cm, both surfaces shortly white pilose, later adaxial hairs deciduous, glabrescent, palmately veined, margin regularly denticulate, apex acute; sinus ca. 1/3 as long as leaf blade, broad; basal lobes short, slightly divergent, outer margin coarsely dentate. Middle stem leaf solitary, subsessile; sheath enlarged, 3–5 cm, margin entire; leaf blade ovate or ovate-cordate, 3–4 × 3.5–5 cm. Distalmost stem leaves sessile, bracteal, ovate-lanceolate. Synflorescence racemose, 7–13 cm; leaflike bracts linear, 1–1.5 cm, submembranous, shortly pilose, margin entire; peduncles 1.5–2.5 cm, shortly pilose. Capitula numerous; supplementary bracts linear. Involucre campanulate, 9–11 × 7–9 mm, outside shortly white pilose; phyllaries 7 or 8, in 2 rows, oblong or lanceolate, 2–3 mm wide, apex obtuse or acuminate; inner phyllaries brown membranous at margin. Ray florets 5 or 6, yellow; lamina linear, to 20 × 1.5 mm; tube 5–6 mm. Tubular florets 8–9 mm; tube as long as limb. Pappus yellowish brown, as long as tube of tubular corolla. Fl. Jul–Sep.

• Grassy slopes; 3500–4200 m. NW and W Yunnan.

117. Ligularia przewalskii (Maximowicz) Diels, Bot. Jahrb. Syst. 29: 621. 1901.

掌叶橐吾 zhang ye tuo wu

Senecio przewalskii Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 26: 493. 1880; *Senecillis przewalskii* (Maximowicz) Kitamura.

Stem erect, 30–130 cm tall, slender, 3–4 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 50 cm, glabrous, base sheathed; leaf blade ovate, 4.5–10 × 8–18 cm, glabrous or rarely shortly pilose on both surfaces, palmately veined, 4–7-palmatisect; lobes 3–7-divided, middle lobes duplicately 3-divided; segments marginally laciniate-dentate. Middle to distal stem leaves fewer, small, palmately divided, often with enlarged sheaths. Synflorescence racemose, 30–48(–60) cm; leaflike bracts linear-subulate; peduncles 3–4 mm, slender, glabrous. Capitula numerous (40–100); supplementary bracts often absent. Involucre narrowly cylindric, 7–11 × 2–3 mm, outside glabrous; phyllaries (3 or)4–6(or 7), in 2 rows, linear-oblong, ca. 2 mm wide, margin narrowly membranous, apex rounded, brown ciliate. Ray florets 2 or 3, yellow; lamina linear-oblong, to 17 × 2–3 mm, transparent, apex obtuse; tube 6–7 mm. Tubular florets usually 3, extending from involucre, 1–1.2 cm; tube as long as limb. Achenes brown, fusiform, 5–7 mm, attenuate at apex. Pappus purplish brown, ca. 4 mm, shorter than tube of tubular corolla. Fl. and fr. Jun–Oct. $2n = 58$*.

• Stream banks, grassy slopes, forest margins, forest understories, scrub; 1100–3700 m. Gansu, ?Henan, Jiangsu, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

Ligularia przewalskii is cultivated in Europe.

118. Ligularia qiaojiaensis Y. S. Chen & H. J. Dong, Nordic J. Bot. 28: 683. 2010.

巧家橐吾 qiao jia tuo wu

Stem erect, to 70 cm tall, ca. 3 mm in diam. at base, longitudinally angulate. Basal leaves petiolate; petiole 12–20 cm, glabrous, base sheathed; leaf blade abaxially pale green, adaxially green, cordate-orbicular, 7–24 × 8–25 cm, papery, abaxially glabrous, adaxially with sparse white glandular hairs, pinnately dissected. Stem leaves 3 or 4; petiole 5–23 cm, base enlarged, sheathing; upper leaves with smaller blades and shorter petioles. Synflorescence racemose, to 25 cm, densely covered with rust-colored glandular hairs; peduncles 0.3–1.2(–8) cm. Capitula 7–15; supplementary bracts subulate. Involucre green, turbinate, 8–10 mm in diam.; phyllaries 8 or 9, in 2 rows, equal in length, broadly oblong, ca. 1 cm × 2–3 mm, apex acute. Ray florets yellow, 4 or 5; lamina lanceolate, 16–18 × ca. 3 mm, apex acute and dentate; tube ca. 4 mm. Tubular florets 16–18; tube ca. 5 mm; limb campanulate, ca. 5 mm; lobes lanceolate, ca. 2 × 0.3 mm. Style ca. 12 mm; stigma brownish yellow. Achenes cylindric, ca. 5 × 0.6 mm, longitudinally ribbed, apex truncate. Pappus brown, 4–5 mm, as long as or shorter than tube of tubular corolla. Fl. Jul–early Aug.

• Wet grassy slopes along forest margins, alpine meadows along streams; 2700–3400 m. NE Yunnan (Dongchuan, Qiaojia).

The population size is very small at two known localities, so *Ligularia qiaojiaensis* should be categorized as "endangered" (Dong & Chen, Nordic J. Bot. 28: 683. 2010).

One of us (Illarionova) believes that *Ligularia qiaojiaensis* is an

occasional hybrid of *L. przewalskii* and some species from the same section.

119. Ligularia confertiflora C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 63. 1935.

密花橐吾 mi hua tuo wu

Stem erect, 60–100 cm tall, 5–10 mm in diam. at base, proximally glabrous, distally shortly yellowish brown pilose. Basal leaves petiolate; petiole 15–50 cm, glabrous, base sheathed; leaf blade ovate-cordate or reniform-cordate, 9.5–19 × 9–22 cm, both surfaces shortly pilose or abaxially hairy only along veins, palmately veined, margin irregularly dentate, apex triangular, obtuse; sinus ca. 1/3 as long as leaf blade, narrow; basal lobes 5–6 mm, coarsely dentate on outer margin, lowermost with larger teeth. Middle to distal stem leaves similar but smaller, shortly petiolate; sheath narrower, margin entire. Synflorescence racemose, lax, 15–35 cm; leaflike bracts narrowly lanceolate, margin entire or denticulate; peduncles to 5 mm, shortly yellowish brown pilose. Capitula numerous; supplementary bracts linear-lanceolate. Involucre narrowly cylindric, ca. 1 cm × to 4 mm, outside glabrous; phyllaries 5 or 6, in 2 rows, oblong, 2–3 mm wide, apex acute. Florets 5–14, all tubular, extending from involucre, 1–1.2 cm; tube 5.5–7 mm. Pappus pale yellow, 4–5 mm, as long as tube of tubular corolla. Fl. Aug–Oct.

● Grassy slopes, forest understories; 3200–3300 m. NW Yunnan.

120. Ligularia stenocephala (Maximowicz) Matsumura & Koidzumi, Bot. Mag. (Tokyo) 24: 149. 1910.

窄头橐吾 zhai tou tuo wu

Stem erect, 40–170 cm tall, 3–6 mm in diam. at base, rarely to 2 cm in diam., glabrous. Basal leaves petiolate; petiole 23–75 cm, slender, glabrous or apically arachnoid-puberulent, base narrowly sheathed; leaf blade cordate-hastate or reniform-hastate, rarely sagittate, 2.5–16.5 × 6–32 cm, glabrous or shortly pilose on both surfaces, abaxially sometimes hairy only along veins, palmately veined, base broadly cordate, margin regularly sharply dentate, apex triangular, acute or shortly mucronate; sinus 1/5–1/3 as long as leaf blade, broad; basal lobes sharply triangular, divergent, margin sharply dentate and 1- or 2-dentate on each outer margin. Middle to distal stem leaves similar but smaller, shortly petiolate or sessile; sheath enlarged. Synflorescence racemose, to 90 cm, glabrescent; leaflike bracts ovate-lanceolate to linear, proximal ones to 5 cm, distal ones linear, shorter; peduncles 1–7 mm, rarely proximal ones to 3 cm. Capitula numerous; supplementary bracts linear. Involucre narrowly or broadly cylindric, 8–12 × 2–4 mm, rarely to 17–18 × ca. 8 mm, outside glabrous; phyllaries 5(–7), in 2 rows, oblong, 1.5–3(–6) mm wide, apex triangular, acute; inner phyllaries membranous at margin. Ray florets 1–4(or 5), yellow; lamina linear-oblong or oblanceolate, 1–1.7 cm × 2–4 mm, apex obtuse; tube 5–13 mm. Tubular florets 5–10, 1–1.9 cm; tube 6–13 mm. Achenes fusiform, 5–7 mm. Pappus white, yellowish white, or sometimes brown, 5–8 mm, shorter than tube of tubular corolla. Fl. and fr. Jul–Dec. $2n = 60$.

Stream banks, grassy slopes, forest understories, at base of rocks, on trees; 900–3300 m. Anhui, ?Fujian, Guangdong, Guangxi, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, NW Yunnan, Zhejiang [Japan].

There are three different populations with differing involucre widths:

1) Narrow-involucre population: Plants large; leaves to 28.5 cm wide; involucre narrowly cylindric, 8–12 × 2–3 mm, phyllaries 5. Anhui, Jiangsu, Taiwan, Zhejiang [Japan].

2) Broad-involucre population: Plants robust, taller; leaves to 32 cm wide; raceme to 90 cm; involucre broadly tubular, 17–18 × 5–8 mm, phyllaries 5(–7). Guangdong, Guangxi, Jiangxi, Zhejiang.

3) Mid-sized involucre population: between populations 1 and 2 in size. C, N, SW China. The plants of Xizang and Yunnan are the smallest.

1a. Leaves glabrous ..... 120a. var. *stenocephala*
1b. Leaves shortly pilose on both surfaces, tip of petiole arachnoid-puberulent ..... 120b. var. *scabrida*

120a. Ligularia stenocephala var. **stenocephala**

窄头橐吾(原变种) zhai tou tuo wu (yuan bian zhong)

Senecio stenocephalus Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 16: 218. 1871; *Cacalia subglabra* C. C. Chang; *Ligularia oligantha* (Miquel) Handel-Mazzetti; *L. sibirica* (Linnaeus) Cassini var. *oligantha* Miquel; *L. sibirica* var. *stenocephala* (Maximowicz) Diels [*"stenoloba"*]; *L. stenocephala* f. *longipedicellata* Y. Ling; *L. stenocephala* f. *quinquebracteata* Yamamoto; *Parasenecio subglaber* (C. C. Chang) Y. L. Chen; *Senecillis stenocephala* (Maximowicz) Kitamura; *Senecio cacaliifolius* Schultz Bipontinus var. *stenocephalus* (Maximowicz) Franchet.

Leaves glabrous on both surfaces.

Stream banks, grassy slopes, forest understories, at base of rocks; 900–3300 m. Anhui, Guangdong, Guangxi, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, NW Yunnan, Zhejiang [Japan].

120b. Ligularia stenocephala var. **scabrida** Koidzumi, Bot. Mag. (Tokyo) 24: 264. 1910.

糙叶窄头橐吾 cao ye zhai tou tuo wu

Leaves shortly pilose on both surfaces, tip of petiole arachnoid-puberulent.

Grassy slopes, forest understories, on trees; 2000–3300 m. Guangxi, SW Sichuan, NW Yunnan [Japan].

121. Ligularia dolichobotrys Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 107. 1905.

太白山橐吾 tai bai shan tuo wu

Senecillis dolichobotrys (Diels) Kitamura.

Stem erect, 20–80 cm tall, 2–3 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 15 cm, slender, glabrous, base narrowly sheathed; leaf blade cordate-hastate, 3–11 × 7–14 cm, glabrous, abaxially sometimes hairy only along veins, palmately veined, margin irregularly dentate, apex

rounded, mucronate; sinus ca. 1/3 as long as leaf blade, broad; basal lobes divergent, with a coarse triangular tooth on each outer margin. Middle stem leaves reniform, 4–6 × 5.5–11.5 cm, shortly petiolate; sheath enlarged. Distalmost stem leaves smaller, sessile. Synflorescence racemose, to 15 cm; leaflike and supplementary bracts subulate, 2–3 mm; peduncles 1.5–2 mm, shortly pilose or glabrous. Capitula numerous. Involucre narrowly cylindric, 6–7 × ca. 2 mm, outside glabrous; phyllaries 4 or 5, in 2 rows, narrowly oblong, ca. 1.5 mm wide, apex obtuse, purplish brown; inner phyllaries membranous at margin. Ray florets 2 or 3, yellow; lamina oblong or narrowly oblanceolate, to 1 cm × 2–3 mm, apex rounded; tube ca. 5 mm. Tubular florets 2 or 3, 9–12 mm; tube 3–4 mm. Achenes narrowly cylindric, ca. 4 mm. Pappus brown, as long as tube of tubular corolla. Fl. and fr. Jun–Aug. $2n = 58$*.

• Stream banks, grassy slopes, forest understories, at base of rocks; 2000–3300 m. ?Henan, S Shaanxi (Qin Ling).

122. Ligularia kojimae Kitamura, Acta Phytotax. Geobot. 3: 135. 1934.

台湾橐吾 tai wan tuo wu

Senecillis kojimae (Kitamura) Kitamura.

Stem erect, ca. 30 cm tall, slender, ca. 2.5 mm in diam. at base, proximally glabrous, distalmost and synflorescence sparsely white arachnoid-puberulent. Basal leaves petiolate; petiole to 10 cm, base sheathed; leaf blade abaxially pale green, reniform, 2.3–3 × ca. 3.5 cm, glabrous, margin regularly denticulate, apex rounded; sinus broad or narrow. Middle stem leaves 1 or 2, reniform; petiolar base enlarged, sheath amplexicaul. Synflorescence racemose; leaflike bracts lanceolate, 8–12 mm; peduncles to 9 mm. Capitula ca. 11. Involucre cylindric, ca. 10 × 4 mm; phyllaries 5, in 2 rows, linear, apex pubescent. Ray florets 2 or 3, yellow; lamina ca. 13 × 1.5 mm, apex 3-divided; tube ca. 7 mm. Tubular florets ca. 6, ca. 1.2 cm. Achenes (immature) truncate at apex, narrowed at base. Pappus ca. 4 mm. Fl. and fr. Aug–Oct.

• Alpine areas; ca. 3000 m. Taiwan (Xinzhu).

123. Ligularia fargesii (Franchet) Diels, Bot. Jahrb. Syst. 29: 621. 1901.

矢叶橐吾 shi ye tuo wu

Senecio fargesii Franchet, Bull. Soc. Bot. France 39: 300. 1893; *Senecillis fargesii* (Franchet) Kitamura.

Stem erect, 24–70 cm tall, slender, 1.5–3 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 30 cm, slender, glabrous, base sheathed; leaf blade ovate- or cordate-hastate, 3.5–8 × 5–6 cm, glabrous, margin denticulate, apex rounded, mucronate; sinus ca. 1/3 as long as leaf blade, narrow; basal lobes divergent, coarsely 2- or 3-dentate on each outer margin. Middle stem leaves similar but smaller, shortly petiolate, sheath amplexicaul. Synflorescence racemose, 4.5–9 cm; leaflike and supplementary bracts linear; peduncles less than 3 mm, shortly pilose. Capitula ca. 11. Involucre narrowly cylindric, 6–10 × 2–3 mm, outside glabrous; phyllaries 4 or 5, in 2 rows, oblong, apex triangular. Ray florets 2, yellow; lamina linear, ca. 15 × 1 mm, apex rounded; tube ca. 7 mm. Tubular florets ca. 3, 9–10 mm; tube ca. 4 mm. Achenes dark brown, cylindric, ca. 6 mm. Pappus white, rarely blackish gray, ca. 3 mm, shorter than tube of tubular corolla. Fl. and fr. Jul–Sep.

• Forest understories, grassy slopes, at base of rocks; 1400–2700 m. Chongqing, W Hubei, S Shaanxi, E Sichuan.

95. CREMANTHODIUM Bentham, Hooker's Icon. Pl. 12: 37. 1873.

垂头菊属 chui tou ju shu

Liu Shangwu (刘尚武); Irina D. Illarionova

Herbs, perennial. Rhizomes short, with rosette leaves, very rarely without rosette leaves. Roots fleshy, numerous. Stem arising from outer axil of rosette leaves, solitary, or 2- or 3-crowded, usually scapelike. Leaves all or many crowded and basal, petiolate; petiolar base broadly sheathed; leaf blade palmately, pinnately, or parallel veined. Stem leaves alternate, bracteal, with or without sheath. Capitula solitary or many in raceme, nodding; leaflike bracts linear, rarely broadly ovate or elliptic. Involucre hemispheric, rarely broadly campanulate, base rounded; phyllaries in 2 rows, imbricate, outer phyllaries narrow; inner phyllaries broad, often margin membranous, or phyllaries in 1 row, equal in size, base united; all phyllaries outside glabrous or hairy, apex ciliate. Receptacle flat, without scales. Outer florets female, radiate or rarely narrowly tubular; lamina well developed, diverse, usually several times as long as involucre, rarely absent. Central florets tubular, bisexual; limb 5-lobed. Anthers basally obtuse. Style branches compressed, apex obtuse or triangular, papillose-hairy. Achenes glabrous, ribbed. Pappus of denticulate hairs as long as or shorter than tubular corolla, rarely absent.

About 69 species: Bhutan, China, India, Kashmir, Myanmar, Nepal, Pakistan; 69 species (46 endemic) in China.

1a. Leaves reniform or orbicular-reniform, cordate-reniform, or hastate, palmately or palmate-pinnately veined.
2a. Capitula without ray florets; phyllaries apically rounded or obtuse.
3a. Phyllaries petaloid, membranous, purplish red or rarely yellowish white, broadly elliptic or obovate-oblong, outside purplish red pilose, rarely white pilose, apex rounded.
4a. Leaf margin regularly crenate or lobed ..... 1. *C. campanulatum*
4b. Leaves palmatisect ..... 2. *C. pinnatisectum*
3b. Phyllaries leaflike, herbaceous, dark brown, oblong or oblanceolate, outside glabrous or pilose, apex obtuse.

5a. Phyllaries oblong, margin broadly brown membranous, apex entire; pappus shorter than tubular corolla; leaves glabrous, abaxially pale green, adaxially dark green ..... 3. *C. calcicola*
5b. Phyllaries usually oblanceolate, margin not membranous, apex denticulate or erose; pappus as long as tubular corolla; leaves concolorous on both surfaces.
6a. Sheaths of stem leaves tubular, outside glabrous; phyllaries black, base shortly pilose, outside glabrous; pappus white ..... 4. *C. atrocapitatum*
6b. Sheaths of stem leaves cucullate, outside white arachnoid-puberulent; phyllaries outside glabrous; pappus yellowish brown ..... 5. *C. cucullatum*
2b. Capitula with ray florets; phyllaries apically acute or acuminate.
7a. Ray lamina yellow, oblong to lanceolate, apex acuminate, rarely obtuse.
8a. Ray lamina oblong, apex acute or obtuse.
9a. Leaves glabrous, with conspicuous white reticulate veins on both surfaces or at least abaxially; involucre outside initially shortly pilose, glabrescent; ray lamina apically obtuse ..... 6. *C. smithianum*
9b. Leaves abaxially brown pilose, without reticulate veins; involucre outside brown pilose; ray lamina apically acute ..... 7. *C. decaisnei*
8b. Ray lamina ovate- or linear-lanceolate, apex acuminate or caudate.
10a. Ray lamina linear-lanceolate, membranous, transparent; pappus as long as tubular corolla; leaves angular dentate ..... 8. *C. stenoglossum*
10b. Ray lamina ovate-lanceolate, not transparent; pappus shorter than to as long as tubular corolla; leaves crenate or coarsely dentate.
11a. Pappus brown, shorter than tubular corolla; leaves green on both surfaces, margin crenate ..... 9. *C. citriflorum*
11b. Pappus yellowish brown, as long as tubular corolla; leaves abaxially pale green, adaxially green, margin coarsely dentate ..... 10. *C. pulchrum*
7b. Ray lamina purplish red or yellow, broadly oblanceolate or cuneate, apex truncate or rounded, 3-lobed, rarely 3-denticulate.
12a. Ray lamina purple; pappus white.
13a. Leaves palmatipartite; tubular florets purplish red ..... 11. *C. palmatum*
13b. Leaf margin regularly crenate; tubular florets yellow or purplish red.
14a. Leaves abaxially densely white arachnoid-pilose; tubular florets yellow; styles proximally yellowish white, distally blackish gray, as long as tubular corolla ..... 12. *C. farreri*
14b. Leaves abaxially sparsely pilose; tubular florets purplish red, styles purplish red, 2–2.5 cm, longer than tubular corolla ..... 13. *C. rhodocephalum*
12b. Ray lamina yellow; pappus white or brown.
15a. Leaves cordate-reniform or hastate.
16a. Stem simple; leaves hastate, leaf margin usually entire or sparsely irregularly dentate; pappus as long as tubular corolla ..... 18. *C. forrestii*
16b. Stems several; leaves cordate-reniform to hastate, leaf margin dentate; pappus shorter than tubular corolla.
17a. Leaves cordate-reniform; involucre ca. 20 mm; pappus brown, ca. 4 mm, much shorter than tubular corolla ..... 19. *C. medogense*
17b. Leaves cordate-reniform to hastate; involucre 30–32 mm; pappus yellowish, 7–8 mm, slightly shorter than tubular corolla ..... 20. *C. latilobum*
15b. Leaves reniform or orbicular-reniform.
18a. Plants slender; leaves thin, margin angular dentate; ray lamina apically rounded, denticulate; pappus white ..... 14. *C. reniforme*
18b. Plants robust; leaves thick, margin regularly dentate; ray lamina apically truncate, 3- or 4-lobed.
19a. Stem leaves with bulbil inside sheaths; pappus white ..... 15. *C. bulbilliferum*
19b. Stem leaves without bulbil inside sheaths; pappus brown.
20a. Basal leaves glabrous; petiole glabrous or distally brown pilose; petiole of stem leaves enlarged into leaf blade, margin sharply dentate; pappus shorter than tubular corolla ..... 16. *C. phyllodineum*
20b. Basal leaves abaxially shortly black pilose along veins; petiole glabrous; petiole of stem leaves sheathlike, margin entire; pappus as long as tubular corolla ..... 17. *C. thomsonii*
1b. Leaves variable in shape, pinnately or parallel veined.
21a. Leaves bluish green or grayish green, linear to broadly elliptic, parallel or straight veined.
22a. Involucre outside densely brown or purplish brown pilose; leaves lanceolate to elliptic.
23a. Capitulum solitary, without ray florets ..... 21. *C. angustifolium*
23b. Capitula 1–13, in raceme or solitary, with ray florets; lamina membranous, transparent, linear-lanceolate, 25–70 × 1.5–5 mm, apex acuminate.
24a. Leaflike bracts linear to lanceolate, herbaceous, green ..... 22. *C. brunneopilosum*

24b. Leaflike bracts ovate, membranous, yellowish white ..... 23. *C. stenactinium*
22b. Involucre outside glabrous; leaves linear to oblanceolate.
25a. Ray lamina linear-lanceolate, to 4 cm, apex acuminate or absent; leaves linear to linear-lanceolate, usually 2–5 mm wide, rarely to 30 mm wide ..... 24. *C. lineare*
25b. Ray lamina oblong, elliptic, or oblanceolate, 12–16 × 3–6 mm, apex obtuse or truncate; leaves oblong or oblanceolate to linear, 2–11 mm wide.
26a. Leaves linear, 2–3.5 mm wide, margin revolute, entire, apex rounded ..... 25. *C. bhutanicum*
26b. Leaves oblong or oblanceolate, 6–11 mm wide, margin remotely denticulate, apex acute ..... 26. *C. conaense*
21b. Leaves green or differently colored on both surfaces, lanceolate to oblong, pinnately veined.
27a. Ray lamina broadly oblanceolate or cuneate, apex truncate, lobed.
28a. Leaves pinnatipartite to pinnatisect.
29a. Leaves ovate, lobes narrowly lanceolate, 10–30 × 1–4 mm; involucre glabrous ..... 27. *C. dissectum*
29b. Leaves oblong, lobes oblong, 4–8 × ca. 1 mm; involucre blackish pilose ..... 28. *C. pinnatifidum*
28b. Leaf margin entire or dentate, rarely lobed.
30a. Leaves spatulate, margin triangularly dentate or denticulate, base truncate; pappus white; stem densely white pilose ..... 29. *C. sino-oblongatum*
30b. Leaves hastate or ovate-cordate, margin entire to lobed or crenate, base cordate; pappus pale brown; stem glabrous ..... 30. *C. trilobum*
27b. Ray lamina elliptic or lanceolate to linear-lanceolate, apex acute or acuminate.
31a. Plants greenish gray or bluish green, glabrous, usually mealy; stem leaves numerous, erect, adnate, tubular-amplexicaul or only base amplexicaul.
32a. Leaflike bracts as leaf blade, usually surrounding involucre; ray lamina narrowly lanceolate, apex acuminate.
33a. Leaves ovate-elliptic to broadly elliptic, base cuneate ..... 31. *C. helianthus*
33b. Leaves narrowly elliptic or spatulate, base gradually narrowed ..... 32. *C. suave*
32b. Leaflike bracts linear, not surrounding involucre.
34a. Capitula 5–10, in raceme; ray lamina 5–7 mm, slightly longer than involucre; pappus pale yellow, 2–3 mm, ca. 1/2 as long as tubular corolla.
35a. Basal leaves broadly elliptic, base gradually narrowed into a narrowly winged petiole; stem leaves apically obtuse ..... 33. *C. botryocephalum*
35b. Basal leaves broadly spatulate-oblong, base gradually narrowed into a broadly winged petiole; stem leaves apically acuminate ..... 34. *C. spathulifolium*
34b. Capitulum solitary; ray lamina longer than involucre; pappus white or pale yellow.
36a. Leaves petiolate; petiole 3–11 cm, slender; leaf blade oblong or elliptic, base rounded.
37a. Pappus white, as long as tubular corolla; ray lamina apically acuminate ..... 35. *C. glaucum*
37b. Pappus much shorter than tubular corolla or absent; ray lamina apically obtuse, acute, or acuminate.
38a. Pappus absent; ray lamina apically acuminate ..... 36. *C. bupleurifolium*
38b. Pappus pale yellow, 1–2 mm, 1/5–1/2 as long as tubular corolla; ray lamina apically acute or obtuse ..... 37. *C. brachychaetum*
36b. Leaves sessile or shortly petiolate; leaf blade ovate or lingulate-spatulate; ray lamina apically acuminate; pappus white, as long as tubular corolla.
39a. Leaves lingulate-spatulate, base gradually narrowed into a broad petiole ..... 38. *C. lingulatum*
39b. Leaves ovate or cordate, base cordate, narrowly petiolate.
40a. Leaves ovate; petiole glabrous ..... 39. *C. yadongense*
40b. Leaves cordate; petiole brown pilose ..... 40. *C. cordatum*
31b. Plants green, hairy, at least stem distally and involucre at base, rarely glabrous.
41a. Phyllaries in 1 row, equal in size, base united, cupular.
42a. Leaves 12–15 × 6–9 cm; petiole 15–30 cm; capitula 3, in corymb-raceme, long pedunculate; involucre outside black pilose; ray lamina linear-lanceolate ..... 41. *C. petiolatum*
42b. Leaves 0.7–6 × 1–4 cm, shortly petiolate; capitulum solitary; involucre outside black or white pilose; ray lamina oblong.
43a. Ray lamina as long as involucre or tubular florets; phyllaries apically rounded; leaves abaxially white pilose.
44a. Outer florets radiate; lamina yellow, as long as involucre ..... 42. *C. nanum*
44b. Outer florets radiate or narrowly tubular, as long as tubular florets in center; lamina white, smaller or absent; slender tubular florets with short corolla ..... 43. *C. microglossum*
43b. Ray lamina longer than involucre; phyllaries apically acute or acuminate; leaves glabrous or abaxially pilose.

45a. Plants with rosette leaves; underground stems absent; leaves glabrous, margin revolute ..... 44. *C. microphyllum*
45b. Plants without rosette leaves; leaves all stem, abaxially densely white pilose, adaxially glabrous; underground stem rhizomelike, with scale leaves.
46a. Leaf margin entire to shallowly dentate ..... 45. *C. humile*
46b. Leaf margin pinnately laciniate; segments linear-oblong ..... 46. *C. laciniatum*
41b. Phyllaries in 2 rows, separate, outer narrow, inner broad, outside glabrous or hairy.
47a. Ray florets absent; involucre outside densely dark brown pilose; leaves abaxially greenish white, adaxially dark green, margin entire ..... 47. *C. discoideum*
47b. Ray florets present, if ray florets absent or with short lamina then involucre outside blackish gray pilose; leaf margin coarsely dentate.
48a. Capitula large; ray lamina tapelike, narrowly lanceolate to linear-lanceolate, usually 2–4 × as long as involucre, apex acuminate.
49a. Leaves densely hairy, oblong, obovate to orbicular; involucre outside white and black pilose.
50a. Leaves densely white pilose, base narrowed into a broadly winged petiole; capitula 1–4, solitary or in corymb-raceme ..... 48. *C. obovatum*
50b. Leaves densely shortly white pilose, base rounded, narrowly petiolate; capitulum solitary ..... 49. *C. puberulum*
49b. Leaves glabrous, variable in shape; involucre outside blackish purple-brown or white pilose, rarely glabrous.
51a. Leaf base cordate or truncate.
52a. Leaves ovate, base cordate, margin entire; ray lamina linear-lanceolate, 2–5 mm wide; pappus white ..... 50. *C. prattii*
52b. Leaves triangular or sagittate, margin dentate; ray lamina broadly lanceolate, 6–9 mm wide; pappus pale brown.
53a. Leaves concolorous on both surfaces, triangular, 6–13 cm, base truncate ..... 51. *C. delavayi*
53b. Leaves abaxially pale green, adaxially dark green, sagittate, 1.5–3 cm, base cordate ..... 52. *C. sagittifolium*
51b. Leaf base cuneate.
54a. Involucre outside purplish red or white pilose; stem glabrous; leaves abaxially pale green, adaxially green, broadly lanceolate, margin coarsely dentate ..... 53. *C. daochengense*
54b. Involucre outside brown or dark brown pilose; stem shortly black pilose; leaves glabrous or yellow pilose, obovate or broadly elliptic, margin subentire or denticulate.
55a. Leaves glabrous, margin subentire ..... 54. *C. nobile*
55b. Leaves yellow pilose, margin denticulate or subentire ..... 55. *C. pilosum*
48b. Capitula small; ray lamina oblong, elliptic to linear, often 1–2 × as long as involucre.
56a. Capitula 2–13, in raceme; stem leaves normal; plants robust, tall.
57a. Involucre outside black pilose; ray lamina broadly elliptic; stem leaves ovate ..... 56. *C. arnicoides*
57b. Involucre outside white pilose; ray lamina oblong; stem leaves oblong or ovate-oblong.
58a. Leaves herbaceous, white arachnoid-puberulent, scarcely veined; stem leaves with sheath amplexicaul; peduncles equal, to 1 cm; raceme not spreading ..... 57. *C. chungdienense*
58b. Leaves leathery, glabrous, prominently veined; stem leaves not amplexicaul; peduncles unequal, 2–6 cm; raceme spreading ..... 58. *C. coriaceum*
56b. Capitulum solitary, rarely 3; stem leaves bracteal, ovate-oblong to linear; plants dwarf.
59a. Pappus brown; leaf base cordate.
60a. Basal leaves ovate-cordate or ovate-lanceolate to lanceolate; involucre broadly campanulate; ray lamina linear ..... 59. *C. potaninii*
60b. Basal leaves ovate-cordate to orbicular-cordate or squarelike; involucre hemispheric; ray lamina oblong.
61a. Leaves small, leathery, nitid, conspicuously reticulate veined ..... 60. *C. cyclaminanthum*
61b. Leaves large, herbaceous, scarcely reticulate veined, abaxially glabrous or brown pilose along veins ..... 61. *C. principis*
59b. Pappus white; leaf base usually cuneate, truncate, or rounded, if base cordate then involucre outside shortly black pilose.
62a. Involucre outside shortly black pilose or glabrous; leaf base cordate or rounded; ray lamina slightly longer than involucre.
63a. Leaves thin, often purplish red, scarcely reticulate veined ..... 62. *C. purpureifolium*
63b. Leaves thick, green, conspicuously prominently reticulate veined.
64a. Basal leaves reticulate veined on both surfaces; capitula sometimes 3; ray lamina broadly elliptic ..... 63. *C. nervosum*
64b. Basal leaves abaxially reticulate veined; capitulum solitary; ray lamina oblong ..... 64. *C. nepalense*

62b. Involucre outside white or blackish gray pilose, rarely glabrous; leaf base usually cuneate, rarely truncate.
65a. Basal leaves narrowly petiolate; petiole densely pilose, not winged; stem leaves numerous, linear, erect, margin entire; involucre outside glabrous; ray lamina slightly longer than involucre, apex truncate ..... 65. *C. variifolium*
65b. Basal leaves broadly petiolate; petiole winged, glabrous or hairy, sometimes enlarged into a leaflike blade; stem leaves ovate-oblong to lanceolate, margin dentate; ray lamina 2–3 × as long as involucre, apex acute.
66a. Involucre outside glabrous, phyllaries narrowly lanceolate, apex acuminate ... 66. *C. pseudo-oblongatum*
66b. Involucre outside densely hairy, phyllaries lanceolate or ovate-lanceolate, apex acute or obtuse.
67a. Involucre outside white arachnoid-puberulent ..... 67. *C. oblongatum*
67b. Involucre outside blackish gray pilose.
68a. Leaves and petiole glabrous ..... 68. *C. ellisii*
68b. Leaves and petiole densely glandular pilose ..... 69. *C. glandulipilosum*

1. Cremanthodium campanulatum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 190. 1912.

钟花垂头菊 zhong hua chui tou ju

Stems solitary, rarely 2, erect, purplish red, 10–30 cm tall, 2–3 cm in diam., proximally glabrous, distally purple pilose. Basal leaves petiolate; petiole 6–12 cm, purple pilose, base sheathed; leaf blade reniform, 0.7–2.5 × 1–5 cm, glabrous, sometimes abaxially purple, pilose, margin purple pilose, shallowly crenate or lobed; lobes 7–12, with white prominent palmate veins on both surfaces. Middle stem leaves shortly petiolate, base sheathed; leaf blade smaller, reniform. Distal stem leaves ovate or lanceolate, margin sharply dentate, without sheaths. Capitulum solitary, nodding. Involucre campanulate, 1.5–2.8 × 1.5–4.5 cm, outside blackish purple pilose or glabrous, but base hairy; phyllaries 10–14, in 2 rows, purplish red, rarely yellowish white, petaloid, obovate-oblong or broadly elliptic, 0.7–2.5 cm, thin, submembranous, conspicuously veined, margin subentire, ciliate, outside sometimes pilose, apex rounded or rarely acute. Florets numerous, all tubular, purplish red, 6–8 mm; tube ca. 2 mm; styles extending from corolla, slender; style branches blackish purple papillate. Achenes brown, cuneate, 3–5 mm, slightly compressed, apex truncate, with denticulate corona. Pappus white or brown, as long as or shorter than tubular corolla. Fl. and fr. May–Sep.

Forest understories, forest margins, grassy slopes, scrub, alpine meadows, gravelly areas on mountains; 3200–4800 m. Sichuan, SE Xizang, NW and W Yunnan [NE Myanmar].

1a. Phyllaries yellowish white, outside long white pilose ..... 1c. var. *flavidum*
1b. Phyllaries purplish red.
2a. Leaves abaxially shortly pilose; phyllaries outside shortly black pilose; pappus brown, much shorter than tubular corolla .... 1b. var. *brachytrichum*
2b. Leaves glabrous; phyllaries outside blackish purple pilose or glabrous; pappus white, as long as corolla ..... 1a. var. *campanulatum*

1a. Cremanthodium campanulatum var. **campanulatum**

钟花垂头菊(原变种) zhong hua chui tou ju (yuan bian zhong)

Senecio campanulatus Franchet, Bull. Soc. Bot. France 39: 284. 1892, not Schultz Bipontinus ex Klatt (1888); *Cremanthodium larium* Handel-Mazzetti; *C. wardii* W. W. Smith.

Leaves glabrous. Phyllaries purplish red, outside glabrous. Pappus white, as long as tubular corolla.

Forest understories, forest margins, grassy slopes, scrub, alpine meadows, gravelly areas on mountains; 3200–4800 m. SW and W Sichuan, SE Xizang, NW Yunnan [NE Myanmar].

1b. Cremanthodium campanulatum var. **brachytrichum** Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 52. 1982.

短毛钟花垂头菊 duan mao zhong hua chui tou ju

Leaves abaxially shortly pilose. Phyllaries purplish red, outside shortly black pilose. Pappus brown, much shorter than tubular corolla.

• Gravelly areas on mountains; ca. 4300 m. W Yunnan.

1c. Cremanthodium campanulatum var. **flavidum** S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 39: 558. 2001.

黄苞钟花垂头菊 huang bao zhong hua chui tou ju

Leaves glabrous. Phyllaries yellowish white, outside long white pilose. Pappus white, as long as tubular corolla.

• Gravelly areas on mountains; 3800–4500 m. Sichuan (Muli).

2. Cremanthodium pinnatisectum (Ludlow) Y. L. Chen & S. W. Liu, Acta Biol. Plateau Sin. 3: 65. 1984.

裂叶垂头菊 lie ye chui tou ju

Cremanthodium campanulatum Diels var. *pinnatisectum* Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 5: 279. 1976.

Stem solitary, erect, 6–13 cm tall, yellowish brown pilose. Basal leaves petiolate; petiole 2–5 cm, glabrous; leaf blade subreniform, 1.5–4 × 2–4.5 cm, glabrous, 2-ternate-palmatisect or sometimes pinnatisect; lobes lanceolate, 4–6 mm, apex acute, mucronate. Middle stem leaves smaller, pinnatisect. Distal stem leaves linear, margin entire or dentate. Distalmost stem leaves bracteal, linear, margin entire. Capitulum solitary, nodding. Involucre campanulate, 1.2–1.7 × 1.5–3.5 cm, outside purple pilose; phyllaries 8–12, in 2 rows, blackish purple, petaloid, ob-

long or suborbicular, 5–15 mm, submembranous, apex rounded or obtuse. Florets numerous, all tubular, purple, ca. 6 mm; tube ca. 1.5 mm; limb narrowly cylindric. Pappus pale brown, as long as tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

Grassy slopes; ca. 4200 m. SE Xizang, NW Yunnan [NE Myanmar].

3. Cremanthodium calcicola W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 201. 1920.

长鞘垂头菊 chang qiao chui tou ju

Stem solitary, erect, 20–50 cm tall, to 7 mm in diam. at base, proximally glabrous, distalmost shortly yellowish brown pilose. Basal leaves petiolate; petiole 5–13 cm, to 5 mm wide, base sheathed; sheath 6–9 cm, submembranous, not split and fibriform when dry; leaf blade abaxially green, adaxially dark green, orbicular-reniform or reniform, 6–8 cm in diam., palmately veined, abaxially with prominent veins, glabrous, margin regularly crenate, apex of teeth mucronate; sinus narrow. Stem leaves 1 or 2; middle leaves reniform, petiolate, base sheathed; distal leaves sessile, bracteal, ovate-oblong, without sheath. Capitulum solitary, nodding. Involucre hemispheric, 1.1–1.3 × 2.5–3 cm, outside blackish purple, glabrous; phyllaries 20, in 2 rows, oblong, 2–5 mm wide, margin entire, apex obtuse or acute; inner phyllaries broadly membranous at margin. Florets numerous, all tubular, yellow, ca. 6 mm; tube ca. 2 mm; limb cylindric. Achenes oblong, to 6 mm. Pappus pale brown, slightly shorter than tubular corolla. Fl. and fr. Jun–Jul.

• Grassy slopes, stream banks, calcitic cliffs; 3400–3500 m. NW Yunnan.

4. Cremanthodium atrocapitatum R. D. Good, J. Linn. Soc., Bot. 48: 282. 1929.

黑垂头菊 hei chui tou ju

Stem solitary, erect, 15–35 cm tall, proximally glabrous, distally black pilose. Basal leaves petiolate; petiole 10–13 cm, glabrous, sheath amplexicaul; leaf blade reniform, 3–5 × 3.5–9 cm, glabrous, abaxially with conspicuous palmate veins, margin regularly triangular-dentate; sinus slightly broad. Stem leaf solitary, bracteal, ovate, ca. 1.5 cm, base enlarged sheathed; sheath to 6 × 1–2 cm, amplexicaul. Capitulum solitary, nodding. Involucre dark purple or black, hemispheric, ca. 1 × to 2 cm, base shortly black pilose, outside glabrous; phyllaries in 2 rows, often oblanceolate, apex obtuse, sparsely denticulate or erose; inner phyllaries 3–4 mm wide. Florets numerous, all tubular, deep yellowish brown, 6–7 mm; tube 2–2.5 mm; limb ca. 2 mm wide. Achenes yellowish brown, cylindric, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

Grassy slopes; ca. 4000 m. Yunnan (Zhongdian) [NE Myanmar].

5. Cremanthodium cucullatum Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 53. 1982.

兜鞘垂头菊 dou qiao chui tou ju

Stem solitary, erect, 20–25 cm tall, 1.5–2 mm in diam. at base, white arachnoid-pilose, distally intermixed yellowish brown pilose. Basal leaves petiolate; petiole to 8 cm, hairy, sheath amplexicaul; leaf blade reniform, 1–1.5 × 1.5–2.7 cm, both surfaces white arachnoid-pilose or adaxially glabrescent, palmately veined, margin regularly denticulate, apex rounded. Stem leaves 2 or 3, smaller distally. Middle stem leaves reniform; petiole enlarged into a cucullate sheath, white arachnoid-puberulent, amplexicaul. Distal stem leaves bracteal, lanceolate to linear. Capitulum solitary, nodding. Involucre hemispheric, 0.9–1 × ca. 2 cm, outside dark brown, glabrous, base hairy; phyllaries 12–24, in 2 rows, oblanceolate, 2–4 mm wide, apex erose. Florets numerous, all tubular, yellow, 5–6 mm; tube 1.5–2 mm; limb campanulate. Achenes brown, obovoid, 3–4 mm. Pappus yellowish brown, as long as tubular corolla. Fl. and fr. Aug.

• Grassy slopes; ca. 3500 m. W Yunnan.

6. Cremanthodium smithianum (Handel-Mazzetti) Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 14. 1925.

紫茎垂头菊 zi jing chui tou ju

Cathcartia smithiana Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 60: 182. 1923; *Cremanthodium acernuum* R. D. Good; *C. heterocephalum* Y. L. Chen; *Meconopsis smithiana* (Handel-Mazzetti) Taylor ex Handel-Mazzetti.

Stem solitary, erect, 10–25 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally shortly white and brown pilose. Basal leaves long petiolate; petiole purplish red, 2–15 cm, base sheathed, distally shortly purplish red pilose or glabrous; leaf blade purplish red, reniform, 0.5–5 × 1.2–7 cm, glabrous, abaxially rarely initially shortly pilose, palmately veined, with white prominent reticulate veins on both surfaces, margin regularly denticulate, apex rounded or retuse. Middle to distal stem leaves 1 or 2, smaller, shortly petiolate or sessile, reniform to linear-lanceolate. Capitulum solitary, nodding or suberect. Involucre hemispheric, 0.8–1.6 × 1.5–2.5 cm, outside initially shortly pilose, glabrescent; phyllaries 12–14, in 2 rows, outer phyllaries lanceolate, apex acute or acuminate; inner phyllaries oblong or narrowly oblanceolate, to 5 mm wide, margin broadly membranous, apex acute or obtuse. Ray florets yellow; lamina oblong, 1–2 cm × 3–5 mm, apex obtuse, entire or lobed; tube ca. 1 mm. Tubular florets numerous, yellow, 6–9 mm; tube ca. 2 mm; limb cylindric. Achenes oblanceolate, ca. 4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

Grassy slopes, stream banks, gravelly areas on mountains, alpine meadows; 3000–5200 m. SW Sichuan, SE Xizang, NW Yunnan [Myanmar].

7. Cremanthodium decaisnei C. B. Clarke, Compos. Ind. 168. 1876.

喜马拉雅垂头菊 xi ma la ya chui tou ju

Cremanthodium decaisnei f. *clarkei* R. D. Good; *C. decaisnei* f. *sinense* R. D. Good; *Senecio renatus* Franchet.

Stem solitary, erect, 6–25 cm tall, 1.5–3 mm in diam. at base, proximally glabrous, distally densely brown pilose. Basal leaves long petiolate; petiole 3–14 cm, glabrous, base narrowly sheathed; leaf blade reniform or orbicular-reniform, 0.5–4.5 × 0.9–5 cm, abaxially densely brown pilose, rarely glabrescent,

adaxially glabrous, palmately veined, margin irregularly shallowly crenate, rarely lobed, apex rounded. Middle to distal stem leaves 1 or 2, petiolate or sessile, smaller, with leaf blade or not. Capitulum solitary, nodding. Involucre hemispheric or rarely campanulate, 0.7–1.5 × 1–2 cm, outside densely brown pilose or sometimes glabrescent; phyllaries 8–12, in 2 rows, apex acuminate, mucronate; outer phyllaries narrowly lanceolate; inner phyllaries oblong-lanceolate, margin broadly membranous. Ray florets yellow; lamina narrowly elliptic or oblong, 1–2 cm × 3–6 mm, apex acute, rarely acuminate, 3-denticulate. Tubular florets numerous, dark yellow, 5–7 mm; tube 1–2 mm. Achenes brown, oblong, 3–7 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

Grassy slopes, gravelly areas on mountains, alpine meadows; 3500–5400 m. SW Gansu, SW Qinghai, SW Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim), Kashmir, Nepal].

8. Cremanthodium stenoglossum Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 55. 1982.

狭舌垂头菊 xia she chui tou ju

Stem solitary, erect, scapelike, 10–32 cm tall, 1.5–3 mm in diam. at base, proximally glabrous, distally white floccose and shortly brown pilose. Basal leaves petiolate; petiole glabrous, 2.6–11.5 cm, base enlarged sheathed; leaf blade orbicular-reniform or reniform, 0.7–2 × 1.5–4 cm, glabrous, palmately veined, margin angular-dentate, white pilose; sinus narrow, basal lobes convergent, subsucculent. Proximal stem leaf solitary, shortly petiolate or sessile, smaller, broadly reniform, base sheathed, margin coarsely angularly dentate. Middle to distal stem leaves absent or bracteal and oblong. Capitulum solitary, nodding. Involucre hemispheric, 1.3–1.6 × to 2 cm, outside glabrous; phyllaries 9–14, in 2 rows, purple; outer phyllaries narrowly lanceolate, 1.5–2 mm wide; inner phyllaries oblong, 3–5 mm wide, margin brown ciliate, apex acuminate or acute, mucronate. Ray florets yellow; lamina linear-lanceolate, 2.5–3.5 cm, ca. 5 mm wide at base, membranous, transparent, with 6 or 7 brown veins, apex long acuminate, 3-lobed. Tubular florets numerous, yellow, 7–9 mm; tube ca. 3 mm; limb 2–2.5 mm wide. Achenes cylindric, ca. 7 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug. $2n = 58$*.

• Swamps, stream banks, scrub, alpine meadows, alpine crevices, gravelly areas on mountains; 3700–5000 m. W Qinghai, NW Sichuan.

9. Cremanthodium citriflorum R. D. Good, J. Linn. Soc., Bot. 48: 277. 1929.

柠檬色垂头菊 ning meng se chui tou ju

Stem solitary, erect, 25–42 cm tall, ca. 4 mm in diam. at base, proximally glabrous, distally white arachnoid-pilose. Basal leaves petiolate; petiole ca. 11.5 cm, glabrous, base enlarged sheathed; sheath to 6 cm; leaf blade green on both surfaces, reniform, ca. 5 × to 6 cm, glabrous, palmately veined, margin minutely crenate and ciliate, apex rounded; sinus broad. Middle to distal stem leaves only enlarged sheathed; sheath 4–7 × to 4 cm, glabrous, margin obtusely dentate. Capitulum solitary, nodding. Involucre black when dry, hemispheric, ca. 2 × to 2.5 cm, outside glabrous, base pilose; phyllaries 12, in 2 rows, purple, apex obtuse or acute; outer phyllaries lanceolate or oblong, 4–6 mm wide; inner phyllaries broadly elliptic, 7–10 mm, margin broadly membranous. Ray florets yellow or lemon-colored; lamina ovate-lanceolate, 4–5 cm, base to 1 cm wide, with brown veins, apex caudate-acuminate, 3-lobed; tube 4–5 mm. Tubular florets numerous, yellowish brown, 8–10 mm; tube ca. 2 mm; limb campanulate-tubular, ca. 3 mm wide. Achenes fusiform, 6–7 mm, narrowed at both ends, ribbed. Pappus brown, shorter than tubular corolla. Fl. and fr. Aug.

Alpine meadows; 3600–4000 m. NW Yunnan [Myanmar].

10. Cremanthodium pulchrum R. D. Good, J. Linn. Soc., Bot. 48: 274. 1929.

美丽垂头菊 mei li chui tou ju

Stem solitary, erect, 15–40 cm tall, slender, ca. 2 mm in diam. at base, proximally glabrous, distally white and brown pilose. Basal leaves petiolate; petiole 8–12 cm, slender, glabrous, base enlarged sheathed; leaf blade abaxially pale green, adaxially green, reniform or ovate-cordate, 1.2–2 × 2.7–3 cm, glabrous, palmately veined, with conspicuous reticulate veins, margin coarsely triangular- or orbicular-dentate, apex rounded or subrounded. Middle to distal stem leaf solitary, bracteal, ovate-lanceolate, ca. 1.5 cm. Capitulum solitary, nodding. Involucre hemispheric, ca. 1 × to 1.5 cm, outside initially white and brown pilose, glabrescent; phyllaries 10–12, in 2 rows, blackish purple, oblong or elliptic, 3–5 mm wide, apex obtuse or acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina ovate-lanceolate, to 2.5 cm, ca. 7 mm wide at base, apex acuminate, 3-lobed. Tubular florets numerous, 4–5 mm; tube ca. 1 mm; limb funnelform, ca. 2.5 mm wide. Achenes (immature) obovoid, ca. 2 mm. Pappus initially white, later yellowish brown, as long as tubular corolla. Fl. Jul–Sep, fr. Aug–Sep.

Grassy slopes, stream banks; ca. 4000 m. NW Yunnan [Myanmar].

11. Cremanthodium palmatum Bentham, Hooker's Icon. Pl. 12: 38. 1873.

掌叶垂头菊 zhang ye chui tou ju

Cremanthodium palmatum var. *benthamii* R. D. Good; *Senecio benthamianus* Franchet.

Stem solitary, erect, to 25 cm tall, proximally glabrous, distally purplish brown pilose. Basal leaves long petiolate, reniform, 1.3–2.5 cm in diam., palmately veined, palmatipartite; lobes 6–12, oblong, glabrous or abaxially sparsely purplish red pilose, very rarely purplish brown pilose on both surfaces, apex mucronate. Middle to distal stem leaves petiolate or sessile, reniform to linear. Capitulum solitary, nodding. Involucre hemispheric, 3.8–6.3 cm in diam., outside glabrous, base blackish purple pilose; phyllaries in 2 rows, oblong or lanceolate, ca. 1.5 cm, margin membranous, apex obtuse. Ray florets purplish red; lamina broadly oblanceolate, apex subtruncate, 2–4-lobed; tube shorter. Tubular florets numerous, purplish red. Achenes short. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Sep.

Alpine meadows, gravelly areas on mountains; 3000–4000 m. S Xizang [Bhutan, India (Sikkim)].

12. Cremanthodium farreri W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 202. 1920.

红花垂头菊 hong hua chui tou ju

Stem solitary, erect, 30–47 cm tall, 3–4 mm in diam. at base, densely initially white arachnoid-puberulent, proximally glabrescent. Basal leaves petiolate; petiole to 21 cm, slender, white arachnoid-puberulent, base sheathed; leaf blade reniform, 1.5–3.5 × 2.5–6 cm, abaxially white arachnoid-pilose, adaxially glabrous, palmately veined, abaxially with prominent veins, margin regularly shallowly crenate, tips of teeth mucronate, apex rounded. Middle stem leaves smaller, reniform; petiole enlarged into a leaf blade, abaxially white arachnoid-puberulent, base cordate, semiamplexicaul, margin denticulate. Distal stem leaves sessile, broadly ovate, base semiamplexicaul, margin dentate. Capitulum solitary, nodding. Involucre hemispheric, 1.5–2 × 3–4 cm, outside blackish purple, glabrous; phyllaries 12–14, in 2 rows, 3–4 mm wide, apex acute, mucronate and white ciliate; outer phyllaries lanceolate; inner phyllaries ovate-lanceolate or elliptic, margin broadly membranous. Ray florets purplish red; lamina oblanceolate, 2.5–3 × ca. 1 cm, apex obtuse, denticulate; tube ca. 1.5 mm. Tubular florets numerous, yellow, ca. 8 mm; tube ca. 1 mm; limb campanulate-cylindric; styles slightly extending from corolla, proximally yellowish white, distally blackish gray. Achenes yellowish brown, cuneate, 4–6 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Aug–Sep.

Alpine meadows, gravelly slopes; 4000–4600 m. W Yunnan [Myanmar].

13. Cremanthodium rhodocephalum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 190. 1912.

长柱垂头菊 chang zhu chui tou ju

Cremanthodium gracillimum W. W. Smith; *C. palmatum* Bentham var. *rhodocephalum* (Diels) R. D. Good; *C. sherriffii* H. R. Fletcher.

Stem solitary, erect, 8–33 cm tall, densely purplish red pilose. Stem leaves crowded in middle to proximal part of stem, petiolate; petiole 2–12 cm, pilose, semiamplexicaul; leaf blade abaxially purplish red, adaxially green, reniform, 0.7–4 × 1–6 cm, abaxially sparsely white pilose, adaxially glabrous, palmately veined, with prominent veins on both surfaces, margin regularly crenate, tips of teeth mucronate. Middle to distal stem leaves shortly petiolate, without sheath; leaf blade orbicular-reniform to linear, margin dentate or entire. Capitula solitary or few, on apex of stem or branches, nodding. Involucre hemispheric, 1–1.5 × 1.5–3 cm, outside long purplish red pilose; phyllaries 10–16, in 2 rows, oblong-lanceolate, 3–5 mm wide, apex acute or acuminate; inner phyllaries broadly white membranous at margin. Ray florets purplish red; lamina oblanceolate, 1.5–2 cm × 5–8 mm, apex rounded or truncate, 2- or 3-lobed; tube ca. 5 mm; styles purplish red, to 3 cm. Tubular florets numerous, purplish red, 1–1.2 cm; tube ca. 1.5 mm; limb cylindric; styles purplish red, 2–2.5 cm. Achenes oblong, ca. 5 mm. Pappus white, slightly shorter than tubular corolla. Fl. and fr. Jun–Sep.

• Alpine meadows, grassy slopes, forest margins, gravelly areas on mountains; 3000–5000 m. SW Sichuan, SE Xizang, NW Yunnan.

14. Cremanthodium reniforme (Candolle) Bentham, Hooker's Icon. Pl. 12: 37. 1873.

肾叶垂头菊 shen ye chui tou ju

Ligularia reniformis Candolle, Prodr. 6: 315. 1838.

Stem solitary, erect, 30–40 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally purplish brown pilose. Basal leaves petiolate; petiole 6–17 cm, slender, glabrous, base sheathed; leaf blade reniform, orbicular-reniform, or cordate-reniform, 2–3.5 × 2.5–7 cm, thin, soft, glabrous, palmate veins prominent abaxially, margin angular-dentate and ciliate, apex rounded. Stem leaves 1 or 2, smaller, proximal leaves shortly petiolate, base enlarged sheathed; leaf blade reniform, distal ones with only sheath. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 2–2.5 cm, outside black pilose; phyllaries 10–12, in 2 rows, 4–6 mm wide, apex acute; outer phyllaries lanceolate; inner phyllaries oblong, margin membranous. Ray florets yellow; lamina oblanceolate, 1.5–2 cm × 4–8 mm, apex rounded, denticulate; tube ca. 1 mm. Tubular florets numerous, deep yellow, 6–7 mm; tube ca. 1 mm; limb campanulate. Achenes brown, cuneate, 4–5 mm. Pappus white, slightly shorter than corolla. Fl. and fr. Aug.

Alpine meadows, forest margins; 3300–4500 m. S Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

15. Cremanthodium bulbilliferum W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 201. 1920.

珠芽垂头菊 zhu ya chui tou ju

Stems 1 or 2, erect, 8–25 cm tall, ca. 3 mm in diam. at base, proximally glabrous, often purplish red, distally shortly black pilose. Basal leaves long petiolate; petiole 4–10 cm, glabrous, base sheathed; leaf blade abaxially purple, reniform or broadly reniform, 1–2.5 × 1.2–5 cm, glabrous, palmate veins prominent abaxially, margin shallowly crenate, apex rounded or retuse. Stem leaves 3 or 4, reniform, smaller distally, distalmost stem leaves with only sheath; sheath cucullate, inside with bulbil, black, ovate, ca. 4 mm. Capitulum solitary, nodding or semierect. Involucre hemispheric, 1–1.2 × 1.5–2 cm, outside dark brown pilose; phyllaries in 2 rows, oblong or linear-oblong, apex acute; inner phyllaries broader, 3–5 mm wide, margin broadly membranous. Ray florets yellow; lamina oblanceolate, 1.2–1.8 cm × 3–5 mm, apex truncate, 3- or 4-lobed; tube ca. 4 mm. Tubular florets numerous, yellow, ca. 8 mm; tube ca. 2 mm; limb cylindric. Achenes oblong, ca. 3 mm. Pappus white, as long as tubular corolla. Fl. and fr. Aug–Oct.

• Grassy slopes, rocky slopes; 3000–4000 m. SE Xizang, NW Yunnan.

16. Cremanthodium phyllodineum S. W. Liu, Acta Biol. Plateau Sin. 3: 60. 1984.

叶状柄垂头菊 ye zhuang bing chui tou ju

Stem solitary, erect, 35–60 cm tall, 2–4 mm in diam. at base, proximally glabrous, distally dark brown pilose. Basal leaves long petiolate; petiole 10–24 cm, base sheathed, glabrous or distally brown pilose; leaf blade reniform or triangular-reniform, 3.5–7 × 4–8.5 cm, glabrous, palmate veins prominent abaxially, margin regularly crenate or coarsely dentate, apex

rounded. Stem leaves 1–3, proximal to middle leaves petiolate, proximal part of petiole enlarged into a blade, thus whole leaf dumbbell-shaped and larger than distal stem leaves, margin irregularly sharply dentate. Distal stem leaves ovate, lobed. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 2.5–3 cm, outside black pilose; phyllaries 12, in 2 rows, 3–7 mm wide, apex acute, ciliate; outer phyllaries lanceolate; inner phyllaries ovate, margin broadly membranous. Ray florets yellow; lamina broadly oblanceolate, 2–2.5 cm × 8–10 mm, apex truncate, 3- or 4-lobed; tube ca. 1 mm. Tubular florets numerous, 7–8 mm, apex brown; tube ca. 1.5 mm; limb narrowly cylindric. Achenes (immature) 2–3 mm. Pappus pale brown, shorter than tubular corolla. Fl. Jul–Aug.

• Alpine meadows, wet grassy slopes; 3700–4200 m. SE Xizang, NW Yunnan.

17. Cremanthodium thomsonii C. B. Clarke, Compos. Ind. 169. 1876.

叉舌垂头菊 cha she chui tou ju

Senecio nephelagetus Franchet.

Stem solitary, erect, 25–50 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally dark brown pilose. Basal leaves long petiolate; petiole 10–15 cm, glabrous, base narrowly sheathed; leaf blade reniform or orbicular-reniform, 2–4 × 3–5.5 cm, abaxially sparsely shortly black pilose along veins, adaxially glabrous, palmate veins prominent abaxially, margin shallowly crenate or coarsely dentate. Middle stem leaf solitary, petiolate; petiolar base with entire sheath; leaf blade smaller, reniform. Distal stem leaves 1 or 2, sessile, linear-lanceolate, margin entire. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 1.5–2.5 cm, outside brown pilose or glabrous; phyllaries 10–14, in 2 rows, 3–7 mm wide, apex acute; outer phyllaries narrower, lanceolate, 3–4 mm wide; inner phyllaries broader, oblong, 4–6 mm wide, margin brown membranous. Ray florets yellow; lamina broadly oblanceolate or cuneate, 1.6–2.3 cm × 6–9 mm, apex truncate, 3-lobed; lobes 2–4 mm; tube ca. 1 mm. Tubular florets numerous, yellow, 7–10 mm; tube 1.5–2 mm; limb cylindric. Achenes yellowish brown, cuneate, 4–5 mm. Pappus brown, proximal part dark brown, as long as tubular corolla. Fl. and fr. Jun–Aug.

Alpine meadows, grassy slopes, forest understories, gravelly areas on mountains; 3500–4800 m. SE Xizang, NW Yunnan [Bhutan, India (Sikkim), Nepal].

18. Cremanthodium forrestii Jeffrey, Notes Roy. Bot. Gard. Edinburgh 5: 191. 1912.

矢叶垂头菊 shi ye chui tou ju

Cremanthodium lobatum Grierson.

Stem solitary, erect, 10–30 cm tall, slender, 1–2 mm in diam. at base, proximally glabrous, distally white pilose. Basal leaves petiolate; petiole 2–17 cm, slender, glabrous, base narrowly sheathed; leaf blade greenish gray, hastate, 0.8–5 × 1.5–7.5 cm, glabrous or abaxially sparsely white pilose, veins ternate, palmate or palmate-pinnate, prominent abaxially, margin entire or sparsely irregularly dentate, rarely lobed, apex acute or acuminate; lobes oblong or suborbicular; basal lobes divergent, sharply triangular. Stem leaves 1 or 2; proximal one hastate, smaller; middle to distal one sessile, linear-oblong, 1–1.5 cm × ca. 2 mm. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 1.5–2 cm, base yellowish brown pilose, outside glabrous; phyllaries 8–10, in 2 rows; outer phyllaries lanceolate, 2–3 mm wide, apex acuminate, sometimes caudate; inner phyllaries ovate-lanceolate, 5–6 mm wide, margin brown membranous, apex acute. Ray florets yellow; lamina oblanceolate, 1.4–2.2 cm × 6–7 mm, with brown veins, apex truncate, 3-lobed; tube ca. 1.5 mm. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1 mm. Achenes yellowish brown, oblong, ca. 5 mm. Pappus brown, as long as tubular corolla. Fl. and fr. Jul–Oct.

• Grassy slopes, alpine meadows; 3500–4000 m. ?Xizang, NW Yunnan.

19. Cremanthodium medogense Y. S. Chen, Nordic J. Bot. 28: 757. 2010.

墨脱垂头菊 mo tuo chui tou ju

Stems caespitose, erect, 18–38 cm tall, slender, 1.5–2 mm in diam. at base, glabrous. Basal leaves numerous, petiolate; petiole 5–19 cm, slender, glabrous, base narrowly sheathed; leaf blade cordate-reniform, 1.2–3.5 × 1.8–5.2 cm, abaxially glabrous, veins palmate-pinnate, margin coarsely dentate, with (11–)16–20 teeth in mature leaves, apex acute. Stem leaves 2 or 3; proximal leaves ovate, shortly petiolate; middle leaves sessile, linear-oblong, 10–23 × 2–4 mm; distal leaves usually 3, subulate, 2–5(–7) mm. Capitulum solitary, nodding. Involucre hemispheric, 1.5–2 × 1.2–1.5 cm, base yellowish brown pilose, outside glabrous; phyllaries 8, in 2 rows; outer phyllaries lanceolate-oblong, 2–2.5 mm wide, apex acuminate; inner phyllaries ovate-lanceolate, 5–6 mm wide, margin brown membranous, apex acute. Ray florets yellow, 8–10; lamina oblong, 20–23 × 9–13 mm, with brown veins, apex truncate, 3-lobed; lobes 3–5 × 3–4 mm; tube ca. 2 mm; style 8–10 mm; stigma black. Tubular florets numerous, yellow, 6–7 mm; style 10–12 mm. Achenes cylindric, 4–5 mm. Pappus brown, 3.5–4 mm, shorter than tubular corolla. Fl. Aug.

• Alpine thickets and meadows; 3700–4200 m. SE Xizang (Mêdog).

20. Cremanthodium latilobum Y. S. Chen, Nordic J. Bot. 28: 756. 2010.

宽裂垂头菊 kuan lie chui tou ju

Stems several, erect, 30–40 cm tall, glabrous. Basal leaves petiolate; petiole 8–14 cm, slender, glabrous, base slightly sheathed; leaf blade green, cordate-reniform to hastate, 4–5 × 5.2–6.5 cm, thin, glabrous, veins palmate-pinnate, prominent abaxially, margin angular-dentate, apex acute. Stem leaves usually 3(or 4), sessile, ovate to triangular-cordate, 4–5.2 × 2.6–3.5 cm, base auriculate; distal leaves ovate, 7–9 × 3–5 mm. Capitulum solitary, nodding. Involucre hemispheric, 3–3.2 × 1.6–1.8 cm, almost glabrous; phyllaries 10–12, in 2 rows; outer phyllaries lanceolate, 15–16 × 4–5 mm, apex acuminate; inner phyllaries oblong-ovate, 15–16 × 7–8 mm, margin reddish membranous, apex acute. Ray florets yellow; lamina obovate-cuneate,

2–2.4 × 1.6–1.8 cm, apex truncate, usually 3–lobed; lobes 3–5 × 5–8 mm; tube ca. 2 mm. Tubular florets numerous, brownish yellow, 10–11 mm; tube ca. 2 mm; limb campanulate; style pale yellow, ca. 2 cm, stigma black. Achenes obovoid, ca. 3 mm. Pappus yellowish, 7–8 mm, slightly shorter than tubular corolla. Fl. Aug.

• Moist meadows around small lakes surrounded by bamboo thickets; 3600–3700 m. NW Yunnan (Fugong: Gaoligong Shan).

21. Cremanthodium angustifolium W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 200. 1920.

狭叶垂头菊 xia ye chui tou ju

Stem solitary, erect, purplish red, 20–50 cm tall, 3–5 mm in diam. at base, proximally glabrous, distally purplish brown pilose. Basal leaves lanceolate to narrowly lanceolate, 7–23 cm × 3–45 mm, parallel veined, glabrous, base narrowed into a winged petiole, margin entire, apex acute or acuminate. Middle to distal stem leaves 4 or 5, smaller distally, narrowly lanceolate to linear, base semiamplexicaul. Capitula solitary or rarely 2, nodding. Involucre hemispheric, 0.7–1.5 × 1.3–3.2 cm, outside densely purplish brown pilose; phyllaries 16–24, in 2 rows, lanceolate, 2–4 mm wide, apex acuminate; inner phyllaries narrowly membranous at margin. Florets numerous, yellow, all tubular, 7–8 mm; tube 2–3 mm; limb cylindric. Achenes brown, cylindric, 5–6 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct.

• Alpine swamps, stream banks, scrub; 3200–4800 m. SW Sichuan, SE Xizang, NW Yunnan.

22. Cremanthodium brunneopilosum S. W. Liu, Acta Biol. Plateau Sin. 3: 63. 1984 [*"brunneo-pilosum"*].

褐毛垂头菊 he mao chui tou ju

Plants grayish green or bluish green. Stem solitary, erect, to 100 cm tall, to 1.5 cm in diam. at base, proximally glabrous, distally white and brown pilose. Basal leaves numerous, broadly petiolate; petiole 6–15 × 1.5–2.5 cm, pinnate-parallel or parallel veined, glabrous, base broadly sheathed; leaf blade narrowly elliptic to lanceolate, 6–40 × 2–8 cm, abaxially shortly pilose along veins, adaxially glabrous, base cuneate, narrowed into a petiole, margin entire or minutely denticulate, apex acute. Middle to distal stem leaves 4 or 5, smaller distally, elliptic, base sheathed. Distalmost stem leaves bracteal, lanceolate, apex acuminate. Capitula 1–13, in raceme, rarely solitary, nodding; peduncles 1–9 cm, brown pilose. Involucre hemispheric, 1.2–1.6 × 1.5–2.5 cm, outside densely brown pilose; leaflike bracts green, lanceolate to linear, herbaceous; phyllaries 10–16, in 2 rows, lanceolate or oblong, 3–5 mm wide, apex long acuminate; inner phyllaries brown membranous at margin. Ray florets yellow; lamina linear-lanceolate, 25–60 × 2–5 mm, membranous, translucent, apex long acuminate or caudate; tube 5–7 mm. Tubular florets numerous, brownish yellow, 8–10 mm; tube ca. 2 mm; limb narrowly cylindric. Achenes yellowish brown, cylindric, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Sep. $2n = 58$*.

• Alpine swamp meadows, stream banks and associated meadows; 3000–4300 m. SW Gansu, W Qinghai, NW Sichuan, NE Xizang.

23. Cremanthodium stenactinium Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 510. 1922.

膜苞垂头菊 mo bao chui tou ju

Cremanthodium stenactinium var. *evillosum* Handel-Mazzetti.

Plants grayish green or bluish green. Stem solitary, erect, 40–50 cm tall, ca. 1.1 cm in diam. at base, middle to proximal part glabrous, distalmost part brown pilose. Basal leaves broadly petiolate; petiole 4–8 cm, to 2.5 cm wide, glabrous, base broadly sheathed; leaf blade oblong or elliptic, 6–15 × 2–6 cm, pinnate-parallel or parallel veined, glabrous, base narrowed into a petiole, margin entire, apex acute or obtuse. Stem leaves 5 or 6, erect; middle to proximal stem leaves oblong, 4–8 cm, tubular-amplexicaul, apex obtuse, mucronate; distalmost stem leaves bracteal, membranous, apex obtuse. Capitula 1–13, in raceme, rarely solitary, nodding; peduncles 0.5–8 cm, brown pilose; leaflike bracts yellowish white, ovate, membranous. Involucre hemispheric, 1.3–1.5 × 1.5–3 cm, outside brown pilose or glabrescent; phyllaries 12–16, in 2 rows, elliptic or oblong, 6–8 mm wide, apex acute or acuminate; inner phyllaries broadly membranous at margin. Ray florets pale yellow; lamina linear-lanceolate, 3–7 cm × 1.5–2.5 mm, apex long acuminate; tube ca. 5 mm. Tubular florets numerous, yellow, ca. 1 cm; tube ca. 3 mm. Achenes yellowish brown, cylindric, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Sep.

• Grasslands, stream banks; ca. 3600 m. NW Sichuan, NE Xizang.

24. Cremanthodium lineare Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 482. 1882.

条叶垂头菊 tiao ye chui tou ju

Plants bluish green. Stems 1(–4), erect, to 45 cm tall, 1–3 mm in diam. at base, glabrous or distalmost part sparsely white pilose. Basal leaves broadly shortly petiolate or sessile, linear or linear-lanceolate, to 23 cm × 2.5–5(–30) mm, parallel veined, glabrous, base narrowed, margin entire, apex acute. Stem leaves numerous, bracteal, lanceolate to linear. Capitulum solitary, nodding. Involucre hemispheric, 1–1.2 × 1–2.5 cm, outside blackish gray, glabrous or base sparsely pilose; phyllaries 12–14, in 2 rows, lanceolate or ovate-lanceolate, 2–4 mm wide, margin narrowly membranous, apex acute, white ciliate. Ray florets sometimes absent, pale yellow; lamina yellow or purplish red, linear-lanceolate, to 4 cm × 2–3 mm, apex long acuminate; tube ca. 2 mm. Tubular florets numerous, yellow, 5–7 mm; tube 1.5–2 mm. Achenes yellowish brown, oblong, 2–3 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct. $2n = 58$*.

• Alpine meadows, stream banks, swamp meadows, scrub; 2400–4800 m. SW Gansu, Qinghai, NW Sichuan, E Xizang.

1a. Capitulum without ray florets ..... 24c. var. *eligulatum*
1b. Capitulum with ray florets.
2a. Ray lamina yellow ..... 24a. var. *lineare*
2b. Ray lamina purplish red ..... 24b. var. *roseum*

24a. Cremanthodium lineare var. **lineare**

条叶垂头菊(原变种) tiao ye chui tou ju (yuan bian zhong)

Senecio armeriifolius Franchet (1892), not Philippi (1891).

Ray lamina yellow.

• Alpine meadows, stream banks, swamp meadows, scrub; 2400–4800 m. SW Gansu, Qinghai, NW Sichuan, E Xizang.

24b. Cremanthodium lineare var. **roseum** Handel-Mazzetti, Acta Horti Gothob. 12: 307. 1938.

红花条叶垂头菊 hong hua tiao ye chui tou ju

Ray lamina purplish red.

• Alpine meadows, scrub; 3900–4300 m. NW Sichuan.

24c. Cremanthodium lineare var. **eligulatum** Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 54. 1982.

无舌条叶垂头菊 wu she tiao ye chui tou ju

Capitulum without ray florets.

• Alpine meadows, stream banks; 4000–4600 m. NW Sichuan.

25. Cremanthodium bhutanicum Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 5: 278. 1976.

不丹垂头菊 bu dan chui tou ju

Plants bluish green. Stem solitary, erect, 10–25 cm tall, 1–2 mm in diam. at base, glabrous or distalmost part sparsely white arachnoid-puberulent. Basal leaves petiolate; petiole 1–2 cm, glabrous, base sheathed; leaf blade abaxially grayish green, adaxially green, linear, linear-lanceolate, or linear-oblong, 1.5–8 cm × 2–3.5 mm, parallel veined, glabrous, base narrowed into a petiole, margin entire, revolute, apex rounded. Middle to distal stem leaves linear, 1.5–2.5 cm, apex obtuse. Capitulum solitary, nodding. Involucre hemispheric, ca. 1 × 1.5 cm, outside glabrous; phyllaries 12, in 2 rows, lanceolate or narrowly lanceolate, 2–3 mm wide, margin narrowly membranous, apex acute, white ciliate. Ray florets yellow; lamina elliptic, 1.2–1.4 cm × 4–6 mm, with brown veins, apex obtuse. Tubular florets numerous, yellow, 5–6 mm; tube ca. 1 mm. Achenes (immature) ca. 2 mm. Pappus white, as long as tubular corolla. Fl. Aug.

Alpine meadows; ca. 4300 m. SE Xizang [Bhutan, ?NE India].

26. Cremanthodium conaense S. W. Liu, Acta Biol. Plateau Sin. 3: 56. 1984.

错那垂头菊 cuo na chui tou ju

Plants bluish grayish green. Stem solitary, erect, 10–15 cm tall, 1–1.5 mm in diam. at base, proximally glabrous, distalmost part white and blackish gray pilose. Basal leaves petiolate; petiole 1–3 cm, glabrous, base sheathed; leaf blade abaxially grayish green, adaxially green, oblong or oblanceolate, 1.5–5 × 0.6–1.1 cm, glabrous, pinnate-parallel veined, margin revolute, denticulate, apex acute. Middle to distal stem leaves 3 or 4, oblong to linear, to 2.5 cm, base semiamplexicaul. Capitulum solitary, nodding. Involucre purplish red, hemispheric, 8–11 mm × to 2.5 cm, outside glabrous, base black and white pilose; phyllaries 10–12, in 2 rows, lanceolate or oblong, 2.5–3.5 mm wide, white ciliate, apex acute; inner phyllaries brown membranous at margin. Ray florets yellow; lamina oblong or oblanceolate, 1.2–1.6 cm × 3–4 mm, with 6 or 7 brown veins, apex subtruncate, 3-dentate; tube ca. 3 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 2 mm. Achenes (immature) 2–3 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

• Alpine meadows, mountain summits; 4300–4600 m. SE Xizang.

27. Cremanthodium dissectum Grierson, Notes Roy. Bot. Gard. Edinburgh 22: 431. 1958.

细裂垂头菊 xi lie chui tou ju

Stem solitary, erect, 25–40 cm tall, slender, 1.5–2 mm in diam. at base, proximally glabrous, distally brown pilose. Basal leaves long petiolate; petiole 3.5–13 cm, slender, glabrous, base sheathed; leaf blade ovate, 1.5–4 × 2–6 cm, glabrous, pinnately veined, subpinnatisect; lobes narrowly lanceolate, 1–3 cm × 1–4 mm, apex acuminate, mucronate. Middle stem leaves fewer, pinnatisect or linear. Capitulum solitary, nodding. Involucre hemispheric, 1.2–1.4 × 1.5–2 cm, outside glabrous; phyllaries 10–12, in 2 rows, oblong-lanceolate, 3–5 mm wide, margin brown membranous, apex acuminate, white ciliate. Ray florets yellow; lamina oblanceolate, 1.5–1.7 cm × 6–9 mm, apex truncate, 3-lobed. Tubular florets numerous, yellow, 7–9 mm; tube ca. 1 mm. Achenes (immature) ca. 3 mm. Pappus brown, 6–7 mm, slightly shorter than tubular corolla. Fl. and fr. Aug–Sep.

• Grassy slopes; ca. 3000 m. NW Yunnan.

28. Cremanthodium pinnatifidum Bentham, Hooker's Icon. Pl. 12: 39. 1873.

羽裂垂头菊 yu lie chui tou ju

Senecio himalayensis Franchet.

Stem solitary, erect, 8–15 cm tall, proximally glabrous, distally black pilose. Basal leaves shortly petiolate; petiole to 4 cm, base enlarged sheathed; leaf blade oblong, 1.8–5 cm, glabrous, pinnately veined, irregularly pinnatipartite; lobes 5–12 pairs, oblong, 4–8 × ca. 1 mm, margin 1- or 2-dentate. Middle to distal stem leaf absent or solitary, bracteal, base sheathed, distally lobed. Capitulum solitary, nodding. Involucre hemispheric, ca. 8 × 12 mm, outside densely black pilose; phyllaries in 2 rows, oblong, lanceolate, or ovate, ca. 1 cm × to 6 mm, apex acute or obtuse; inner phyllaries membranous at margin. Ray florets yellow; lamina oblong, to 1 cm × 4–7 mm, apex truncate, deeply dentate. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Pappus white, as long as tubular corolla. Fl. Aug.

Alpine rocky places; 4300–4600 m. SE Xizang [Bhutan, India (Sikkim), Nepal].

29. Cremanthodium sino-oblongatum R. D. Good, J. Linn. Soc., Bot. 48: 288. 1929.

铲叶垂头菊 chan ye chui tou ju

Stem solitary, erect, often purplish red, 15–25 cm tall, 1.5–2.5 mm in diam. at base, distally branched or simple, densely white arachnoid-pilose. Basal leaves petiolate; petiole 2–4 cm, white pilose, base sheathed; leaf blade spatulate, 2–5 × 1.5–4

cm, abaxially sparsely white pilose, adaxially glabrous, pinnate veins prominent abaxially, base truncate or shallowly cordate, margin triangular-dentate or denticulate, apex rounded. Stem leaves numerous, sessile or shortly petiolate, spatulate to linear, smaller distally, not amplexicaul. Capitulum usually solitary, very rarely solitary at apex of branch, nodding. Involucre hemispheric, 1.5–1.7 × 2.5–3.5 cm, outside white pilose; phyllaries 14–18, in 2 rows, lanceolate, apex acute. Ray florets yellow; lamina oblanceolate, 1.3–1.6 cm, apex truncate, lobed; tube ca. 2 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Achenes yellowish brown, cylindric, 3–4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Grassy slopes, scrub; 3900–5000 m. NW Yunnan.

30. Cremanthodium trilobum S. W. Liu, Acta Biol. Plateau Sin. 3: 61. 1984.

裂舌垂头菊 lie she chui tou ju

Stem solitary, erect, 12–15 cm tall, slender, 1.5–2 mm in diam. at base, proximally glabrous, distally brown pilose. Basal leaves petiolate; petiole 2.5–9 cm, slender, glabrous, base sheathed; leaf blade abaxially pale green or purplish red when dry, adaxially dark green, ovate or ovate-cordate, 1.5–5.5 × 1–4.5 cm, thick, nitid, glabrous, white pinnate veins prominent abaxially, base shallowly cordate or subtruncate, margin crenate-dentate, apex rounded. Stem leaves smaller distally, proximal leaves shortly petiolate, sheath amplexicaul, leaf blade ovate; distal stem leaves sessile, bracteal, linear. Capitulum solitary, nodding. Involucre hemispheric, 1.2–1.4 × to 2 cm, outside glabrous, base brown pilose; phyllaries 12–14, in 2 rows, lanceolate, 2–4 mm, white ciliate, apex acuminate; inner phyllaries membranous at margin. Ray florets yellow; lamina broadly oblanceolate, 2–3 cm × 7–9 mm, apex truncate, 3-lobed; tube ca. 2 mm. Tubular florets numerous, yellow, 8–10 mm; tube ca. 1.5 mm. Pappus pale brown, slightly shorter than tubular corolla. Fl. and fr. Aug.

• Rocky slopes; 3700–4300 m. SE Xizang.

31. Cremanthodium helianthus (Franchet) W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 14: 289. 1924.

向日垂头菊 xiang ri chui tou ju

Senecio helianthus Franchet, Bull. Soc. Bot. France 39: 286. 1892.

Plants grayish green, mealy. Stem solitary, erect, 7–56 cm tall, 2–4 mm in diam. at base, glabrous. Basal leaves petiolate; petiole 1–12 cm, slender, glabrous, base long sheathed; leaf blade ovate-elliptic to broadly elliptic, 3–15 × 1.2–9 cm, glabrous, pinnately veined, base cuneate, margin entire, apex obtuse. Stem leaves 6–8, sessile, erect, adnate, tubular-amplexicaul. Capitulum solitary, nodding; leaflike bracts several, ovate-lanceolate or broadly elliptic, 1.5–2.5 × to 1.5 cm, grayish green, glabrous, margin entire, usually surrounding capitulum. Involucre hemispheric, 1–1.5 × 2–2.5 cm, outside glabrous, grayish green or blackish gray when dry; phyllaries 12–20, in 2 rows, lanceolate or ovate-lanceolate, 3–7 mm wide, apex acute or acuminate. Ray florets yellow; lamina narrowly lanceolate, to 3.5 cm × 3–4 mm, apex acuminate or caudate, 3-lobed; tube ca. 2 mm. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1 mm; limb cylindric. Achenes pale brown, oblong, 3–5 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Nov.

• Forest understories, scrub, grassy slopes, alpine meadows; 2800–4500 m. SW Sichuan, NW Yunnan.

32. Cremanthodium suave W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 203. 1920.

木里垂头菊 mu li chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 20–40 cm tall, 2–4 mm in diam. at base, glabrous. Basal leaves petiolate; petiole to 6 cm, glabrous, with narrow wings, base sheathed; leaf blade narrowly elliptic or narrowly spatulate, 10–18 × to 2.5 cm, thick, succulent, glabrous, pinnately veined, base gradually narrowed into petiole, margin entire, apex acute or obtuse. Stem leaves 4–6, sessile, bracteal, lanceolate, 2–9 cm, smaller distally. Capitulum solitary, nodding; leaflike bracts 5 or 6, grayish green, ovate or ovate-lanceolate, to 1.5 × 1.2 cm, apex acute, glabrous. Involucre hemispheric, ca. 1 × to 2.5 cm, outside glabrous; phyllaries in 2 rows, lanceolate or ovate-lanceolate, 3–5 mm wide, apex acuminate. Ray florets yellow; lamina linear-lanceolate, to 3 cm, apex acuminate. Tubular florets numerous, yellow, ca. 8 mm; tube ca. 3 mm. Achenes (immature) oblong, 3–5 mm. Pappus white, ca. 4 mm, shorter than tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

• Forest understories, grassy slopes, alpine meadows; 3000–4300 m. SW Sichuan, NW Yunnan.

33. Cremanthodium botryocephalum S. W. Liu, Acta Biol. Plateau Sin. 3: 55. 1984 [*"botrycephalum"*].

总状垂头菊 zong zhuang chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 50–55 cm tall, 4–5 mm in diam. at base, proximally glabrous, distally white puberulent and brown pilose. Basal leaves petiolate; petiole 5–6 cm, slender, glabrous, winged; leaf blade broadly elliptic or oblong, 10–11 × 4–7 cm, pinnately veined, glabrous, base narrowed into a petiole, margin entire, apex obtuse. Stem leaves 7–9, smaller distally; middle leaves sessile, broadly elliptic or oblong, to 8 × 5 cm, base rounded, semiamplexicaul, margin entire, apex obtuse. Distal stem leaves lanceolate to linear, erect, adnate, base semiamplexicaul. Capitula 5 or 6, in lax raceme, nodding; peduncles 1–2 cm, white puberulent and brown pilose. Involucre nearly hemispheric, 6–8 × ca. 10 mm, outside glabrous, base hairy; phyllaries 8–10, in 2 rows, oblong, 3–4 mm wide, ciliate, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina elliptic, 5–6 × ca. 4 mm, apex obtuse, 2- or 3-dentate; tube ca. 1 mm. Tubular florets numerous, ca. 5 mm, apex dark brown; tube ca. 1 mm. Achenes (immature) oblong, ca. 4 mm. Pappus pale yellow, 2–3 mm, shorter than tubular corolla. Fl. Jul.

• Grassy slopes; ca. 3100 m. S Xizang.

34. Cremanthodium spathulifolium S. W. Liu, Acta Biol. Plateau Sin. 3: 56. 1984.

匙叶垂头菊 shi ye chui tou ju

Cremanthodium hirtiflorum S. W. Liu.

Plants grayish green, mealy. Stem solitary, erect, to 100 cm tall, 4–5 mm in diam. at base, proximally glabrous, distally shortly white pilose. Basal leaves petiolate; petiole 5–12 cm, glabrous, base sheathed; leaf blade oblong-spatulate, 10–15 × 4–7.5 cm, glabrous, pinnately veined, base gradually narrowed into a winged petiole, margin entire, apex rounded or obtuse. Middle to distal stem leaves 6 or 7, erect, adnate, sessile, smaller distally, oblong to lanceolate, base semiamplexicaul, apex acuminate. Capitula ca. 10, in raceme, nodding; peduncles to 3 cm, shortly white pilose. Involucre hemispheric, 6–7 × ca. 10 mm, outside glabrous; phyllaries 13, in 2 rows, 1.5–3 mm wide, apex acuminate, ciliate; outer phyllaries lanceolate; inner phyllaries oblong, margin white membranous. Ray florets yellow, lamina oblong, ca. 7 × 2 mm, apex acute; tube ca. 1 mm. Tubular florets numerous, ca. 5 mm; tube ca. 1.5 mm. Achenes pale brown, obovoid, ca. 5 mm, ribbed. Pappus pale yellow, 2–3 mm, shorter than tubular corolla. Fl. and fr. Sep.

• Scrub; ca. 2900 m. S Xizang.

35. Cremanthodium glaucum Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 641. 1937.

灰绿垂头菊 hui lü chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 12–40 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally white puberulent. Basal leaves petiolate; petiole 3–7 cm, slender, glabrous, base sheathed; leaf blade oblong or elliptic, 2.5–14 × 1.4–7.3 cm, glabrous, pinnately veined, abaxially prominent, base cuneate or subtruncate, margin entire, apex rounded or acute. Stem leaves 4–6, sessile, oblong to lanceolate, base amplexicaul, margin entire, apex acute or acuminate. Capitulum solitary, nodding. Involucre hemispheric, 1–1.2 × 1.5–2 cm, outside glabrous, grayish green; phyllaries 12–14, in 2 rows, lanceolate or ovate-lanceolate, 3–5 mm wide, white ciliate, apex acute; inner phyllaries membranous at margin. Ray florets yellow; lamina lanceolate, 1.5–2 cm × 3–4 mm, apex acuminate; tube ca. 1 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Achenes dark brown, oblong, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct.

• Grassy slopes, alpine meadows; 3400–4000 m. NW Yunnan.

36. Cremanthodium bupleurifolium W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 112. 1913.

柴胡叶垂头菊 chai hu ye chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 20–40 cm tall, 2–3 mm in diam. at base, proximally glabrous, distally black pilose. Basal leaves long petiolate; petiole 5–11 cm, glabrous; leaf blade grayish green, elliptic to oblong, 3.5–11 × 1.5–4.5 cm, glabrous, pinnately veined, base cuneate or subtruncate, margin entire or slightly denticulate, apex rounded or acute. Stem leaves 2–4, sessile, obovate-oblong to oblanceolate, erect, adnate, base amplexicaul. Capitulum solitary, nodding. Involucre black, hemispheric, 7–10 × ca. 15 mm, outside glabrous, base black pilose; phyllaries in 2 rows, 3–7 mm wide, apex acute; outer phyllaries linear to lanceolate; inner phyllaries oblong or oblanceolate, margin membranous. Ray florets yellow; lamina lanceolate, 7–15 × ca. 4 mm, apex acuminate; tube 1.5–2 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Achenes brown, oblong, ca. 4 mm. Pappus absent. Fl. Jun–Aug.

• Grassy slopes, gravelly places; 3500–4100 m. SW Sichuan, SE Xizang, NW Yunnan.

37. Cremanthodium brachychaetum C. C. Chang, Acta Phytotax. Sin. 1: 322. 1951.

短缨垂头菊 duan ying chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 25–35 cm tall, proximally glabrous, distally black pilose. Basal leaves petiolate; petiole 5–11 cm, slender, glabrous; leaf blade oblong or elliptic, 2–5 × 1–3 cm, glabrous, pinnately veined, base cuneate or truncate, margin sparsely dentate, apex obtuse. Stem leaves 3, sessile, erect, adnate, oblong, 2.5–4 × ca. 1.5 cm, base semiamplexicaul. Capitulum 1(or 2), nodding; peduncles 4–9 cm, black pilose. Involucre hemispheric, 8–10 × ca. 15 mm, outside black, glabrous; phyllaries in 2 rows, oblong, 2–4 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets yellow; lamina oblong, 1.1–1.3 cm × to 6 mm, apex obtuse or acute, 2- or 3-dentate; tube ca. 1 mm. Tubular florets numerous, yellowish brown, ca. 5 mm; tube ca. 1 mm; limb ca. 2 mm wide. Achenes oblanceolate, ca. 5 mm. Pappus yellowish white, 1–2 mm, shorter than tubular corolla. Fl. Jul–Aug.

• Grassy slopes; ca. 3500 m. NW Yunnan.

38. Cremanthodium lingulatum S. W. Liu, Acta Biol. Plateau Sin. 3: 57. 1984.

舌叶垂头菊 she ye chui tou ju

Plants grayish green, mealy. Stem solitary, erect, 25–56 cm tall, 2–3 mm in diam. at base, glabrous. Basal leaves petiolate; petiole 2–5 cm, narrowly winged, base narrowly sheathed; leaf blade oblong or lingulate-spatulate, 2.5–10 × 1.5–3 cm, glabrous, pinnately veined, base cuneate, gradually narrowed into petiole, margin entire or denticulate, apex rounded. Stem leaves 3–5, erect, adnate, tubular-amplexicaul; leaf blade obovate-oblong or oblong, 2.5–5.5 cm, apex rounded. Capitulum solitary, nodding. Involucre hemispheric, ca. 1.5 × to 2 cm, outside glabrous, blackish gray when dry; phyllaries 10–14, in 2 rows; outer phyllaries lanceolate, 2–3 mm wide, apex acuminate; inner phyllaries oblong, 4–7 mm wide, apex acute or obtuse. Ray florets yellow; lamina linear-lanceolate, 2.5–3 cm × 2–2.5 mm, apex acuminate; tube 4–5 mm. Tubular florets numerous, blackish gray when dry, 5–6 mm; tube to 1.5 mm. Achenes yellowish brown, cylindric, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

• Scrub, alpine meadows; 2800–5000 m. SE Xizang, NW Yunnan.

39. Cremanthodium yadongense S. W. Liu, Acta Biol. Plateau Sin. 3: 62. 1984.

亚东垂头菊 ya dong chui tou ju

Plants gray-green, mealy. Stem solitary, erect, 25–56 cm tall, 2–3 mm in diam. at base, lower part glabrous, upper part brown pilose. Basal leaves petiolate; petiole 1–3 cm, glabrous and mealy, base narrowly sheathing; leaf blade ovate, 3–6 × 2.5–4.5 cm, glabrous, pinnately veined, base cordate, cuneate,

margin entire or denticulate, apex obtuse. Stem leaves 1–3, erect, adnate, tubular-amplexicaul. Capitulum solitary, nodding. Involucre hemispherical, 1–1.3 mm, to 2.5 cm wide, outside glabrous, base brown pilose, black-gray when dry; phyllaries 14–20, in 2 rows, oblong or lanceolate, 3–5 mm wide, apex acuminate; inner phyllaries with brown margin. Ray florets yellow; lamina lanceolate, 15–20 × 3–6 mm, apex acuminate; tube ca. 2 mm. Tubular florets numerous, yellow-brown, ca. 7 mm; tube to 1 mm; limb tubular, ca. 2 mm wide. Achenes cylindric, ca. 4 mm. Pappus white, as long as corolla. Fl. Jul, fr. Aug.

• Grassy slopes, alpine meadows; 4000–4800 m. Xizang (Yadong).

40. Cremanthodium cordatum S. W. Liu, Acta Biol. Plateau Sin. 7: 28. 1988.

心叶垂头菊 xin ye chui tou ju

Plants grayish green. Stem solitary, erect, 15–25 cm tall, shortly white and black pilose. Basal leaves petiolate; petiole 1–2.5 cm, brown pilose; leaf blade cordate or ovate-cordate, rarely oblong-cordate, 2–8.5 × 1.6–7 cm, abaxially viscid-pilosulose, adaxially glabrous, pinnately veined, base cordate, margin entire or crenate and pilose, apex rounded. Stem leaves 3 or 4, bracteal, linear. Capitulum solitary, nodding. Involucre black when dry, hemispheric, 1–1.2 × 1.5–2 cm, outside glabrous, base black pilose; phyllaries in 2 rows, linear-oblong, apex acute. Ray florets yellow; lamina oblong, 1–1.2 cm × ca. 2 mm, apex 2- or 3-lobed; tube ca. 3 mm. Tubular florets numerous, dark yellow, ca. 6 mm; tube ca. 1 mm. Achenes yellowish brown, cylindric, 4–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Grasslands in valleys; ca. 4200 m. S Xizang.

41. Cremanthodium petiolatum S. W. Liu, Acta Biol. Plateau Sin. 3: 64. 1984.

长柄垂头菊 chang bing chui tou ju

Stem solitary, erect, to 55 cm tall, 4.5–5 mm in diam. at base, proximally glabrous, distally black pilose. Basal leaves petiolate; petiole 15–30 cm, glabrous, base sheathed, proximally purplish red; leaf blade broadly elliptic, 12–15 × 6–9 cm, glabrous, both surfaces with conspicuous pinnate veins, base broadly cuneate, margin coarsely sharply dentate, apex rounded. Stem leaves smaller distally, proximal leaves petiolate or sessile; sheath to 5 cm, tubular; leaf blade obovate-oblong, to 10 × 4 cm, margin shallowly sharply dentate, apex rounded; upper leaves sessile, without sheath, oblong, base semiamplexicaul, margin sharply dentate. Capitula 3, in corymb-raceme; peduncles 4–10 cm, black pilose. Involucre hemispheric, 1–1.2 × ca. 1.5 cm, outside densely black pilose; phyllaries 12–14, in 1 row, base united and cupular, separate part linear, 2–3 mm wide, apex acuminate, white ciliate. Ray florets yellow; lamina narrowly lanceolate to linear-lanceolate, 1.5–2 cm × 3–5 mm, apex acuminate; tube ca. 1.5 mm. Tubular florets numerous, yellowish brown, ca. 7 mm; tube ca. 2 mm; limb narrowly cylindric. Achenes white, oblong, ca. 4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul.

• Stream banks on mountains; ca. 4500 m. SW Xizang.

42. Cremanthodium nanum (Decaisne) W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 14: 118. 1924.

小垂头菊 xiao chui tou ju

Ligularia nana Decaisne in Jacquemont, Voy. Inde 4(Bot.): 91. 1843; *Cremanthodium deasyi* Hemsley; *Senecio clarkeanus* Franchet (1892), not A. Gray (1868); *S. sessilifolius* Schultz Bipontinus; *Werneria nana* (Decaisne) Bentham & J. D. Hooker.

Stem solitary, erect, 5–10 cm tall, proximally glabrous, purplish red, distally densely white puberulent; underground stem white, with scale leaf. Basal leaves petiolate; petiole 2–4 cm, glabrous, base sheathed; leaf blade ovate, obovate, or orbicular, 1–3.9 × 0.5–2.7 cm, densely white puberulent or abaxially glabrescent, adaxially glabrous, pinnately or subparallel veined to petiole, base cuneate, margin entire, apex rounded or acute. Stem leaves crowded distally, 2–4, sessile, ovate to oblong, both surfaces white puberulent or adaxially glabrescent, base semiamplexicaul. Capitulum solitary. Involucre hemispheric, 1–1.5 × 1.5–3 cm, outside densely black and white pilose; phyllaries 10–14, in 1 row, base united and cupular; separate part oblong, 2–3 mm wide, spreading at anthesis, apex obtuse or rounded. Ray florets yellow; lamina elliptic, 6–8 × 3–4 mm, shorter than phyllaries, apex obtuse, dentate; tube 3–5 mm. Tubular florets numerous, yellow, 5–8 mm; corolla narrowly funnelform. Achenes yellowish brown, linear-cylindric, 3–6 mm, ribbed. Pappus white, numerous, in many rows, outer ones 5–12 mm, longer than tubular corolla, thick. Fl. and fr. Jul–Aug.

Gravelly areas on mountains; 4000–5400 m. SW Sichuan, S Xinjiang, Xizang, NW Yunnan [India (Sikkim), Kashmir, Nepal, Pakistan].

43. Cremanthodium microglossum S. W. Liu, Novon 6: 185. 1996.

小舌垂头菊 xiao she chui tou ju

Stem solitary, erect, dark purple, 4–15 cm tall, proximally glabrous, distally white and black puberulent. Basal leaves petiolate; petiole purplish brown, 4–14 cm, glabrous; leaf blade ovate or broadly ovate, 1–3 × 0.7–2.4 cm, with 3–5 pinnate veins, both surfaces white and black puberulent, base rounded or truncate, margin entire, apex rounded. Stem leaves 3, petiolate or sessile, ovate to oblong-ovate, 1.5–4 × 1–2 cm, both surfaces white puberulent or only abaxially, base semiamplexicaul, apex obtuse. Capitulum solitary, erect. Involucre hemispheric, 1.5–2 × 2.5–3 cm, outside densely white and black puberulent; phyllaries 9–12, in 1 row, oblong to narrowly lanceolate, 3–7 mm wide, rectangular-spreading from middle, apex obtuse to acute. Outer florets white; corolla narrowly tubular, 3–6 mm, slender; limb apically truncate or a small linear lamina; style 6.5–11 mm. Central florets numerous, orange, tubular; limb 5-lobed. Achenes yellowish brown, cylindric, 4–6 mm, ribbed. Pappus white, 1–1.2 cm, as long as tubular corolla. Fl. and fr. Jul–Sep. $2n = 58$*.

• Grassy slopes in gravelly areas on mountains, alpine meadows, swamp meadows; 4000–5400 m. SW Gansu, Qinghai, SW Sichuan, NW Yunnan.

44. Cremanthodium microphyllum S. W. Liu, Fl. Xizang. 4: 856. 1985.

小叶垂头菊 xiao ye chui tou ju

Stem solitary, erect, ca. 7 cm tall, ca. 1 mm in diam. at base, with rosette leaves, proximally glabrous, distally white and black pilose. Basal leaves 2, petiolate; petiole purplish brown, to 6 cm, glabrous, base sheathed; leaf blade ovate, 1.5–1.7 × ca. 1 cm, glabrous, pinnately veined, base cuneate, margin entire, slightly revolute, apex rounded. Stem leaves 3, proximal one a scale; middle one petiolate; petiole purplish red, glabrous, ca. 1 cm, base enlarged, sheath amplexicaul; leaf blade ovate; distal one linear, white puberulent. Capitulum solitary. Involucre hemispheric, 8–9 × ca. 15 mm, outside densely white and black pilose; phyllaries 10–12, in 1 row, base united and cupular; separate part narrowly lanceolate, 1.5–2.5 mm wide, apex acute. Ray florets yellow; lamina narrowly oblong, ca. 15 × 3–5 mm, extending from involucre. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1.5 mm. Achenes (immature) 2–3 mm. Pappus white, as long as tubular corolla. Fl. Jul.

• Gravelly areas on mountains; 4800–5000 m. SE Xizang.

45. Cremanthodium humile Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 481. 1882.

矮垂头菊 ai chui tou ju

Cremanthodium comptum W. W. Smith; *Senecio kansuensis* Franchet.

Stem solitary, erect, 5–20 cm tall, 2–3 mm in diam. at base, proximally glabrous, distally long white and black pilose; underground stem stocklike, horizontal or ascending, with scale leaf and roots on nodes. Rosette of leaves absent. Stem leaves numerous. Proximal stem leaves petiolate; petiole 2–14 cm, glabrous, base ± sheathed; leaf blade ovate or ovate-oblong, sometimes orbicular, 0.7–6 × 1–4 cm, abaxially densely white puberulent, adaxially glabrous, pinnately veined, base cuneate or rounded, margin entire or shallowly dentate, apex obtuse or rounded. Middle to distal stem leaves sessile or shortly petiolate; leaf blade ovate to linear, smaller distally, abaxially densely white puberulent, margin entire or dentate. Capitulum solitary. Involucre hemispheric, 8–13 × 10–30 mm, outside densely white and black pilose; phyllaries 8–12, in 1 row, base united and cupular; separate part linear-lanceolate, 2–3 mm wide, apex acute or acuminate. Ray florets yellow; lamina extending from involucre, elliptic, 1–2 cm × 3–4 mm, apex acute; tube ca. 3 mm. Tubular florets numerous, yellow, 7–9 mm; tube ca. 3 mm. Achenes brown, oblong, 3–4 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Nov. $2n = 60^*, 116^*$.

Gravelly areas on mountains; 3500–5300 m. Gansu, Qinghai, SW and W Sichuan, E Xizang, NW Yunnan [Bhutan].

46. Cremanthodium laciniatum Y. Ling & Y. L. Chen ex S. W. Liu, Acta Biol. Plateau Sin. 3: 65. 1984.

条裂垂头菊 tiao lie chui tou ju

Stem solitary, erect, 12–21 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally long white and black pilose; underground stem stocklike, horizontal or ascending, with scale leaf and roots on nodes. Rosette of leaves absent. Proximal stem leaves petiolate; petiole to 4 cm, abaxially white puberulent, base ± sheathed; leaf blade adaxially green, oblong, 1.5–6 × to 2 cm, abaxially densely white puberulent, adaxially glabrous, pinnately veined, margin laciniate; lobes oblong or linear-oblong, to 6 mm, apex acute. Middle to distal stem leaves sessile or shortly petiolate, oblong to linear, smaller distally, margin entire or denticulate, apex acute. Capitulum solitary. Involucre hemispheric, 1.2–1.7 × ca. 1.5 cm, outside densely long white and black pilose; phyllaries 8–12, in 1 row, base united and cupular; separate part linear-lanceolate, 1.5–2 mm wide, apex acuminate. Ray florets yellow; lamina extending from involucre, oblong, to 1.7 cm, apex acute; tube ca. 4 mm. Tubular florets numerous, yellow, ca. 7 mm; tube ca. 1 mm. Achenes (immature) cylindric, 2–3 mm, apex truncate, ribbed. Pappus white, as long as or shorter than tubular corolla. Fl. Aug, fr. Aug–Sep.

• Gravelly areas on mountains; ca. 4100 m. E Xizang.

47. Cremanthodium discoideum Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 482. 1882.

盘花垂头菊 pan hua chui tou ju

Cremanthodium cuculliferum W. W. Smith; *Senecio discoideus* (Maximowicz) Franchet.

Stem solitary, erect, 15–30 cm tall, proximally glabrous, distally long white and purplish brown pilose. Basal leaves petiolate; petiole 1–6 cm, glabrous, base sheathed; leaf blade abaxially grayish green, adaxially green or greenish white, ovate-oblong or ovate-lanceolate, 1.5–4 × 0.7–1.5 cm, glabrous, with obscure pinnate veins, base rounded, margin entire or rarely denticulate, apex obtuse. Stem leaves few, proximal leaves sessile, lanceolate, base semiamplexicaul; distal leaves linear. Capitulum solitary, nodding. Involucre hemispheric, 8–10 × 15–25 mm, outside densely long dark brown pilose; phyllaries 8–10, in 2 rows, linear-lanceolate, 1–3 mm wide, apex acuminate or acute. Florets numerous, blackish purple, all tubular, 7–8 mm; tube 2–3 mm. Achenes brown, cylindric, 4–6 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Aug. $2n = 58$.

Grassy slopes, canopy gaps in forests, gravelly areas on mountains, swamp meadows; 3000–5000 m. Gansu, Qinghai, Sichuan, Xizang [Bhutan, ?India (Sikkim), Nepal].

48. Cremanthodium obovatum Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 3: 59. 1984.

硕首垂头菊 shuo shou chui tou ju

Stem solitary, erect, 20–30 cm tall, ca. 4 mm in diam. at base, distally branched in synflorescence, densely white puberulent. Basal leaves petiolate; petiole purplish red, 3.5–8.5 cm, to 1.6 cm wide, broadly winged, base sheathed; leaf blade obovate, oblong, or elliptic, 6–9 × 3–5 cm, both surfaces white pilose or adaxially glabrescent, pinnately veined, base broadly cuneate, attenuate into a winged petiole, margin entire or remotely denticulate, apex rounded or obtuse. Middle to distal

stem leaves smaller, lanceolate to linear, apex acuminate. Capitula 1–4, in corymbose raceme or solitary, nodding; peduncles 9–17 cm. Involucre hemispheric, 1.5–2 × 3–4 cm, outside densely white puberulent and black pilose; phyllaries 14–24, in 2 rows, 3–5 mm wide, apex acuminate, ciliate; outer phyllaries narrowly lanceolate; inner phyllaries lanceolate, margin brown membranous. Ray florets yellow; lamina narrowly lanceolate, 2–4 cm × 4–8 mm, apex acute, 3-dentate; tube ca. 5 mm. Tubular florets numerous, dark yellow, 6–8 mm; tube ca. 2 mm; limb cylindric. Achenes brown, cylindric, ca. 6 mm, ribbed. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Gravelly areas on mountains; 4800–5000 m. NW Sichuan (Sêrtar), SE Xizang.

49. Cremanthodium puberulum S. W. Liu, Acta Biol. Plateau Sin. 3: 61. 1984.

毛叶垂头菊 mao ye chui tou ju

Stem solitary, erect, 20–35 cm tall, 3–6 mm in diam. at base, shortly white pilose. Basal leaves petiolate; petiole 3–6 cm, shortly white pilose, base sheathed; leaf blade oblong or ovate-oblong, rarely suborbicular, 3.5–9 × 2–6 cm, both surfaces densely shortly white pilose, pinnately veined, base rounded or broadly cuneate, margin shallowly dentate, apex rounded or obtuse. Stem leaves 3–5, sessile, bracteal, oblong to linear, 3–5 cm, base semiamplexicaul. Capitulum solitary, nodding. Involucre black, hemispheric, 9–11 × 20–25 mm, outside densely white puberulent and dark brown pilose; phyllaries 12–16, in 2 rows, lanceolate, 3–5 mm wide, apex acute; inner phyllaries membranous at margin. Ray florets yellow; lamina linear-oblong, (2–)3–4 cm × 2–5 mm, apex acute, dentate; tube ca. 7 mm. Tubular florets numerous, dark yellow, 8–11 mm; tube 3–5 mm. Achenes cylindric, ca. 5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jun–Sep.

• Grassy slopes, alpine meadows, gravelly areas on mountains; 4800–5000 m. SW Qinghai, NE Xizang.

50. Cremanthodium prattii (Hemsley) R. D. Good, J. Linn. Soc., Bot. 48: 285. 1929.

长舌垂头菊 chang she chui tou ju

Senecio prattii Hemsley, Hooker's Icon. Pl. 25: t. 2491. 1896.

Stem solitary, erect, 25–40 cm, ca. 3 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 4–12 cm, glabrous, base ± sheathed; leaf blade abaxially greenish white, adaxially dark green, ovate or ovate-oblong, 2–7.5 × 1.5–4 cm, glabrous, pinnately veined, base cordate, margin entire or rarely denticulate, apex rounded. Stem leaves 1 or 2, sessile, oblong, base semiamplexicaul, margin entire, apex obtuse. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 2–3 cm, outside densely long brown and white pilose; phyllaries 12–16, in 2 rows, lanceolate, 1.5–4 mm wide, apex caudate-acuminate. Ray florets yellow; lamina linear-lanceolate, 4–6 cm × 2–5 mm, apex long acuminate, entire or lobed. Tubular florets numerous, yellow, 6–7 mm; tube 1.5–2 mm. Achenes oblong, 5–6 mm, tuberculate. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Aug.

• Wet grassy slopes, alpine meadows; 3200–4400 m. NW Sichuan.

51. Cremanthodium delavayi (Franchet) Diels ex H. Léveillé, Cat. Pl. Yun-Nan, 43. 1916.

大理垂头菊 da li chui tou ju

Senecio delavayi Franchet, Bull. Soc. Bot. France 39: 286. 1892.

Stem solitary, erect, 20–50 cm tall, 3–6 mm in diam. at base, proximally glabrous, distally white puberulent. Basal leaves petiolate; petiole ca. 20 cm × to 5 mm, base narrowly sheathed; leaf blade broadly triangular or ovate-triangular, 6–13 × 7–10 cm, glabrous or abaxially initially white puberulent, glabrescent, pinnate veins prominent abaxially, base truncate, margin sharply dentate or undulate-dentate, apex acute. Middle stem leaves shortly petiolate, base sheathed; leaf blade ovate-triangular, small, ca. 6 × to 7 cm. Distal stem leaves sessile, ovate-lanceolate, base semiamplexicaul. Capitulum solitary, nodding. Involucre hemispheric, 1–1.2 × 2–2.5 cm, outside glabrous, rarely puberulent at base; phyllaries 10–14, in 2 rows, ovate-lanceolate or elliptic, 6–8 mm wide, apex acute. Ray florets yellow; lamina linear-lanceolate, 2.5–4.5 cm, to 9 mm wide at base, apex caudate-acuminate, 3-lobed; tube ca. 2 mm. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1 mm; limb campanulate, 3–3.5 mm. Achenes oblanceolate, ca. 4 mm, ribbed. Pappus brown, as long as tubular corolla. Fl. and fr. Jul–Sep.

Grassy slopes, wastelands; 3600–4200 m. NW and W Yunnan [Myanmar].

52. Cremanthodium sagittifolium Y. Ling & Y. L. Chen ex S. W. Liu, Acta Biol. Plateau Sin. 1: 54. 1982.

箭叶垂头菊 jian ye chui tou ju

Stem solitary, erect, purplish red, 10–20 cm tall, 1.5–2 mm in diam. at base, proximally glabrous, distally brown and white pilose. Leaves nitid, leathery. Basal leaves petiolate; petiole purplish red, 2–5 cm, base narrowly sheathed; leaf blade abaxially pale green, adaxially dark green, sagittate, 1.5–3 × 1.2–2 cm, pinnate veins prominent abaxially, base deeply cordate, margin sparsely denticulate or entire, apex acute; basal lobes slightly divergent. Stem leaves 1 or 2. Middle stem leaves smaller, sagittate, petiolate; petiole purplish red, base enlarged into a sheath. Distal stem leaves bracteal, linear. Capitulum solitary, nodding. Involucre hemispheric, 1.1–1.3 × 1.8–2.5 cm, outside glabrous, base brown pilose; phyllaries 12–14, in 2 rows, oblong or broadly elliptic, 3–8 mm wide, apex acute; inner phyllaries pale brown membranous at margin. Ray florets yellow; lamina lanceolate, 1.5–2.5 cm × 6–8 mm, apex acuminate, 2- or 3-lobed; tube 1.5–2 mm. Tubular florets numerous, yellow, 6–7 mm; tube 1.5–2 mm; limb narrowly tubular, anthers blackish purple. Achenes narrowly oblanceolate, ca. 5 mm, ribbed. Pappus pale brown, 4–5 mm, shorter than tubular corolla. Fl. and fr. Jul–Oct.

• Alpine meadows; 3400–4400 m. NE Yunnan.

53. Cremanthodium daochengense Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 54. 1982.

稻城垂头菊 dao cheng chui tou ju

Stem solitary, erect, purplish red, to 50 cm tall, 3–4 mm in diam. at base, proximally glabrous, distally long white and purplish red pilose. Basal leaves petiolate; petiole 7–9 cm, slender, base sheathed, distally slightly broadened; leaf blade abaxially pale green, adaxially dark green, broadly lanceolate, 2.5–10 cm, middle to 2 cm wide, glabrous, conspicuously pinnately veined, base broadly cuneate to cuneate, margin undulately coarsely triangular-dentate, apex obtuse or acute. Stem leaves 3 or 4. Proximal stem leaves petiolate; petiole short, enlarged into a sheath; leaf blade lanceolate or reduced. Distal stem leaves subulate, ca. 5 mm. Capitulum solitary, nodding. Involucre hemispheric, 0.9–1.5 × 2–2.5 cm, outside densely long purplish red and white pilose; phyllaries 14–16, in 2 rows, linear, 1–2 mm wide, apex acuminate; inner phyllaries narrowly membranous at margin. Ray florets yellow; lamina linear-lanceolate, 3.5–3.7 cm × 3–4 mm, with 5–7 brown veins, apex long acuminate, laciniate-dentate. Tubular florets numerous, purple, 5–7 mm; tube 1–2 mm; limb narrowly tubular; anthers purple. Achenes dark brown, oblanceolate, ca. 4 mm. Pappus white, 7–9 mm, slightly longer than tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

• Stream banks, alpine swamp meadows, alpine meadows; 4700–5400 m. SW Sichuan.

54. Cremanthodium nobile (Franchet) Diels ex H. Léveillé, Cat. Pl. Yun-Nan, 43. 1916.

壮观垂头菊 zhuang guan chui tou ju

Senecio nobilis Franchet, Bull. Soc. Bot. France 39: 287. 1892.

Stems 1–4, erect, 15–40 cm tall, 2–4 mm in diam. at base, shortly black pilose, proximally glabrescent. Basal leaves sessile or shortly petiolate; petiole to 3 cm, broadly or narrowly winged; leaf blade obovate, broadly elliptic, or suborbicular, 1.2–10 × 1–5.5 cm, glabrous, pinnate veins prominent abaxially, base cuneate, narrowed into petiole, margin entire, apex obtuse or rounded. Stem leaves few, sessile, narrowly oblong to linear, base not amplexicaul. Capitulum solitary, nodding. Involucre hemispheric, 1.2–1.7 × 2–3 cm, outside shortly brown or dark brown pilose; phyllaries 10–14, in 2 rows; outer phyllaries lanceolate, 4–5 mm wide, apex acuminate; inner phyllaries broadly ovate, to 8 mm wide, margin shortly pilose and broadly membranous, apex acute. Ray florets yellow; lamina narrowly lanceolate or narrowly elliptic, 2.5–3.5 × 0.4–1 cm, apex acuminate or caudate-acuminate; tube ca. 3 mm. Tubular florets numerous, yellow, 5–6 mm; tube ca. 1 mm. Achenes obovoid, 2–4 mm, conspicuously ribbed, apex narrowed into a short rostrum, between ribs purplish red. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Scrub, alpine meadows; 3400–5000 m. SW Sichuan, SE Xizang, NW Yunnan.

55. Cremanthodium pilosum S. W. Liu, Acta Biol. Plateau Sin. 7: 29. 1988.

黄毛垂头菊 huang mao chui tou ju

Stem solitary, erect, 30–35 cm tall, 2–2.5 mm in diam. at base, shortly black pilose. Basal leaves petiolate; petiole 2–3.5 cm, densely shortly black pilose, base sheathed; leaf blade oblong, broadly elliptic, or obovate, 2.5–6 × 2–4 cm, both surfaces densely yellow pilose, pinnately veined, base cuneate, margin denticulate or subentire, apex obtuse-rounded. Stem leaves sessile, narrowly oblong to linear, 1.5–3 × 0.4–1.2 cm, densely yellow pilose. Capitulum solitary, nodding. Involucre hemispheric, ca. 1 × 1.5–2 cm, outside brown pilose; phyllaries ca. 12, in 2 rows, oblong, ca. 2 mm wide, apex rounded. Ray florets yellow; lamina lanceolate, 1.5–2.5 cm × 4–7 mm, with 5–7 brown veins, apex acuminate; tube ca. 2 mm. Tubular florets numerous, 6–7 mm; tube 1–1.5 mm. Achenes yellowish brown, oblanceolate, ca. 4 mm. Pappus white, shorter than tubular corolla. Fl. and fr. Aug.

• Grasslands, forest understories; 3500–4000 m. SW Sichuan.

56. Cremanthodium arnicoides (Candolle ex Royle) R. D. Good, J. Linn. Soc., Bot. 48: 288. 1929.

宽舌垂头菊 kuan she chui tou ju

Ligularia arnicoides Candolle ex Royle, Ill. Bot. Himal. Mts. 251, t. 60, f. 2. 1835; *Senecio arnicoides* (Candolle ex Royle) Wallich ex C. B. Clarke.

Stem solitary, erect, 10–15(–45) cm tall, 3–6 mm in diam. at base, proximally glabrous, distally white and black pilose. Basal leaves petiolate; petiole to 5 cm, base sheathed; leaf blade ovate or ovate-oblong, 3–8 × 2.5–6 cm, thin, herbaceous, glabrous or abaxially hairy along veins, pinnate veins prominent abaxially, base cuneate or subrounded, margin coarsely dentate, apex acute. Middle stem leaves shortly petiolate, base sheathed, amplexicaul; leaf blade ovate, 3–7 × 2–6 cm, glabrous, base cuneate or rounded, margin coarsely dentate, apex obtuse. Distal stem leaves sessile, ovate, base cordate, amplexicaul. Distalmost stem leaves bracteal, lanceolate to oblong, both surfaces hairy. Capitula 1–4, in lax raceme, nodding; peduncles 2–3.5 cm, white pilose. Involucre hemispheric or broadly campanulate, 9–20 × 20–40 mm, outside black pilose; phyllaries ca. 14, in 2 rows, 3–10 mm wide, apex acute, white ciliate; outer phyllaries lanceolate; inner phyllaries broadly ovate, margin broadly membranous. Ray florets yellow; lamina broadly elliptic, 1.5–2.7 cm × 6–9 mm, apex obtuse, 3-dentate. Tubular florets numerous, 6–9 mm; tube 1–3 mm; limb narrowly campanulate. Achenes brown, cylindric, 5–6 mm, ribbed. Pappus white, as long as tubular corolla. Fl. Aug.

Gravelly areas on mountains; 3600–4600 m. S and SW Xizang [Kashmir, Nepal, Pakistan].

57. Cremanthodium chungdienense Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 1: 52. 1982.

中甸垂头菊 zhong dian chui tou ju

Plants white arachnoid-puberulent. Stem solitary, erect, 32–76 cm tall, 8–10 mm in diam. at base. Basal leaves petiolate; petiole to 15 cm, winged; wings entire, wider distally; leaf blade ovate or ovate-oblong, 14–23 × 7–14 cm, herbaceous, both surfaces initially white arachnoid-puberulent, glabrescent in fruit, pinnately veined, with 8–13 pairs of lateral veins, base broadly cuneate, narrowed into a winged petiole, margin entire or denticulate, apex obtuse. Middle stem leaves shortly petiolate or sessile; leaf blade smaller, oblong or elliptic; sheath enlarged, cymbiform, to 10 × 1.5 cm, amplexicaul. Distal stem leaves ob-

long, 4–8.5 × 2–6 cm, parallel veined, apex obtuse, mucronate; sheath amplexicaul. Capitula 5–13, in lax raceme, to 26 cm, nodding; peduncles equal, to 10 cm. Involucre hemispheric, 8–11 × 20–25 mm, outside white puberulent; phyllaries 14–16, in 2 rows; outer phyllaries lanceolate, 2–3 mm wide, apex acute or acuminate; inner phyllaries oblong, 4–5 mm wide, margin membranous, apex triangular or obtuse. Ray florets yellow; lamina oblong or elliptic, 1–1.3 cm × 4–7 mm, apex rounded, 2- or 3-denticulate; tube ca. 2 mm. Tubular florets numerous, yellow, 5–6 mm; tube 1–1.5 mm; limb broadly campanulate, ca. 2.5 mm wide. Achenes (immature) oblanceolate, apex slightly narrowed. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

• Grassy slopes, stream banks; 3600–4100 m. NW Yunnan.

58. Cremanthodium coriaceum S. W. Liu, Fl. Reipubl. Popularis Sin. 77(2): 165. 1989.

革叶垂头菊 ge ye chui tou ju

Senecio scytophyllus Diels, Notes Roy. Bot. Gard. Edinburgh 5: 193. 1912, not Kunth (1818); *S. dielsii* H. Léveillé (1916), not Muschler (1909).

Stem solitary, erect, 35–55 cm tall, 3–4 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent. Basal leaves petiolate; petiole 7–12 cm, subglabrous; leaf blade ovate or broadly ovate, (2.5–)6–10 × (2–)4–5 cm, leathery, nitid, glabrous, both surfaces with prominent pinnate reticulate veins, base cuneate, margin denticulate, apex obtuse. Middle to distal stem leaves sessile, smaller, bracteal, ovate-oblong, base semiamplexicaul, apex acute or acuminate. Capitula 2–5, in raceme, or rarely solitary, nodding; peduncles 2–6 cm, white arachnoid-puberulent. Involucre hemispheric, 8–11 × 20–30 mm, outside white arachnoid-puberulent or glabrous; phyllaries 10–14, in 2 rows, lanceolate or ovate-lanceolate, 3–5 mm wide, white ciliate, apex acute; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina oblong, 1–1.5 cm × to 5 mm, apex 2- or 3-denticulate; tube ca. 2 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1 mm. Achenes brown, oblanceolate, 4–5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug.

• Grassy slopes, rocky slopes, grasslands, alpine meadows; 3000–4000 m. NW and W Yunnan.

59. Cremanthodium potaninii C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 150. 1895.

戟叶垂头菊 ji ye chui tou ju

Cremanthodium limprichtii Diels; *Senecio kialensis* Franchet.

Stem solitary, erect, 5–30 cm tall, 1–2 mm in diam. at base, proximally glabrous, distally white arachnoid-puberulent, glabrescent. Basal leaves petiolate; petiole 1–7 cm, glabrous, base sheathed; leaf blade ovate-cordate, triangular-cordate, or ovate-lanceolate to lanceolate, 1.5–2.5 × 0.5–3 cm, glabrous, pinnately veined, base cordate, truncate, or cuneate, margin entire, regularly triangular-dentate, or distal margin entire, proximal margin dentate, apex acute. Middle to distal stem leaves sessile, linear-lanceolate to linear, margin entire. Capitulum solitary, nodding. Involucre broadly campanulate, 8–14 × 10–15 mm, outside pale brown puberulent or glabrous; phyllaries 12–14, in 2 rows, lanceolate or linear-lanceolate, 2–3 mm wide, apex acuminate; inner phyllaries broadly membranous at margin. Ray florets yellow; lamina linear, 1.5–2(–3.5) cm × 2–3 mm, apex acuminate, entire or denticulate; tube ca. 5 mm. Tubular florets numerous, yellow, 6–8 mm; tube 1.5–2 mm. Achenes brown, cylindric, ca. 5 mm. Pappus brown, as long as tubular corolla. Fl. and fr. Jul–Sep.

• Wet grassy slopes, alpine scrub, alpine meadows; 3600–4500 m. SW Gansu, ?Shaanxi, NW Sichuan.

60. Cremanthodium cyclaminanthum Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 14. 1925.

香客来垂头菊 xiang ke lai chui tou ju

Stem solitary, erect, 15–33 cm tall, slender, proximally glabrous, distally brown pilose. Basal leaves petiolate; petiole 3–8 cm, glabrous; leaf blade ovate-cordate or orbicular-cordate, 1.5–2.5 × 1.5–2 cm, subleathery, nitid, glabrous, pinnately veined, with conspicuous reticulate veins, base cordate, margin entire, or shallowly crenate, apex rounded or obtuse. Stem leaves few, bracteal, linear. Capitulum solitary, nodding. Involucre hemispheric, ca. 1 × 1–2 cm, outside brown pilose or glabrate, glabrescent; phyllaries 10 or 11, in 2 rows, lanceolate, 2–4 mm wide, apex acute. Ray florets yellow; lamina oblong, 1.1–1.3 cm × to 5 mm, apex obtuse; tube ca. 2 mm. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 1.5 mm; limb campanulate. Achenes straw-colored, ca. 4 mm, with 5 thick ribs, apex truncate. Pappus pale brown, as long as tubular corolla. Fl. and fr. Aug.

• Alpine meadows; 2900–4400 m. SW Sichuan, NW Yunnan.

61. Cremanthodium principis (Franchet) R. D. Good, J. Linn. Soc., Bot. 48: 283. 1929.

方叶垂头菊 fang ye chui tou ju

Senecio principis Franchet, J. Bot. (Morot) 10: 412. 1896; *Cremanthodium gypsophilum* R. D. Good.

Stem solitary, erect, 10–30 cm tall, 1.5–3 mm in diam. at base, proximally glabrous, distally brown puberulent. Basal leaves petiolate; petiole 2–6 cm, brown puberulent, base sheathed; leaf blade oblong, square, or suborbicular, 1.8–5 × 2–5 cm, herbaceous, glabrous or abaxially brown pilose along veins, pinnately veined, abaxially with conspicuous veins, base cordate, margin denticulate, apex rounded, truncate, or retuse. Middle to distal stem leaves few, smaller distally, sessile, bracteal, square to linear. Capitulum solitary, nodding. Involucre hemispheric, 8–13 × 10–20 mm, outside brown puberulent or glabrate, glabrescent; phyllaries ca. 12, in 2 rows, 3–5 mm wide, apex acute; outer phyllaries lanceolate; inner phyllaries oblong, margin brown membranous. Ray florets yellow; lamina oblong, 1.6–2.5 cm × to 8 mm, dentate or lobed, apex acute or truncate; tube 4–5 mm. Tubular florets numerous, yellow, ca. 8 mm; tube ca. 3 mm. Achenes dark brown, cylindric, ca. 5 mm. Pappus brown, as long as tubular corolla. Fl. and fr. Jun–Jul.

• Alpine scrub, alpine meadows, rocky places; 3600–4600 m. SW Sichuan, NW Yunnan.

62. Cremanthodium purpureifolium Kitamura, Acta Phytotax. Geobot. 15: 106. 1954.

紫叶垂头菊 zi ye chui tou ju

Stems 1 or 2, erect, 7–15 cm tall, 1.5–2 mm in diam. at base, proximally glabrous, distally purplish red, white arachnoid-puberulent. Basal leaves petiolate; petiole purple, 2–6.5 cm, glabrous or sparsely white arachnoid-puberulent; leaf blade abaxially purple, oblong, broadly oblong, or ovate-oblong, 3.7–7.5 × 1.5–5.5 cm, abaxially shortly pilose, adaxially glabrous, pinnate veins conspicuous abaxially, base broadly cuneate or rarely truncate, margin denticulate, apex rounded. Stem leaves bracteal, ovate or oblong to linear, 1–3 cm, base sheathed. Capitulum solitary, nodding. Involucre hemispheric, 1–1.4 × 1.5–2 cm, outside black pilose; phyllaries 10–12, in 2 rows, 2–4 mm wide, apex acuminate, white ciliate; outer phyllaries lanceolate; inner phyllaries oblong, margin broadly membranous. Ray florets yellow; lamina oblong, 1.5–2 cm × 3–5 mm, apex obtuse, denticulate. Tubular florets numerous, yellow, ca. 6 mm; tube ca. 2 mm. Pappus white, as long as tubular corolla. Fl. Jul.

Gravelly areas on mountains; 3600–4900 m. S Xizang [Nepal].

63. Cremanthodium nervosum S. W. Liu, Acta Biol. Plateau Sin. 3: 58. 1984.

显脉垂头菊 xian mai chui tou ju

Stem solitary, erect, 20–40 cm tall, slender, 2–3.5 mm in diam. at base, black pilose. Basal leaves petiolate; petiole purple, 4–5 cm, glabrous; leaf blade ovate or oblong-ovate, 4.5–9 × 2.5–6.5 cm, glabrous, pinnately veined, both surfaces with prominent reticulate veins, base cordate to subtruncate, margin regularly denticulate, apex rounded. Stem leaves smaller distally, proximal leaves petiolate, base sheathed, distal leaves linear-lanceolate. Capitula solitary or 3 in raceme, nodding; peduncles 1.5–3.5 cm, black pilose. Involucre hemispheric, 8–12 × 12–20 mm, outside glabrous or black pilose; phyllaries 10–16, in 2 rows, lanceolate, 3–4 mm wide, apex acuminate, white ciliate; inner phyllaries broader, margin membranous. Ray florets yellow; lamina broadly elliptic, 1–1.5 cm × 4–6 mm, apex rounded, 3-denticulate; tube ca. 2 mm. Tubular florets numerous, yellow, 6–7 mm; tube ca. 1 mm. Achenes (immature) ca. 3 mm. Pappus white, as long as tubular corolla. Fl. Aug, fr. Aug–Sep.

• Grassy slopes; 3500–4800 m. S Xizang.

64. Cremanthodium nepalense Kitamura, Acta Phytotax. Geobot. 15: 105. 1954.

尼泊尔垂头菊 ni bo er chui tou ju

Stem solitary, erect, 14–30 cm tall, slender, 1–2 mm in diam. at base, shortly black pilose and sparsely long white puberulent, or sometimes proximally glabrous. Basal leaves petiolate; petiole 1.5–8 cm, initially black pilose, glabrescent; leaf blade ovate to suborbicular, 2.5–4.5(–8.5) × 1.5–2.5(–7) cm, glabrous, pinnately veined, abaxially with prominent reticulate veins, base truncate, rounded, or shallowly cordate, margin dentate, apex obtuse or rounded. Stem leaves 2–4; proximal leaves petiolate, base sheathed; leaf blade ovate, to 10 × 7 mm; middle and distal leaves linear-lanceolate to linear, margin entire or dentate. Capitulum solitary, nodding. Involucre hemispheric, 1–1.2 × 1.5–2 cm, outside black when dry, shortly black pilose; phyllaries 10–14, in 2 rows, 2–3.5 mm wide, apex acute or acuminate; outer phyllaries lanceolate; inner phyllaries oblong. Ray florets yellow; lamina oblong, 8–15 × 2–3 mm; tube 1–1.5 mm. Tubular florets numerous, yellow, blackish gray when dry, 4–5 mm; tube ca. 1 mm; limb tubular. Achenes white, oblong, ca. 3 mm. Pappus white, as long as tubular corolla. Fl. and fr. Aug–Sep.

Grassy slopes, stream banks, rocky places; 4300–4800 m. S Xizang [Nepal].

65. Cremanthodium variifolium R. D. Good, J. Linn. Soc., Bot. 48: 298. 1929.

变叶垂头菊 bian ye chui tou ju

Stem solitary, erect, 8–25 cm tall, 1.5–2.5 mm in diam. at base, densely white or proximally brown and distally white pilose. Basal leaves petiolate; petiole 2–5 cm, slender, densely pilose, base sheathed; leaf blade elliptic, ovate, or obovate, 1–4.5 × 0.6–3.5 cm, glabrous, pinnately veined, base cuneate or subrounded, margin entire and pilose, apex obtuse or rounded. Stem leaves numerous, dense, sessile, linear-oblong, longer than internodes, smaller than basal leaves, margin entire. Capitulum solitary, nodding. Involucre hemispheric, 8–10 × ca. 15 mm, outside glabrous, base pilose; phyllaries 12–14, in 2 rows, oblong or lanceolate, 3–5 mm wide, apex acute; inner phyllaries broader, margin membranous. Ray florets yellow; lamina oblong or narrowly oblanceolate, 1–1.5 cm × 2–4 mm, with brown veins, apex obtuse or truncate, 3-dentate. Tubular florets numerous, deep yellow, 6–7 mm; tube ca. 1 mm. Achenes brown or yellowish brown, obovoid, 2–3 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct.

• Grasslands beneath bamboo forests, margins of bamboo forests, grassy slopes, alpine meadows; 3200–4500 m. SW Sichuan, SE Xizang, NW Yunnan.

66. Cremanthodium pseudo-oblongatum R. D. Good, J. Linn. Soc., Bot. 48: 297. 1929.

无毛垂头菊 wu mao chui tou ju

Stems 1 or 2, erect, purplish red, 8–12 cm tall, 1–2 mm in diam. at base, glabrous. Basal leaves petiolate; petiole purplish red, 1.5–4 cm, winged, glabrous, base sheathed; leaf blade ovate or oblong, 2–5 × 1.5–3.5 cm, thick, glabrous, pinnately veined, base truncate, margin entire and sparsely coarsely dentate, apex acute or subrounded. Middle to distal stem leaves sessile, bracteal, ovate or elliptic to linear, base semiamplexicaul, margin dentate, apex acuminate. Capitulum solitary, nodding. Involucre hemispheric, 1–1.5 × 1–2 cm, outside glabrous; leaflike bracts 3–7, linear; phyllaries 12–14, in 2 rows, 2–4 mm, apex long acuminate, white ciliate; outer phyllaries narrowly lanceolate; inner phyllaries lanceolate, margin membranous. Ray florets yellow; lamina linear-lanceolate, 1.5–2.5 cm × 3–5 mm, apex long acuminate, 3-dentate; tube ca. 4 mm. Tubular florets numerous, dark yellow, 7–8 mm; tube 2–3 mm. Achenes (immature) ca. 3 mm. Pappus white, as long as tubular corolla. Fl. Jul.

Gravelly areas on mountains; 5100–5300 m. S Xizang [Bhutan, ?India (Sikkim)].

67. Cremanthodium oblongatum C. B. Clarke, Compos. Ind. 168. 1876.

矩叶垂头菊 ju ye chui tou ju

Cremanthodium nakaoi Kitamura; *Ligularia arnicoides* Candolle ex Royle var. *glabra* Candolle; *Senecio oblongatus* (C. B. Clarke) Franchet; *S. pyrolifolius* H. Léveillé.

Stems 1 or 2, erect, often purplish red, 8–20 cm tall, 2–3 mm in diam. at base, proximally glabrous, distally white puberulent. Basal leaves petiolate; petiole purplish red, winged, 1.5–5 cm, glabrous; leaf blade oblong, orbicular, or elliptic, 2–8 × 1.5–5 cm, thick, glabrous, pinnately veined, base subrounded to cuneate, margin entire and coarsely dentate, apex obtuse or rounded. Stem leaves 3 or 4, sessile, oblong to lanceolate, 1–4.5 × to 1.5 cm, base semiamplexicaul, margin remotely dentate, apex obtuse or acute. Capitulum solitary, nodding. Involucre hemispheric, 9–12 × to 25 mm, outside black when dry, white arachnoid-puberulent; phyllaries 10–14, in 2 rows, 2–3 mm wide; outer phyllaries lanceolate, apex acuminate; inner phyllaries ovate-lanceolate, 5–8 mm wide, margin yellowish brown membranous. Ray florets yellow; lamina oblong, 1–2.5 cm × 2–5 mm, apex acuminate or acute; tube to 5 mm. Tubular florets numerous, dark yellow, 7–8 mm; tube ca. 2 mm. Achenes brown, cuneate-cylindric, 4–5 mm. Pappus white, as long as tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

Gravelly areas on mountains, alpine meadows; 4500–5300 m. S Xizang [India, Nepal].

68. Cremanthodium ellisii (J. D. Hooker) Kitamura in H. Hara et al., Enum. Fl. Pl. Nepal 3: 22. 1982.

车前叶垂头菊 che qian ye chui tou ju

Stem solitary, erect, 6–60 cm tall, 2–3 mm in diam. at base, branched only in synflorescence, proximally glabrous, distally densely blackish gray pilose, purplish red. Basal leaves petiolate; petiole often purplish red, winged, 1–13 × to 1.5 cm, tubular-sheathed; leaf blade ovate or broadly elliptic to oblong, sometimes suborbicular, 1.5–19 × 1–8 cm, subsucculent, pinnately veined, glabrous or initially sparsely white puberulent, base cuneate to rounded, usually narrowed into a petiole, margin entire or minutely to coarsely dentate, rarely lobed, apex acute to rounded. Stem leaves sessile, ovate or ovate-oblong to linear, margin entire or denticulate, base with or without sheaths. Capitula 1–5, usually solitary or in corymb-raceme, nodding; peduncles 2–10 cm, blackish gray pilose. Involucre hemispheric, 8–17 × 10–25 mm, outside densely blackish gray pilose; phyllaries 8–14, in 2 rows, 2–9 mm, apex acute and white ciliate; outer phyllaries lanceolate; inner phyllaries ovate-lanceolate. Ray florets sometimes absent, yellow or purplish red; lamina oblong, 10–17 × 2–7 mm, apex obtuse or acute; tube 3–5 mm. Tubular florets numerous, dark yellow, 6–7 mm; tube 2–3 mm. Achenes brown, cylindric, 4–5 mm. Pappus white, as long as tubular corolla. Fl. and fr. Jul–Oct. $2n = 58$.

Gravelly areas on mountains, alpine scrub, grassy slopes, alpine meadows, swamp meadows, riverbanks; 3400–5600 m. SW and W Gansu, Qinghai, Sichuan, Xizang, NW Yunnan [Bhutan, India (Sikkim), Kashmir, Nepal, Pakistan].

1a. Capitulum without ray florets ..... 68c. var. *ramosum*
1b. Capitulum with ray florets.
2a. Ray lamina yellow ..... 68a. var. *ellisii*
2b. Ray lamina purplish red ..... 68b. var. *roseum*

68a. Cremanthodium ellisii var. **ellisii**

车前叶垂头菊(原变种) che qian ye chui tou ju (yuan bian zhong)

Werneria ellisii J. D. Hooker, Fl. Brit. India 3: 357. 1881; *Cremanthodium fletcheri* (Hemsley) Hemsley; *C. goringense* (Hemsley) Hemsley; *C. oblongatum* C. B. Clarke var. *villosius* C. B. Clarke; *C. plantagineum* Maximowicz; *C. plantagineum* f. *albidum* R. D. Good; *C. plantagineum* f. *ellisii* (J. D. Hooker) R. D. Good; *C. plantagineum* f. *goringense* (Hemsley) R. D. Good; *C. plantagineum* f. *maximowiczii* (Franchet) R. D. Good; *C. plantagineum* var. *maximowiczii* (Franchet) B. S. Aswal; *Senecio arnicoides* (Candolle ex Royle) Wallich ex C. B. Clarke var. *frigidus* J. D. Hooker; *S. fletcheri* Hemsley; *S. goringensis* Hemsley; *S. maximowiczii* Franchet; *S. paberensis* Franchet.

Capitulum with ray florets. Ray lamina yellow.

Gravelly areas on mountains, swamp meadows, riverbanks; 3400–5600 m. SW and W Gansu, Qinghai, Sichuan, Xizang, NW Yunnan [Kashmir, Nepal, Pakistan].

68b. Cremanthodium ellisii var. **roseum** (Handel-Mazzetti) S. W. Liu, Fl. Reipubl. Popularis Sin. 77(2): 162. 1989.

红舌垂头菊 hong she chui tou ju

Cremanthodium plantagineum f. *roseum* Handel-Mazzetti, Acta Horti Gothob. 12: 307. 1938.

Capitulum with ray florets. Ray lamina purplish red.

• Alpine scrub, grassy slopes, alpine meadows; 4000–4300 m. NW Sichuan.

68c. Cremanthodium ellisii var. **ramosum** (Y. Ling) Y. Ling & S. W. Liu, Acta Biol. Plateau Sin. 3: 65. 1984.

祁连垂头菊 qi lian chui tou ju

Cremanthodium discoideum Maximowicz subsp. *ramosum* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 1. 1937; *C. plantagineum* var. *ramosum* (Y. Ling) Y. Ling & S. W. Liu.

Capitulum without ray florets.

• Gravelly areas on mountains; 3000–4600 m. Qinghai, N Xizang.

69. Cremanthodium glandulipilosum Y. L. Chen ex S. W. Liu, Acta Biol. Plateau Sin. 3: 58. 1984.

腺毛垂头菊 xian mao chui tou ju

Stem solitary, erect, 8–20 cm tall, ca. 3 mm in diam. at base, proximally glabrous, distally densely blackish gray pilose and white puberulent, purplish red. Basal leaves petiolate;

petiole purple, 0.5–4 cm, glandular pilose or glabrous, base sheathed; leaf blade ovate-lanceolate, 3.5–7 × 1.5–3.5 cm, both surfaces densely glandular pilose or intermixed sparsely initially white puberulent, glabrescent, pinnately veined, base broadly cuneate to truncate, margin entire and triangular-dentate, apex acute to acuminate. Stem leaves 2–4, sessile, lanceolate to linear, base semiamplexicaul. Capitula 1–3, nodding. Involucre hemispheric, 8–12 × to 15 mm, outside densely blackish gray pilose and white puberulent; phyllaries 12–16, in 2 rows, lanceolate or oblong-lanceolate, 2–4 mm, apex acuminate; inner phyllaries membranous at margin. Ray florets yellow; lamina oblong, 1.5–2 cm × 3–6 mm, apex obtuse; tube 4–5 mm. Tubular florets numerous, dark yellow, 6–8 mm; tube ca. 2 mm. Pappus white, or base sometimes reddish brown, as long as tubular corolla. Fl. Jul–Aug, fr. Aug–Sep.

• Wet grasslands in valleys, rocky slopes; 5200–5300 m. S Xinjiang (Pishan), C Xizang.

96. SINACALIA H. Robinson & Brettell, Phytologia 27: 274. 1973.

华蟹甲属 hua xie jia shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

Herbs, perennial, erect, with thick subterranean tuberiform rhizomes and numerous fibrous roots. Leaves simple, petiole not winged, basal and lower stem leaves usually fallen by anthesis; blade ovate to suborbicular, palmately or pinnately veined, base cordate to subtruncate, sometimes expanded and subamplexicaul, but not vaginate. Capitula solitary or few to numerous, arranged in terminal lax corymb or compound paniculoid thyrses, radiate; peduncles bracteolate. Involucres not calyculate, narrowly cylindric to obconic-campanulate, with minutely puberulent tips and scarious margins. Ray florets 2–8; lamina yellow, oblong or linear-oblong, 4–7-veined, with 2 or 3 small terminal teeth. Disk florets 2 to many; corolla yellow; limb funnelform; lobes 5, anthers shortly acutely to obtusely caudate, tails 1/4–3/4 as long as antheropodium; antheropodia broadly obconic to somewhat balusterform, broader than filament at base; endothecial cell wall thickenings strictly polar. Style branches incurved, obtuse with numerous rather long, prominent, obtuse terminal papillae. Achenes cylindric, ribbed, glabrous. Pappus persistent, capillary-like.

• Four species: China.

Ligularia and *Parasenecio* are the closest relatives to *Sinacalia*. *Sinacalia* differs from the former by its non-vaginate leaf sheaths, from the latter by its radiate capitula, and from both by its tuberiform rhizomes.

1a. Capitula small, numerous, in broad, richly branched paniculoid thyrses; involucre cylindric, ca. 2 mm in diam., phyllaries 5; ray florets 2 or 3.
2a. Leaf blade deeply pinnatisect, with 3 or 4 lateral lobes on each side, pinnately veined ..... 4. *S. tangutica*
2b. Leaf blade not lobed, pentagonal or triangular, sinuate, apiculate-dentate, basally palmately 3–5-veined ..... 3. *S. davidii*
1b. Capitula large, 20 or fewer, corymbose or solitary; involucre obconic-campanulate, 5–8 mm in diam., phyllaries 8; ray florets 5–8.
3a. Leaf blade deeply cordate, thickly papery; ray lamina 15–18 mm ..... 1. *S. macrocephala*
3b. Leaf blade shallowly cordate, truncate, or broadly cuneate, leathery or subleathery; ray lamina 8–11 mm ..... 2. *S. caroli*

1. Sinacalia macrocephala (H. Robinson & Brettell) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 217. 1984.

大头华蟹甲 da tou hua xie jia

Koyamacalia macrocephala H. Robinson & Brettell, Phytologia 27: 272. 1973, based on *Cacalia macrocephala* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 633. 1937, not (Lessing) Kuntze (1891).

Stems erect, conspicuously striate, robust, 8–10 mm in diam. at base, fistulose, 80–100 cm tall, simple, sparsely puberulent, glabrescent. Leaves subradical, thickly papery, long petiolate; petiole 8–15 cm, stout, expanded and somewhat amplexicaul at base, sparsely puberulent or subglabrous; blade adaxially dark green, broadly ovate-orbicular, 14–16 × 20–30 cm, thickly papery, abaxially arachnoid, soon glabrescent, adaxially glabrous, veins prominent on both surfaces, base cordate, margin irregularly repand-denticulate, apex rounded, mucronate. Stem leaves bractlike, ovate-lanceolate, 2–3 cm × 4–6 mm, many veined, sparsely arachnoid, glabrescent, apex acuminate. Capitula large, 5–22, arranged in a terminal or compound corymb; peduncles 1–3.5 cm, stout, fulvous arachnoid; bracteoles 2 or 3, linear-lanceolate, 6–10 × 1–1.5 mm. Involucres obconic-campanulate, 13–15 × 6–10 mm; phyllaries 8, green, linear-oblong or linear-lanceolate, ca. 15 × 2–3.5 mm, herbaceous, glabrous or subglabrous, with puberulent tips and broadly scarious margins, obscurely 3–5-veined, apically acuminate. Ray florets 5 or 6, yellow, with 8–8.5 mm tube; lamina linear-oblong, 15–18 × 3–3.5 mm, 6- or 7-veined, apically minutely 2- or 3-dentate. Disk florets numerous; corolla yellow, 1.2–1.3 cm, with 5–5.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acuminate; anthers oblong, 4–4.5 mm, shortly obtusely caudate, appendages ovate-oblong; style branches ca. 1.5 mm. Achenes cylindric, 5–6 mm, glabrous, ribbed. Pappus white, 1.3–1.5 cm, scabrid. Fl. Sep–Nov.

• W Hubei (near Yichang).

2. Sinacalia caroli (C. Winkler) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 218. 1984.

革叶华蟹甲 ge ye hua xie jia

Senecio caroli C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 7. 1893; *Cacalia caroli* (C. Winkler) C. C. Chang.

Rhizomes fusiform, 5–6 mm in diam., subglabrous, with numerous fibrous roots. Stem solitary, erect or ascending, often flexuous, 2–3 mm in diam. at base, leafless in lower part, 15–40 cm tall, sparsely puberulent or subglabrous. Radical and lower leaves fallen by anthesis. Stem leaf petiole 2.5–6 cm, sparsely puberulent, expanded and somewhat amplexicaul at base; blade abaxially pale green or purplish, adaxially dark green, suborbicular or subflabelliform, 2–4 × 3–6 cm, leathery or subleathery, abaxially fulvous puberulent or glabrescent, adaxially glabrous, basally palmately 7–9-veined, veins distinctly prominent abaxially, base truncate or weakly cordate, rarely broadly cuneate, margin coarsely palmately dentate-lobulate with apically cartilaginous-mucronate teeth, ± revolute. Upper stem leaves progressively smaller with shorter petioles. Uppermost leaves bractlike, lanceolate or linear-lanceolate, apically cartilaginous mucronate. Capitula solitary or 3–5 arranged in lax corymbs, medium-sized, 2.5–6 cm in diam.; peduncles 3–5 cm, slender, usually 5–7-bracteolate. Involucres obconic-campanulate, 12–13 × 5–7 mm; phyllaries 8, oblong-linear or linear, ca. 12 × 2–3 mm, ± glabrous, with white puberulent tips and scarious margins, apex acute or subobtuse. Ray florets 6–8, yellow, corolla tube ca. 6 mm; lamina oblong-lanceolate, 8–11 × 2.5–3 mm, 4–6-veined, apically minutely 3-dentate. Disk florets numerous; corolla yellow, 9–9.5 mm, with 4–4.5 mm tube and funnelform limb; lobes oblong-ovate, ca. 2 mm, apically acute. Anthers dark brown, oblong, ca. 3.5 mm, shortly obtusely caudate; appendages ovate-oblong; style branches ca. 1.5 mm, apically obtuse, papillose. Achenes cylindric, ca. 4 mm, glabrous, ribbed. Pappus 9–9.5 mm. Fl. Jul–Aug.

• Roadsides, forest understories, valleys; 1000–2900 m. Gansu (Têwo), Sichuan.

3. Sinacalia davidii (Franchet) H. Koyama, Acta Phytotax. Geobot. 30: 82. 1979.

双花华蟹甲 shuang hua hua xie jia

Senecio davidii Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 40. 1887 [*"Davidi"*]; *Cacalia davidii* (Franchet) Handel-Mazzetti; *C. didymantha* (Dunn) Handel-Mazzetti; *S. didymanthus* Dunn; *S. tuberivagus* W. W. Smith.

Stems robust, 8–10 mm in diam. at base, fistulose, to 150 cm tall, distinctly sulcate when dry, glabrous. Radical and lower stem leaves fallen by anthesis, petiolate; middle stem leaves with petiole 3–5 cm, sparsely puberulent or glabrous, basally expanded and subamplexicaul; blade of middle stem leaves abaxially pale green or purplish, adaxially dark green, triangular or pentagonal, 8–15 × 9–20 cm, leathery, abaxially fulvous puberulent on veins or glabrescent, adaxially sparsely hispidulous or subglabrous, basally palmately 3–5-veined, base truncate or weakly cordate, apex acute, mucronate-dentate. Upper stem leaves smaller; uppermost leaves shortly petiolate, ovate-triangular. Capitula small, numerous, arranged in terminal compound paniculoid thyrses; axes and peduncles fulvous puberulent; peduncles short, 2–5 mm, usually with 2 or 3 linear or linear-lanceolate bracteoles. Involucres cylindric, 8–10 × 1.5–2 mm; phyllaries 4 or 5, linear-oblong, 0.5–1.5 mm wide, with obtuse minutely puberulent tips and narrow scarious margins, glabrous, inconspicuously 3–5-veined. Ray florets 2; corolla yellow, ca. 8 mm with ca. 5.5 mm tube; lamina oblong-linear, 10–12 × 0.5–1.5 mm, 4-veined, apically minutely 2-dentate. Disk florets 2, rarely 4; corolla yellow, ca. 8 mm, with ca. 2 mm tube and funnelform limb; lobes 5, lanceolate, ca. 1.5 mm, apically acute. Anthers linear-oblong, ca. 3.5 mm, shortly caudate; appendages ovate-oblong. Style branches ca. 1.5 mm, papillose, obtuse. Achenes cylindric, ca. 3 mm, glabrous, ribbed. Pappus white, sometimes rubescent, 5–6 mm. Fl. Jul–Aug, fr. Oct.

• Grassy slopes, cliffs, roadsides, forest margins; 900–3200 m. Shaanxi, Sichuan, Xizang, Yunnan.

4. Sinacalia tangutica (Maximowicz) B. Nordenstam, Opera Bot. 44: 15. 1978.

华蟹甲 hua xie jia

Senecio tanguticus Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 486. 1882; *Ligularia tangutica* (Maximowicz) Mattfeld; *Senecillis tangutica* (Maximowicz) Kitamura; *Senecio henryi* Hemsley.

Rhizomes tuberiform, 1–1.5 cm in diam., with numerous fibrous roots. Stems robust, fistulose, 50–100 cm tall, 5–6 mm in diam., simple, sparsely arachnoid when young, or glabrous at base, puberulent with brown hairs in upper parts. Lower stem leaves fallen by anthesis, petiolate. Petiole of median stem leaves 3–6 cm, expanded and subamplexicaul at base, sparsely puberulent or subglabrous; blade of median stem leaves adaxially dark green, ovate or ovate-cordate, 10–16 × 10–15 cm, thickly papery, abaxially puberulent and sparsely arachnoid, adaxially sparsely adpressed hispidulous at least on veins, distinctly pinnately veined, base subtruncate or weakly cordate, margin deeply pinnatisect with 3 or 4 lateral lobes on each side, apex mucronate; lateral lobes subopposite, narrowly to broadly oblong, with a few acute marginal teeth or lobules. Upper stem leaves smaller, shortly petiolate. Capitula small, numerous, arranged in terminal often broad and much branched, compound paniculoid thyrses; axes and peduncles fulvous glandular puberulent; peduncles 2–3 mm, slender, with 2 or 3 small linear-acuminate bracteoles. Involucres cylindric, 8–10 × 1.5–2 mm; phyllaries 4 or 5, linear-oblong, 0.5–1.5 mm wide, with obtuse minutely puberulent tips and narrow scarious margins. Ray florets 2 or 3, yellow, with ca. 4.5 mm tube; lamina oblong-lanceolate, 13–14 × ca. 2 mm, 4-veined, apically minutely 2-dentate. Disk florets 4, rarely 7; corollas yellow, 8–9 mm, with 2–2.5 mm tube and funnelform limb; lobes oblong-ovate, ca. 1.5 mm, apically acuminate; anthers oblong, 3.5–3.7 mm, shortly caudate; appendages oblong, apically acuminate; style branches ca. 1.5 mm, papillose, obtuse. Achenes cylindric, ca. 3 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. Jul–Aug, fr. Oct.

• Grassy slopes, cliffs, streamsides, meadows, roadsides, forest margins; 1200–3500 m. Gansu, Hebei, Henan, Hubei, Hunan, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

97. DICERCOCLADOS C. Jeffrey & Y. L. Chen, Kew Bull. 39: 213. 1984.

歧笔菊属 qi bi ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

Herbs, perennial, rhizomatous. Rhizomes woody, with fibrous, tomentose roots. Stems erect, leafy. Leaves alternate, stem leaves petiolate, strongly 3-veined from above base. Capitula homogamous, discoid, axillary to upper leaves, solitary or paired; pedunculate; peduncles slender, divaricate, minutely multibracteolate in upper part. Involucres cylindric, minutely calyculate. Receptacle subconvex, areolate; phyllaries 10 or 11, linear or linear-lanceolate, subleathery, with scarious margins. Florets 15 or 16, all discoid, bisexual, fertile; corollas yellow, actinomorphic; tubular with funnelform limb, 5-lobed, lobes oblong-lanceolate. Anthers linear, exserted from corolla, basally long caudate, appendages lanceolate; endothecial cell wall thickenings strictly polar. Antheropodia long, narrow, without enlarged basal cells, as broad as filaments, shorter than anther tails. Ovary cylindric, glabrous. Style branches with confluent stigmatic areas, abaxially and apically long papillose; papillae divided at apex into 2 brushlike lobes. Pappus of numerous capillary-like hairs, many seriate, barbellate.

• One species: China.

In habit and the shape of the capitula, the single species of *Dicercoclados* is very similar to some species of *Synotis*, such as *S. sinica*; however, the strongly 3-veined leaves, cylindric antheropodia, and completely polarized endothecial tissue cell wall thickenings place it in the subtribe Tussilagininae and ally it firmly to *Parasenecio*. The apically bipenicillate style branches and its habit readily distinguish it from the latter.

1. Dicercoclados triplinervis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 214. 1984.

歧笔菊 qi bi ju

Roots densely tomentose. Stems to 100 cm tall, ascending at base, leafless in lower part, leafy above, simple or branching in upper part, sparsely fulvous puberulent when young, glabrescent. Leaves shortly petiolate, lower leaves withered and fallen by anthesis; median leaves rather numerous; petiole 3–5 mm, sparsely pubescent, not winged, not auriculate; blade abaxially paler, adaxially deep green, oblong-lanceolate or lanceolate, 5–9 × 0.8–1.8 cm, leathery, abaxially glabrous, adaxially glabrous except for sparsely puberulent main veins and margins, prominently 3-veined from above base, main veins conspicuously impressed, base cuneate, margin remotely mucronulate-dentate and when dry somewhat revolute, apex acuminate or acuminate-caudate. Upper leaves similar but gradually smaller upward. Capitula solitary or paired in upper leaf axils; peduncles 1–2.5 cm, slender, divaricate, densely ferruginous puberulent, when paired bracteate at base, minutely and rather closely 7–9-bracteolate in upper part, sparsely puberulent; bracteoles linear-subulate, 2–3 mm, apically incurved. Involucres cylindric, 7–9 × 3–5 mm, calyculate; bracteoles of calyculus 5 or 6, linear-subulate, minute; phyllaries 10 or 11, linear or linear-lanceolate, 1–2 mm wide, subleathery, glabrous, margin broadly scarious, apically acute and sparsely puberulent. Florets 15 or 16; corolla yellow, ca. 7 mm, with 2–2.5 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically papillose, acute. Anthers linear, ca. 5 mm, prominently caudate, tails 2–3 × as long as antheropodia. Ovary cylindric, ca. 0.5 mm, glabrous. Style branches ca. 1.5 mm, truncate, with papillae divided at apex into 2 brushlike lobes. Pappus white, ca. 6.5 mm. Fl. Sep.

• Probably extinct. Guizhou (Guiding).

98. PARASENECIO W. W. Smith & J. Small, Trans. & Proc. Bot. Soc. Edinburgh 28: 93. 1922.

蟹甲草属 xie jia cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Hiroshige Koyama

Herbs, perennial. Rhizomes robust, erect or horizontal, with numerous fibrous roots. Stem solitary, erect, usually striate or sulcate, glabrous, arachnoid, or glandular puberulent. Leaves alternate, petiolate, simple or palmately or pinnately lobed, serrate. Capitula small or medium-sized, discoid, homogamous, all bisexual, fertile, few to numerous flowered, terminal or axillary, racemose or paniculate, pedunculate or subsessile, often calyculate. Involucres cylindric or narrowly campanulate, rarely campanulate. Phyllaries uniseriate, free. Receptacle flat, paleaceous or not. Florets few to numerous; corolla yellow, white, or orange, tubular, with slender tube and narrowly campanulate or broadly tubular limb; lobes 5, lanceolate or ovate-lanceolate; anthers sagittate or caudate at base; antheropodium cylindric, filaments slender; style branches apically truncate or rather dilated with unequal papillae. Achenes cylindric, glabrous, ribbed. Pappus of capillary-like bristles, white, sordid white, or sordid fulvous-brown.

About 60 species: mainly in E Asia and the Sino-Himalayan region, also across Russia and one species in the Aleutian Islands; 52 species (43 endemic) in China.

1a. Leaves large, orbicular or orbicular-cordate, palmately divided, petioles basally amplexicaul, shortly vaginate (1. *P.* sect. *Taimingasa*) ..... 1. *P. firmus*

1b. Leaves large or medium-sized, not orbicular or orbicular-cordate, simple or divided, petioles basally not vaginate.

2a. Radical leaves persistent, stem leaves 1, rarely 2, or bracteal-leaflike; capitula 3 or 4, or more; involucres campanulate or narrowly campanulate, phyllaries 8–10; florets 10–28 (2. *P.* sect. *Parasenecio*).

3a. Plants densely glandular pubescent; radical leaves broadly cordate, obtuse, or suborbicular; stem leaves 1, rarely 2, sessile or subsessile; capitula pendulous; phyllaries 8 or 9; florets 10–16, corolla white or pink-white ..... 2. *P. forrestii*

3b. Plants densely brown pubescent; radical leaves ovate or ovate-orbicular, stem leaves few, bracteal-leaflike, shortly petiolate; capitula erect; phyllaries 9 or 10; florets 28, corolla yellow ..... 3. *P. begoniifolius*

2b. Radical leaves withered by anthesis, or if persistent then florets 5; stem leaves few to numerous; capitula few to numerous, paniculate or racemose-paniculate; involucres cylindric or narrowly campanulate; phyllaries 3–10, rarely more; florets (2 or)3–5(–8) or more.

4a. Involucres cylindric, 2–5 mm; phyllaries 4–6; florets 2–6; leaves ovate or broadly ovate-cordate, irregularly coarsely toothed or shallowly 3–10-lobed; petioles not winged, basally not expanded (3. *P.* sect. *Koyamacalia*) .... 4. *P. chola*

4b. Involucres cylindric or campanulate, more than 4 mm; phyllaries 3–8, rarely more; florets 3–15, rarely more; leaves polymorphic, irregularly coarsely toothed, shallowly lobed to divided; petioles winged or not, basally auriculate or not auriculate.

5a. Stem leaves numerous; leaf blade palmately divided; phyllaries 3–5, rarely 7 or 8; florets 3–5, rarely 10–14 (5. *P.* sect. *Delphiniifolii*).

6a. Leaf blade palmately 5–7-lobed, lobes obovate, oblong, or ovate-oblong.

7a. Leaf blade basally hastate, lobes broad, apically caudate or long acuminate; peduncles ca. 1 mm, glandular puberulent; phyllaries and florets 5 ..... 47. *P. delphiniifolius*

7b. Leaf blade basally subcordate, lobes narrow, apically acute; capitula sessile, brown puberulent; phyllaries and florets 3 ..... 48. *P. pilgerianus*

6b. Leaf blade palmately deeply 5–7-sect, lobes lanceolate or oblong-lanceolate to linear, rarely obovate or spatulate.

8a. Leaf blade broadly ovate, palmately deeply sect, lobes obovate or spatulate, lateral lobes 2-fid to deeply sect, both surfaces glabrous; phyllaries and florets 3; pappus white ..... 52. *P. tripteris*

8b. Leaf blade ovate-oblong, pentagonal-cordate, or orbicular-ovate, lobes lanceolate or oblong-lanceolate to linear.

9a. Leaves pinnate-palmately divided, lobes pinnately lobulate or 2–4-denticulate; phyllaries 4; (plants of Sichuan, Xizang, Yunnan) ..... 51. *P. palmatisectus*

9b. Leaves palmately lobed, lateral lobes often 1-lobulate or finely toothed; phyllaries 5, 7, or 8; (plants of Henan, Hubei, Shaanxi).

10a. Leaf blade 10–20 × 12–24 cm, 5–7-lobed; phyllaries 7 or 8; florets 10–14; achenes 5–6 mm; pappus red-brown ..... 49. *P. sinicus*

10b. Leaf blade 16–27 × 15–35 cm, (5 or)6–9-lobed; phyllaries 5; florets 5; achenes ca. 3 mm; pappus white ..... 50. *P. dissectus*

5b. Stem leaves few to numerous, triangular, triangular-ovate, reniform, polyangular, or ovate-cordate, coarsely toothed or shallowly lobed, adaxially glabrous, pubescent, or densely tomentose.

11a. Leaves adaxially glabrous or pubescent; capitula few to numerous, pedunculate or not; pappus white or red-brown (3. *P.* sect. *Koyamacalia*).

12a. Capitula few, or solitary at apex and axillary in upper leaves, pendulous; involucres campanulate, 5–10 mm in diam.; phyllaries 8–10; florets numerous, ca. 38; leaves triangular; petioles not winged ..... 5. *P. deltophyllus*

12b. Capitula numerous or more in terminal racemes or panicles; involucres cylindric or narrowly campanulate, (1–)3–5 mm in diam.; phyllaries 3–8; florets few; leaves not triangular; petioles winged or not.

13a. Capitula numerous, small; involucres cylindric, 1–2 mm in diam.; phyllaries and florets 3–5; leaf blade polyangular or reniform, 5–7-lobed or coarsely toothed; corolla white or yellow.

14a. Capitula sessile; involucres ca. 5 × 1 mm; phyllaries and florets 3 or 5; corolla white; pappus sordid white or pale yellow-brown ..... 18. *P. ambiguus*

14b. Capitula pedunculate; involucres 6–8 × 1.5–2 mm; phyllaries and florets 5; corolla white or yellow; pappus white or yellow-brown.

15a. Capitula racemose or compound racemose; peduncles short or very short; involucres cylindric; phyllaries obtuse or rounded; pappus white ..... 19. *P. ainsliaeiflorus*

15b. Capitula laxly racemose or compound racemose; peduncles 1–2 mm; involucres narrowly campanulate; phyllaries acute; corolla yellow; pappus pale yellow-brown ..... 20. *P. kangxianensis*

13b. Capitula more numerous, larger; involucres 3–5 or 10–20 mm in diam.; pappus white, sordid white, or red-brown.

16a. Involucres campanulate, 10–15 × 10–20 mm; phyllaries 7–12; florets 8–38; pappus red-brown.

17a. Leaves broadly triangular, 3–5-lobed, lobes triangular, basal lobes sometimes rudimentary; capitula smaller; involucres narrowly campanulate, 10–12 × 5–10 mm; phyllaries 7 or 8; florets 8–10 ..... 21. *P. rubescens*

17b. Leaves pentagonal-hastate, lateral lobes small, narrowly triangular or obscure; capitula large; involucres campanulate, 13–15 × 17–20 mm; phyllaries 12; florets numerous (ca. 38) .... 22. *P. matsudae*

16b. Involucres 5–8(–10) mm; phyllaries and florets 4–8, rarely more; pappus white or sordid white.

18a. Petioles not winged, basally not expanded into auricles.

19a. Leaf axils with buds.

20a. Leaf blade hastate-triangular, apex acuminate or long acuminate, base cordate, both surfaces scaly puberulent; phyllaries 7 or 8; florets 10–13; pappus white ..... 14. *P. nokoensis*

20b. Leaf blade broadly triangular-hastate or ovate-triangular, apex long acuminate or caudate, base hastate or broadly cordate, adaxially densely glandular pubescent; phyllaries and florets 5; pappus brown or purple-brown ..... 15. *P. hastiformis*

19b. Leaf axils without buds.

21a. Leaf blade triangular-hastate, apex acute or acuminate, base broadly cordate, both surfaces glabrous or subglabrous; phyllaries 5; florets 5 or 6 ..... 16. *P. albus*

21b. Leaf blade pentagonal-reniform, apex acute or rounded-obtuse, base deeply cordate, abaxially hispidulous, adaxially on veins puberulent; phyllaries 8(or 9); florets 16–19 ..... 17. *P. vespertilio*

18b. Petioles winged.

22a. Petioles narrowly or indistinctly winged, basally not expanded into auricles.

23a. Capitula pendulous, arranged in pyramidal panicles; phyllaries 7 or 8, glandular pubescent; florets 8–15(–20); blade triangular-hastate, adaxially densely or laxly pubescent; petioles narrowly winged ..... 6. *P. hastatus*

23b. Capitula erect, arranged in broadly pyramidal panicles with long divaricate branches; phyllaries 5 or 6; florets 5–8; blade triangular-lanceolate, apex acuminate or caudate, adaxially laxly pilose on veins or subglabrous; petioles indistinctly winged ..... 7. *P. lancifolius*

22b. Petioles broadly winged, base often expanded and auriculate.

24a. Plants to 2–3 m tall, stems robust; leaves broadly triangular or triangular-hastate, petioles with 1.5–2 cm wide wings, base expanded and amplexicaul-auriculate; capitula numerous, 250–350, in broad pyramidal panicles; phyllaries 4 or 5; florets 5–7 ..... 8. *P. komarovianus*

24b. Plants 30–100 cm tall; stems slender; leaves reniform or triangular-reniform, petioles large or small auriculate; capitula more numerous, racemose or paniculate; phyllaries 4 or 5; florets 4–7.

25a. Leaf blade oblate-reniform, thinly papery, retuse or subtruncate, triangular-rostrate at center, margin irregularly coarsely toothed stipitate glandular hairy; petioles basally entire or dentate auriculate; phyllaries 4; florets 5 ..... 9. *P. maowenensis*

25b. Leaf blade not oblate-reniform, papery, apically constricted long apiculate, with regular teeth or with concave teeth at subbasal margins glandular puberulent; phyllaries 5; florets 4–7(or 8).

26a. Leaves reniform or triangular-reniform, both surfaces glabrous.

27a. Phyllaries 4–8 mm, 1/3–1/2 as long as corolla and pappus by anthesis; capitula racemose, rarely paniculate; petioles basally expanded and small auriculate ..... 10. *P. auriculatus*

27b. Phyllaries 8–12 mm, subequal to or rather shorter than corolla by anthesis; capitula laxly or densely paniculate; petioles basally with 1.5–2 cm wide auricle ..... 11. *P. praetermissus*

26b. Leaves triangular-hastate or ovate to broadly ovate, adaxially hairy.

28a. Median stem leaves triangular-hastate, lateral lobes triangular, irregularly repand-dentate, adaxially puberulent on veins; petioles toward base gradually expanded into ovate-orbicular or orbicular, 1.5–2.5 cm wide auricle; auricles entire or remotely toothed; phyllaries 5; florets 5 or 6 ..... 12. *P. gansuensis*

28b. Stem leaves broadly ovate or broadly cordate, adaxially sparsely arachnoid or subglabrous; petioles with 5–10 mm wide wings, basally expanded into a large amplexicaul auricle; phyllaries (3 or)5; florets 3 or 4(or 5) ..... 13. *P. otopteryx*

11b. Leaves adaxially arachnoid, densely lanate, or hairy initially, gradually glabrescent (4. *P.* sect. *Monanthi*).

29a. Plants glabrous or sparsely arachnoid in upper part; leaves triangular, ovate-triangular, or hastate-triangular, distinctly prominently 3-veined; anthers basally long caudate.

30a. Leaves divided.

31a. Leaf blade obovate-spatulate, lyrately pinnate; lobes ovate, oblong, or obovate-triangular, coarsely toothed, adaxially arachnoid-tomentose; petioles broadly winged, basally expanded into auricle; phyllaries and florets 5 or 6 ..... 32. *P. cyclotus*

31b. Leaf blade 3–5-lobed to medially sect.
32a. Leaves reniform-pentangular or broadly ovate-pentangular; petioles not winged, often with many globose bulblets in upper branches of synflorescence; phyllaries and florets 4 or 5 ..... 29. *P. quinquelobus*
32b. Leaves reniform-triangular or broadly ovate; petioles winged, but without bulblets.
33a. Leaf blade broadly triangular, 3-lobed, central lobe 3-fid, lateral lobes 2-fid, abaxially white arachnoid-tomentose; petioles narrowly winged, basally without auricle; phyllaries and florets 4 or 5 ..... 30. *P. rockianus*
33b. Leaf blade reniform-triangular or broadly ovate, medially 3–5-sect, lobes lobulate or coarsely toothed, abaxially white arachnoid-tomentose, adaxially densely brown hispidulous; petioles broadly winged, basally auriculate; phyllaries 5; florets 8(–10) ..... 31. *P. souliei*
30b. Leaves not divided.
34a. Petioles winged, often expanded into subamplexicaul auricle; capitula pendulous.
35a. Leaf blade ovate-triangular to broadly triangular, stiffly papery; petioles broadly winged, basally expanded into broad or narrow auricle; phyllaries 3; florets 5 or 6 ..... 23. *P. latipes*
35b. Leaf blade triangular or triangular-hastate, thick, abaxially arachnoid-tomentose; petioles with 4–15 mm in diam. orbicular auricles; phyllaries 6–8; florets 9–12(–14) ..... 24. *P. lidjiangensis*
34b. Petioles not winged, base not or ± expanded, but without auricles; capitula ascending or pendulous.
36a. Stem leaves numerous, crowded at middle part of stem; leaves ovate or reniform-triangular, margin with cartilaginous coarse teeth; capitula laxly racemose, but not secund; phyllaries 3; florets 2 or 3 ..... 27. *P. tenianus*
36b. Stem leaves 3 or 4, often crowded at middle to lower part of stem; capitula secund.
37a. Radical leaves withered and fallen by anthesis; leaf blade membranous or submembranous, broadly ovate or ovate-oblate, abaxially densely white tomentose; florets (6–)8 or 9 ..... 25. *P. taliensis*
37b. Radical leaves persistent at anthesis; leaf blade papery, ovate-triangular, broadly ovate, or rhombic, abaxially not white tomentose; florets 5.
38a. Stems yellow-brown multicellular pubescent; leaves often crowded in lower middle part of stem, ovate-triangular or broadly ovate, rarely rhombic or cordate, abaxially yellow-brown villous; capitula narrowly paniculate ..... 28. *P. koualapensis*
38b. Stems slender, glabrous; leaves crowded near base of stem, ovate-orbicular or cordate, abaxially becoming purple when dry, glabrous; capitula spicate ..... 26. *P. jiulongensis*
29b. Plants all or at least upper part arachnoid or villous; leaf blade ovate-triangular, ovate-cordate, or cordate, basally 3-veined or palmately 5–7-veined, abaxially arachnoid, glandular hairy, or ± glabrescent.
39a. Leaf blade ovate-triangular, ovate, or cordate, usually basally 3-veined; phyllaries (2 or)3–5; florets 1–5, rarely more.
40a. Capitula numerous, spreading or pendulous, racemose or paniculate; phyllaries (2 or)3; florets 1–3, rarely 4.
41a. Phyllaries 2; floret 1; leaves 4, lax on stem, subtriangular-reniform, abaxially densely lanate, adaxially crisped-volute hairy; petioles not winged ..... 35. *P. morrisonensis*
41b. Phyllaries 2 or 3(or 4); florets 3(or 4); leaf blade ovate-triangular or broadly cordate; petioles winged or not.
42a. Capitula laxly pyramidal-paniculate, pendulous, secund; leaves ovate-triangular, abaxially white or gray-white arachnoid; petioles not winged ..... 33. *P. roborowskii*
42b. Capitula narrowly racemose-paniculate, spreading; leaves broadly cordate, abaxially sparsely arachnoid, adaxially sparsely hairy; petioles narrowly winged ..... 34. *P. xinjiashanensis*
40b. Capitula laxly paniculate or narrowly racemose-paniculate; phyllaries 5; florets 5 or 6, rarely 10–13.
43a. Stem leaves 4 or 5; petioles winged.
44a. Leaves membranous, broadly ovate to ovate-rhombic, acute, angular coarsely toothed; petioles distinctly winged ..... 36. *P. profundorum*
44b. Leaves thinly papery, broadly ovate or ovate-triangular, caudate-acuminate, serrulate; petioles indistinctly winged or not winged; uppermost leaves bractlike ..... 37. *P. phyllolepis*
43b. Stem leaves 2–4(or 5); petioles not winged.
45a. Stems slender, glabrous; stem leaves 2 or 3, broadly cordate-orbicular or ovate-cordate-orbicular or ovate-cordate, abaxially violet or purplish, sparsely arachnoid; capitula broadly paniculate; involucres 12–14 × 1.5–2 mm, glabrous; florets 5 or 6 ..... 38. *P. ianthophyllus*

45b. Stems robust, white arachnoid; stem leaves 4 or 5, ovate-triangular or triangular-hastate, abaxially white arachnoid; capitula narrowly paniculate; involucres 8–10 × 4–5 mm, outside white lanate; florets 10–13 ..... 39. *P. leucocephalus*

39b. Leaf blade broadly ovate-cordate or cordate, palmately 5–7-veined, abaxially arachnoid-tomentose or glandular hairy; phyllaries 3–5(or 6); florets (2–)5–8(–10).

46a. Phyllaries 3 or 4; florets 2–4; plants adpressed gray-white arachnoid-lanate, intermixed glandular puberulent ..... 40. *P. longispicus*

46b. Phyllaries 5; florets 5–8(–10); plants arachnoid or red-brown glandular pubescent.

47a. Axillary scale buds ovoid-globose, brown tomentose; capitula racemose, upper part laxly bracteate, often with bulblets; phyllaries 5 or 6; florets 8–10 ..... 41. *P. bulbiferoides*

47b. Bulblets absent from leaf axils and bracts; capitula spicate-racemose or paniculate.

48a. Stems, petioles, and involucres arachnoid or later ± glabrescent.

49a. Capitula spicate-racemose; involucres 12–14 mm; florets 5–8; petioles 5–14 cm, not winged, basally not expanded ..... 42. *P. petasitoides*

49b. Capitula laxly narrowly paniculate; involucres ca. 10 mm; florets 7 or 8; petioles indistinctly narrowly winged, basally expanded and subamplexicaul ..... 43. *P. hwangshanicus*

48b. Stems, petioles, and involucres red-brown or brown villous or knotted glandular pubescent.

50a. Lower stems glandular pubescent, upper part white arachnoid or hispidulous; peduncles 3–4 mm; corolla orange ..... 46. *P. dasythyrsus*

50b. Stems, petioles, and phyllaries red-brown or brown pubescent; peduncles very short or capitula subsessile; corolla yellow.

51a. Leaf blade broadly ovate-cordate or reniform, triangularly 5-lobed or deeply serrate, red-brown hyaline glandular hairy; petioles 5–10 cm, basally not expanded ..... 44. *P. rufipilis*

51b. Leaf blade reniform or ovate, undulate-lobed, lobes broadly triangular, abaxially arachnoid or puberulent, adaxially brown puberulent; petioles 10–15 cm, basally expanded, subamplexicaul ..... 45. *P. tsinlingensis*

1. Parasenecio sect. **Taimingasa** (Kitamura) H. Koyama in Iwatsuki et al., Fl. Japan 3b: 47. 1995.

鞘叶组 qiao ye zu

Cacalia sect. *Taimingasa* Kitamura, Acta Phytotax. Geobot. 20: 172. 1962.

Leaves large, few, usually 2 or 3; blade orbicular, palmately medially sect; petioles amplexicaul, shortly sheathed at base. Involucres narrowly campanulate; phyllaries 3–5. Florets 5–10. Pappus sordid white.

Five species: China, Japan, Korea; one species in China.

1. Parasenecio firmus (Komarov) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 26. 1999.

大叶蟹甲草 da ye xie jia cao

Cacalia firma Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 420. 1901; *Koyamacalia firma* (Komarov) H. Robinson & Brettell; *Miricacalia firma* (Komarov) Nakai.

Stems erect, striate, to 2 m tall, robust, 1.5–2 cm in diam. at base, terete, glabrous. Radical leaves long petiolate, large; petiole 22–28 cm, stout, crisped-pubescent; blade abaxially pale green, adaxially green, orbicular or orbicular-cordate, ca. 30 × 35–100 cm, palmately medially cleft, base cordate, apex acute; lobes 11–15, triangular-ovate, adaxially glabrous, reticulate veined, abaxially puberulent on veins, margin irregularly mucronulate-serrate, apically acute. Stem leaves small; petiole short, 3–8 mm, stout; leaf blade ovate-triangular or ovate-oblong. Peduncles 10–12 × 2–3 mm, with linear bracteoles. Phyllaries 5, linear-lanceolate, 10–12 × 1.5–2 mm, sparsely puberulent or subglabrous, with membranous margins, apex obtuse or slightly acute. Florets 5–10; corolla yellow, 8–10 mm, tube slender, ca. 3.5 mm, limb narrowly tubular; lobes 5, linear-lanceolate, ca. 2 mm. Anthers basally caudate; style branches excurved, apex truncate, penicillate-papillose. Achenes yellow-brown, cylindric, 5–6 mm, glabrous, ribbed. Pappus white or sordid white, ca. 7 mm. Fl. Aug–Sep, fr. Oct.

Forest understories, forest margins, open spaces; 800–1100 m. Jilin [N Korea].

2. Parasenecio sect. **Parasenecio**

蟹甲草组 xie jia cao zu

Radical leaf 1, stem leaves 1, rarely 2 or few, bracteal-leaflike. Capitula 3 or 4 to numerous, erect or pendulous, narrowly paniculate. Involucres campanulate or narrowly campanulate; phyllaries uniseriate or nearly biseriate, 8–10. Florets 10–28. Pappus white.

• Two species: China.

2. Parasenecio forrestii W. W. Smith & J. Small, Trans. & Proc. Bot. Soc. Edinburgh 28: 93. 1922.

蟹甲草 xie jia cao

Cacalia forrestii (W. W. Smith & J. Small) Handel-Mazzetti.

Rhizomes slender, woody, scabrous. Stem solitary, 60–80 cm tall, striate, densely glandular pubescent at base, with laxly paniculate synflorescence branches in upper part, densely glandular pubescent. Leaves petiolate, often crowded in lower part, usually 3. Radical leaf 1, large; petiole 3–5 cm, not winged, densely pubescent; leaf blade cordate, 10–12 × 14–17 cm, abaxially densely villous on veins, adaxially villous, ± reticulate, apex obtuse. Stem leaves usually 1, rarely 2, similar to radical leaves but smaller, sessile or subsessile, elliptic-triangular. Capitula numerous, pendulous, narrowly paniculate; peduncles 0.5–5 cm, puberulent; bracteoles 1–4. Involucres campanulate, 1.3–1.4 cm; phyllaries 8 or 9, subbiseriate; outer phyllaries 3 or 4, larger, puberulent. Florets 10–16; corolla pale pink-white. Anthers caudate at base. Style branches excurved, truncate, penicillate-papillose. Achenes cylindric, 5–6 mm, glabrous, 5-ribbed. Pappus white, ca. 8 mm. Fl. Aug, fr. Sep–Oct.

• Forest understories; 2300–3700 m. SW Sichuan, Yunnan.

Parasenecio forrestii is quite similar to *P. begoniifolius* in aspect, but the form of the leaves and indumentum are different.

3. Parasenecio begoniifolius (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 28. 1999.

秋海棠叶蟹甲草 qiu hai tang ye xie jia cao

Senecio begoniifolius Franchet, J. Bot. (Morot) 8: 358. 1894; *Cacalia begoniifolia* (Franchet) Handel-Mazzetti.

Plants densely brown multicellular pubescent throughout, with numerous, stout, fibrous roots. Stem solitary, ca. 50 cm tall, erect or curved from base, striate, with 1 radical leaf and few scaly leaflets. Radical leaves long petiolate; petiole 7–15 cm, stout, not winged, densely fulvous-brown tomentulose, base ± expanded, slightly amplexicaul; blade abaxially pale green, adaxially deep green, broadly ovate or ovate-orbicular, 15–20 × 12–13 cm, papery, both surfaces red-brown puberulent, basally 7–9-veined, lateral veins branched, base deeply cordate, margin irregularly mucronulate-serrate, apex acute. Stem leaves few, shortly petiolate, bracteal-leaflike, lanceolate, ca. 2 cm. Capitula usually 3 or 4, terminal or on synflorescence branches arranged in narrow panicle; peduncles erect, 5–15 mm, densely pubescent; bracteoles 3–5, linear. Involucres narrowly campanulate, 7–9 × 1–1.5 mm, puberulent, margin narrowly scarious, apically acute or acuminate; phyllaries 9 or 10. Florets 28, longer than involucres; corolla yellow, 9–10 mm, tube 3–4 mm, slender, limb broadly tubular; lobes lanceolate, ca. 2 mm. Anthers caudate at base. Style branches excurved, truncate, papillose. Achenes cylindric, glabrous, ribbed. Pappus white, ca. 1 cm. Fl. Nov–Dec.

• Forest understories on slopes, forest margins, roadsides; 700–2200 m. Chongqing (Chengkou), W Hubei (Badong), E Sichuan (Daba Shan).

3. Parasenecio sect. **Koyamacalia** (H. Robinson & Brettell) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 28. 1999.

小山蟹甲草组 xiao shan xie jia cao zu

Koyamacalia H. Robinson & Brettell, Phytologia 27: 270. 1973.

Stem leaves numerous, triangular or ovate-hastate to reniform, abaxially not arachnoid. Capitula numerous. Involucres cylindric to campanulate; phyllaries 3–12. Florets 3–38; corolla white or yellow. Pappus white, rarely yellow-brown or red-brown.

About 26 species: Eurasia from Russia to E Asia; 19 species (14 endemic) in China.

1. Parasenecio ser. **Trilobi** (H. Koyama) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 29. 1999 [*"Trilobae"*].

三裂叶蟹甲草系 san lie ye xie jia cao xi

Cacalia ser. *Trilobae* H. Koyama, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 2(2): 170. 1969.

Petiole basally expanded into an amplexicaul auricle or not; leaf blade ovate or broadly ovate-cordate, 3-lobed or coarsely toothed. Involucres cylindric, 2–4 mm; phyllaries 4 or 5. Florets 2–5.

One species: China, India (Sikkim), Kashmir, Nepal.

4. Parasenecio chola (W. W. Smith) R. C. Srivastava & C. Jeffrey, J. Bombay Nat. Hist. Soc. 93(2): 318. 1996.

藏南蟹甲草 zang nan xie jia cao

Senecio chola W. W. Smith, J. Proc. Asiat. Soc. Bengal 7: 72. 1911.

Rhizomes woody, densely yellow-brown tomentose on collar, with few fibrous roots. Stem solitary, erect, 50–100 cm tall, sulcate, simple or inflorescence-branched in upper part, sparsely puberulent in lower part, densely yellow-brown pubescent in upper part. Leaves long petiolate; petiole not winged, 7–11 cm, sparsely pubescent, not expanded at base; blade abaxially pale green, adaxially green, ovate or ovate-cordate, 10–18 × 9–17 cm, abaxially yellow-brown puberulent on veins, adaxially sparsely adpressed hairy, basally 3–5-veined, lateral veins branched from midvein, base cordate or subtruncate, margin irregularly coarsely, triangularly mucronulate-toothed, rarely 3–10-lobed, apex acute or acuminate. Capitula numerous, small,

terminal and in upper leaf axils, crowded in paniculate racemes, sessile or subsessile, densely yellow-brown pubescent. Involucres cylindric, 2–5 mm; phyllaries 4–6, linear, 5–6 mm, densely puberulent, margin scarious, apically obtuse. Florets 2–6; corolla yellow, shorter than involucres. Achenes cylindric, ca. 2 mm, glabrous, ribbed. Pappus pale brown. Fl. Jul–Aug.

Forest understories; 3300–3800 m. S Xizang (Gyirong) [India (Sikkim), Kashmir, Nepal].

2. Parasenecio ser. **Candidi** (Kitamura) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 30. 1999 [*"Candidae"*].

戟叶蟹甲草系 ji ye xie jia cao xi

Cacalia ser. *Candidae* Kitamura, Compos. Jap. 3: 203. 1942.

Leaves reniform or triangular-ovate to hastate, margin toothed or shallowly lobed. Involucres cylindric or narrowly campanulate; phyllaries 3–8, rarely 10. Florets 3–5, rarely more. Pappus white, rarely yellow-brown.

About 20 species: China, N Japan, Korea, Mongolia, Russia; 13 species (nine endemic) in China.

5. Parasenecio deltophyllus (Maximowicz) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 30. 1999.

三角叶蟹甲草 san jiao ye xie jia cao

Senecio deltophyllus Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 487. 1882; *Cacalia deltophylla* (Maximowicz) Mattfeld ex Rehder & Kobuski; *Koyamacalia deltophylla* (Maximowicz) H. Robinson & Brettell.

Rhizomes robust, elongate with numerous fibrous roots. Stem solitary, erect, 50–80 cm tall, distinctly sulcate, sparsely pubescent or subglabrous. Leaves petiolate; lower leaves withered and fallen; petiole 3–6 cm, not winged, white crisped- and glandular hairy. Median leaves triangular, 4–10 × 5–7 cm, abaxially sparsely puberulent, adaxially glabrous, basally 3–5-veined, lateral veins upward divaricate, base truncate or cuneate, margin irregularly undulate-toothed, teeth obtuse and mucronulate, apex acute. Upper leaves shortly petiolate, lanceolate. Capitula few to 10, pendulous, terminal or in upper leaf axils, corymbose; peduncles 1–3 cm, sparsely crisped- and glandular hairy; bracteoles 3–8, linear. Involucres campanulate, 6–8 × 5–10 mm; phyllaries 8–10, oblong, ca. 8 × 2–3 mm, outside sparsely white pubescent and glandular hairy, barbate, with broad scabrous margins, apex acuminate. Florets numerous (ca. 38); corolla yellow or yellow-brown, 5–7 mm, with ca. 3 mm tube and campanulate limb; lobes lanceolate, apex puberulent. Anthers caudate at base. Style branches finely long excurved, apex truncate, long papillose. Achenes cylindric, 3–4 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jul–Aug, fr. Sep.

• Forest understories, slopes, thickets in valleys, shaded places; 3100–4000 m. Gansu, Qinghai, N Sichuan.

6. Parasenecio hastatus (Linnaeus) H. Koyama in Iwatsuki et al., Fl. Japan 3b: 52. 1995.

山尖子 shan jian zi

Rhizomes procumbent, with numerous fibrous roots. Stem stiff, erect, 40–150 cm tall, simple, sulcate, glabrous or subglabrous in lower part, densely glandular puberulent in upper part. Lower leaves withered and fallen at anthesis. Median leaf petiole 4–5 cm, narrowly winged, not expanded at base; blade abaxially pale green, adaxially green, triangular-hastate, 7–10 × 13–19 cm, basal lateral lobes sometimes incised-lobulate, abaxially densely pubescent, adaxially glabrous or sparsely puberulent, base hastate or subcordate, margin irregularly finely toothed, apex acute or acuminate. Upper leaves smaller; basal lobes rudimentary, triangular or subrhombic, base truncate or broadly cuneate, apex acuminate. Uppermost bracteal leaves lanceolate to linear. Capitula numerous, pendulous, apically and in upper leaf axils narrowly pyramidal-paniculate; peduncles 4–20 mm, densely glandular puberulent. Involucres cylindric, 9–11 × 5–8 mm; phyllaries 7 or 8, linear or lanceolate, ca. 2 mm wide, apex acute, with 2 subulate bractlets. Florets 8–15(–20); corolla whitish, 9–11 mm, with ca. 4 mm tube narrowly campanulate, limb lobes lanceolate, apically acuminate. Anthers caudate at base. Style branches slender, excurved, apically truncate, papillose. Achenes pale brownish, cylindric, 6–8 mm, glabrous, ribbed. Pappus white, equal to achenes or shorter. Fl. Jul–Aug, fr. Sep–Oct. $2n = 40, 60$.

Forest understories, slopes, grasslands, forest margins, roadsides. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [N Japan, Korea, Mongolia, Russia (Far East)].

1a. Leaves abaxially and phyllaries outside densely glandular puberulent ..... 6a. var. *hastatus*

1b. Leaves glabrous or veins sparsely puberulent; phyllaries outside glabrous or puberulent only at base ..... 6b. var. *glaber*

6a. Parasenecio hastatus var. **hastatus**

山尖子(原变种) shan jian zi (yuan bian zhong)

Cacalia hastata Linnaeus, Sp. Pl. 2: 835. 1753; ?*C. hastata* subsp. *orientalis* Kitamura; *C. hastata* var. *pubescens* Ledebour; *Hasteola hastata* (Linnaeus) Pojarkova; *Koyamacalia hastata* (Linnaeus) H. Robinson & Brettell; *Senecio sagittatus* Schultz Bipontinus; *S. sagittatus* var. *pubescens* (Ledebour) Maximowicz.

Leaves abaxially and phyllaries outside densely glandular puberulent.

Forest understories, grasslands along forest margins; 1700–2300 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi [N Japan, Korea, Mongolia, Russia (Far East)].

6b. Parasenecio hastatus var. **glaber** (Ledebour) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 33. 1999.

无毛山尖子 wu mao shan jian zi

Cacalia hastata var. *glabra* Ledebour, Fl. Altaic. 4: 52. 1833.

Leaves glabrous or veins sparsely puberulent. Phyllaries outside glabrous or only puberulent at base.

• Forest understories on slopes, forest margins, roadsides. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi.

7. Parasenecio lancifolius (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 33. 1999.

披针叶蟹甲草 pi zhen ye xie jia cao

Senecio sagittatus Schultz Bipontinus var. *lancifolius* Franchet, J. Bot. (Morot) 10: 421. 1896 [*"lancifolia"*]; *Cacalia hastata* Linnaeus subsp. *lancifolia* (Franchet) H. Koyama; *C. hastata* var. *lancifolia* (Franchet) H. Koyama.

Rhizomes robust, 1.5–2 cm in diam., with numerous fibrous roots. Stem solitary, erect, green or purple in lower part, striate, 90–200 cm tall, glabrous, long naked in lower part. Leaves long petiolate, lower leaves withered at anthesis; petiole 3–5 cm, not or inconspicuously winged; blade abaxially pale green, adaxially deep green, triangular-lanceolate to lanceolate, 18–20 × 4–8 cm, abaxially sparsely puberulent or subglabrous on veins, adaxially glabrous, base 3–5-veined, lateral veins numerous, upward divaricate, reticulately connected, base truncate or rarely subcordate, apex long acuminate or caudate, lateral lobes excurved or spreading, narrowly triangular-lanceolate, small, sometimes indistinct, margin equally denticulate or triangularly coarsely toothed, teeth long mucronulate. Upper leaves smaller, lanceolate or narrowly lanceolate, lateral lobes very small or inconspicuous, shortly acute. Capitula numerous, terminal and in upper leaf axils in a large divaricately branched panicle; branches spreading or ascending, rachis and peduncles yellow-brown glandular puberulent; peduncles (3–)5–8 mm, slender, with 2 or 3 linear or subulate bractlets. Involucres cylindric, 10–13 × 2–3 mm; phyllaries 5 or 6, green or purple, linear-lanceolate, 10–12 × 1–1.5 mm, outside glabrous or laxly puberulent at base, margin narrowly scarious, apex obtuse or rather acute. Florets 5–8, shorter than involucres or subequal to involucres; corolla yellow, 8–9 mm, with 3–3.5 mm tube and broadly tubular limb; lobes lanceolate. Anthers caudate at base. Style branches not curved, apex truncate, papillose. Achenes yellow-brown, cylindric, 5–6 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. Jul–Aug, fr. Sep.

• Forest understories on slopes, thickets, wet places in grasslands; 1300–2100 m. Chongqing, W Hubei, E Sichuan.

Parasenecio lancifolius is similar to *P. hastatus* in leaf form but differs in having upper stem leaves triangular-lanceolate or narrowly lanceolate, capitula arranged in large divaricately branched panicles, and different numbers of phyllaries and florets.

8. Parasenecio komarovianus (Pojarkova) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 34. 1999.

星叶蟹甲草 xing ye xie jia cao

Hasteola komaroviana Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 381. 1960; *Cacalia hastata* Linnaeus subsp. *komaroviana* (Pojarkova) Kitagawa; *C. komaroviana* (Pojarkova) Pojarkova.

Rhizomes procumbent, with numerous stout fibrous roots. Stems robust, erect, (70–)100–200(–300) cm tall, 8–12 mm in diam. in lower part, striate, glabrous or laxly pubescent. Lower leaves withered by anthesis; petiole 1/3–1/2 as long as blade, with 1.5–2 cm wide wings, basally expanded into an amplexicaul auricle. Median leaf petiole decurrent into a broad wing; median leaves abaxially pale green, adaxially dark green, triangular-hastate, rarely broadly triangular-hastate, 20–30 × 20–50 cm, abaxially glandular puberulent on veins, adaxially sparsely puberulent, 3-veined from base, lateral veins upward divaricate, base truncate or subcordate, margin irregularly triangularly or lanceolate toothed, thin, apex caudate-acute; lateral lobes usually 2-lobed, lobules narrowly lanceolate, apex acute, slightly retuse. Upper leaves smaller, shortly petiolate. Lower leaves 1 or 2, similar to median stem leaves, but rather narrow, triangular-hastate, 2- or 3-fid or lateral lobes with smaller teeth on margins. Capitula quite numerous, 250–350, crowded at apices of stems in 20–50 cm large pyramidal panicles; lower synflorescence branches to 22 cm, ascending; upper branches erect or spreading; peduncles 4–12 mm, slender; rachis and peduncles often densely glandular puberulent. Involucres narrowly cylindric, 9–12 × 2–3 mm; phyllaries 4 or 5, green, linear-lanceolate, 9–12 mm, outside sparsely glandular puberulent or subglabrous, margin scarious, apically acute. Florets 5–7; corolla yellow, 7–8 mm, with 1.5–2 mm tube and campanulate-tubular limb; lobes lanceolate. Anthers ca. 3 mm, basally caudate. Style branches long excurved, apically truncate, papillose. Achenes cylindric, 7–8 mm, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. Jul–Aug, fr. Sep.

Forest understories, forest margins; 800–2000 m. Jilin, Liaoning [Korea, Russia (Far East)].

9. Parasenecio maowenensis Y. L. Chen, Acta Phytotax. Sin. 34: 645. 1996.

茂汶蟹甲草 mao wen xie jia cao

Rhizomes short, stout, ca. 1 cm in diam., with numerous fibrous roots. Stem solitary, erect or curved in lower part, 60–65 cm tall, slender, striate, long naked in lower part, sparsely or densely yellow-brown capitate stipitate glandular hairy. Lower leaves withered by anthesis; petiole 4–8.5 cm, not winged, expanded into an amplexicaul auricle; auricle entire or laxly toothed, with capitate stipitate glandular hairs. Stem leaves 2, long petiolate; blade abaxially pale green, adaxially deep green, broadly reniform, 6–9 × 12–14 cm, thinly papery, both surfaces glabrous, capitate stipitate glandular hairy, basally 3–5-veined, lateral veins upward divaricate, base deeply cordate, margin irregularly undulate coarsely toothed, large teeth angular, stiffly mucronulate, apex retuse or subtruncate, triangular-rostrate-acute at center. Uppermost leaves reduced to bracteal leaf; bracteal leaves linear, 6–8 mm. Capitula very numerous, apically in a branched panicle; rachis and peduncles densely yellow-brown capitate stipitate glandular hairy; peduncles 6–13 mm, slender, with 1 or 2 linear bractlets. Involucres cylindric, 10–11 × 2–3 mm; phyllaries 4, green, linear or linear-lanceolate, 0.5–1 mm wide, outside sparsely capitate stipitate glandular hairy, margin narrowly scarious, apically acute. Florets 5, exserted from involucres; corolla yellow, 8–9 mm, with ca. 3 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 2 mm. An-

thers caudate at base. Style branches excurved, apex truncate, papillose. Achenes yellow-brown, cylindric, ca. 6 mm, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. and fr. Aug.

• Open places on slopes; ca. 2800 m. Sichuan (Wenchuan).

Parasenecio maowenensis is similar to *P. auriculatus* but differs in the shape of leaves, the indumentum, and the number of phyllaries and florets.

10. Parasenecio auriculatus (Candolle) J. R. Grant, Novon 3: 154. 1993.

耳叶蟹甲草 er ye xie jia cao

Cacalia auriculata Candolle, Prodr. 6: 329. 1838; *C. auriculata* var. *ochotensis* (Maximowicz) Komarov; *Hasteola auriculata* (Candolle) Pojarkova; *Koyamacalia auriculata* (Candolle) H. Robinson & Brettell; *Senecio dahuricus* Schultz Bipontinus; *S. dahuricus* var. *ochotensis* Maximowicz.

Rhizomes procumbent, with numerous fibrous roots. Stem solitary, erect or often curved, 30–100 cm or taller, sulcate, glabrous. Radical leaves withered often by anthesis; stem leaves 4–6, thinly papery; lower leaf petiole 1.5–2(–3) × as long as blade, slender, expanded at base only, but without auricle. Lower stem leaves 1 or 2; blade reniform, 2–4 × 4–7 cm, margin with unequally sized large teeth, apex contracted and long acute or sometimes slightly retuse. Median stem leaf petiole equal to blade or 1/4–1/2 as long, basally usually expanded into a small auricle; blade reniform to triangular-reniform, 5–16 × 7–14 cm, margin with equal large teeth or teeth retuse or indistinctly toothed near base, rarely entire, apex deeply retuse or retuse, often angulate, sometimes long acuminate. Upper leaves same shape as median leaves but smaller, triangular or oblong-ovate, shortly petiolate; uppermost leaves lanceolate. Capitula very numerous, terminal, arranged in 4.5–15 cm, narrow racemes, rarely shortly branched in lower part, or few racemose; peduncles pendulous, 1.5–5 mm or 7–9 mm in lower part, slender, glandular hairy and puberulent, with setiform or lanceolate bractlets; bractlets ca. 2 mm. Involucres purple or purple-green to green, cylindric; phyllaries 5, rarely 4, oblong, 4–8 mm, outside subglabrous, apically slightly acute. Florets 4–7; corolla yellow, 6–8 mm; tube as long as limb. Anthers exserted from corollas, basally sagittate. Style branches apically truncate, papillose. Achenes yellowish, cylindric, 3.5–5 mm, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. Jun–Jul, fr. Sep.

Forest understories, forest margins; 1400–1600 m. Heilongjiang, Jilin, Nei Mongol [N Japan, N Korea, Russia (Far East)].

11. Parasenecio praetermissus (Pojarkova) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 38. 1999.

长白蟹甲草 chang bai xie jia cao

Hasteola praetermissa Pojarkova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 386. 1960; *Cacalia praetermissa* (Pojarkova) Pojarkova.

Rhizomes ascending or procumbent, 5–15 mm in diam., with numerous fibrous roots. Stem solitary, erect, green or purple tinged, 50–150 cm tall, sulcate, glabrous or sparsely puberulent. Leaves densely crowded; lower leaves 1 or 2, long petiolate, reniform, smaller, withered by anthesis. Median stem leaves 3 or 4; petiole 1/4–1/2 as long as blade, ± winged, basally expanded into a 1.5–2 cm wide auricle, subamplexicaul; leaf blade abaxially gray-green, adaxially dark green, narrowly reniform, rarely triangular-reniform, 7–15 × 12–24 cm, both surfaces glabrous, basally 3-veined, divaricately branched near base, veins prominent abaxially, base cordate or subhastate, margin unequally undulate-toothed, teeth mucronulate, apex contracted into acute large teeth, with 2 rarely similar acute teeth. Upper leaves 1 or 2, triangular or triangular-reniform, very small, base truncate or cuneate, margin usually 3-toothed or nearly so, or nearly 3-lobed. Capitula numerous, laxly or densely narrowly paniculate at apices of stems, branched in upper or middle part; branches racemose, (1.5–)2–7 cm; lower branches ascending, to 10 cm, distinctly shorter than rachis; bracteal leaves lanceolate-linear, 8–20 mm; uppermost leaves setose, lower leaves same as upper stem leaves; capitula pendulous at anthesis; peduncles 3–8 mm, slender, puberulent, with 2–4 setose bractlets. Involucres cylindric; phyllaries 5, green or reddish, narrowly linear, (6–)8–12 × 1–1.5 mm, slightly shorter than corolla, apex rather acute or obtuse. Florets 5–8; corolla 8–9 mm, with 3–5 mm tube and campanulate-tubular limb; lobes lanceolate. Anthers exserted from corolla, basally caudate. Style branches truncate, papillose. Achenes brownish, cylindric, ca. 6 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. Aug, fr. Sep–Oct.

Forest understories, riversides; 900–1400 m. Heilongjiang, Jilin (Changbai Shan) [Korea, Russia (Far East)].

12. Parasenecio gansuensis Y. L. Chen, Acta Phytotax. Sin. 34: 643. 1996.

甘肃蟹甲草 gan su xie jia cao

Rhizomes short and stout, 10–15 mm in diam., with numerous fibrous roots. Stem solitary, erect, 60–80(–100) cm, striate, sparsely puberulent or subglabrous, long naked in lower part. Leaves long petiolate, lower leaves fallen by anthesis, median stem leaves papery; petiole 5–8 cm, basally expanded into an ovate or rounded amplexicaul auricle; auricle 1.5–2.5 cm wide, entire or laxly toothed, sparsely puberulent; blade abaxially gray-green, adaxially green, triangular-hastate, 9–13 × 9–14 cm, abaxially puberulent on veins, adaxially sparsely adpressed puberulent, basally 5- or 6-veined, lateral veins upward divaricate, branched, veins convex abaxially, concave adaxially, base hastate-cordate, apex acute or acuminate; central lobes large, lateral lobes triangular, upper ones long, lower ones smaller, margin irregularly undulate-toothed, teeth mucronulate. Upper leaves similar, like median stem leaves but smaller, shortly petiolate; uppermost leaves triangular-hastate to lanceolate, with broad amplexicaul auricle or sessile. Capitula numerous, apically or in upper axils racemose-paniculate; rachis and peduncles with capitate stipitate glandular hairs; peduncles 1–2 mm, with 1 or 2 linear bractlets. Involucres cylindric, 6–7 × ca. 2 mm; phyllaries 5, purple-red, linear or linear-lanceolate, 0.5–1 mm wide, outside sparsely glandular or subglabrous, margin narrowly scarious, apically rather acute or obtuse. Florets 5 or 6; corolla yellow, 6–7 mm, with ca. 3 mm tube and broadly tubular limb; lobes lanceolate. Anthers exserted from corolla,

3–4 mm, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindric, 3–4 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Forest understories on slopes, thickets, shaded places by canals; 1300–2500 m. Gansu, Shaanxi.

13. Parasenecio otopteryx (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 40. 1999.

耳翼蟹甲草 er yi xie jia cao

Cacalia otopteryx Handel-Mazzetti, Symb. Sin. 7: 1132. 1936; *Koyamacalia otopteryx* (Handel-Mazzetti) H. Robinson & Brettell.

Rhizomes not dilated, with numerous fibrous roots. Stem solitary, erect, striate, often purple in lower part, 70–100 cm tall, glabrous. Lower leaves withered by anthesis; stem leaves 4–6, long petiolate; petiole with 5–10 mm wide wings, expanded into an amplexicaul large auricle; blade abaxially gray-green, adaxially green, broadly ovate-cordate or broadly cordate, 10–16 × 11–19 cm, papery, abaxially sparsely arachnoid or subglabrous, adaxially sparsely brown glandular, basally 3-veined, lateral veins 3 or 4 pairs, upward divaricate, base cordate, margin irregularly undulate-serrate, teeth mucronulate, apex acute or shortly acute. Capitula numerous, terminal, compound racemose; rachis and peduncles glandular puberulent, with 1 or 2 lanceolate-subulate bractlets at base of peduncles; bractlets 1–8 mm, spreading or pendulous. Involucres cylindric or narrowly campanulate, 5–7 × 2–2.5 mm; phyllaries (3–)5, oblong-lanceolate, 6–7 × 1–1.5 mm, outside with paleaceous short hairs, margin scabrous, apically obtuse. Florets 3(–5); corolla yellow-white, 7–8 mm, with ca. 3 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 1.5 mm. Anthers exserted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes brown, cylindric, 4–5 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. and fr. Jul–Sep.

• Forest understories on slopes, forest margins, shaded places in thickets; 1400–2800 m. Henan, Hubei, Shaanxi, Sichuan.

Parasenecio otopteryx is similar to *P. profundorum* but differs by the shape of leaves and in having petioles broadly winged and expanded at the base into an amplexicaul auricle.

14. Parasenecio nokoensis (Masamune & Suzuki) C. I Peng & S. W. Chung, Fl. Taiwan, ed. 2, 4: 1026. 1998.

高能蟹甲草 gao neng xie jia cao

Cacalia nokoensis Masamune & Suzuki, J. Soc. Trop. Agric. 2: 51. 1930; *Koyamacalia nokoensis* (Masamune & Suzuki) H. Robinson & Brettell.

Rhizomes obliquely ascending. Stem solitary, 45–80 cm tall, erect, 2–3.5 mm in diam., glabrous below, densely shortly crisped-pubescent above; branchlets spreading. Basal and lower leaves fallen at anthesis. Stem leaves numerous, petiolate in median leaves; petioles 2.5–5 cm, not winged, usually with axillary buds at base, sparsely shortly crisped-pubescent; blade abaxially pale green, adaxially green, hastate-triangular, 4–13 × 4.5–10 cm, both surfaces scaly and shortly hairy, base ± cordate, margin denticulate, apex acuminate or long acuminate; lateral lobes acuminate. Upper leaves smaller; uppermost leaves linear. Capitula more numerous, terminal, arranged in panicles, 8–10 mm wide; peduncles 4–10 mm, with 1 or 2 linear bractlets, crisped-hairy. Involucres cylindric, not calyculate, 7–10 × 4–7 mm; phyllaries 7 or 8, linear-oblong, outside densely shortly crisped-hairy, margin narrowly scabrous, apically obtuse. Florets 10–13; corolla yellow, 8–9 mm, with 2.5–3 mm tube and broadly tubular limb; lobes lanceolate, ca. 1.5 mm, apex angularly thickened. Anthers exserted from corolla, basally sagittate-caudate. Style branches excurved, apex obtuse, papillose. Achenes cylindric, ca. 5 mm, glabrous, ribbed. Pappus white, ca. 8 mm, fragile. Fl. Aug–Oct.

• Forest margins on slopes; ca. 2900 m. Taiwan.

Parasenecio nokoensis is similar to *P. hastatus* in aspect but differs by its leaves unwinged, petioles with axillary buds at the base, phyllaries 7 or 8, and florets 10–13.

15. Parasenecio hastiformis Y. L. Chen, Acta Phytotax. Sin. 34: 641. 1996.

戟状蟹甲草 ji zhuang xie jia cao

Rhizomes 10–15 mm in diam., with numerous fibrous roots. Stem solitary, erect, 80–100 cm tall, striate, long naked below, sparsely glandular shortly pubescent, densely so in upper part. Leaves crowded, long petiolate; lower leaves fallen at anthesis; median leaf petioles not winged, 6–10 cm, expanded at base but not amplexicaul, sparsely or densely glandular shortly pubescent, sometimes with axillary ovoid scale buds; blade abaxially pale green or gray-green, adaxially dark green, broadly triangular-hastate or ovate-triangular, 10–15 × 12–15 cm, thinly papery, abaxially densely glandular shortly pubescent on veins, adaxially adpressed hispidulous, basally 3–5-veined, lateral veins upward divaricate and reticulate, base broadly cordate or hastate, apex long acuminate or caudate; lateral lobes broadly triangular, margin with long mucronulate teeth. Upper leaves smaller, similar to median leaves, or ovate-triangular, shortly petiolate; uppermost narrowly triangular to lanceolate, small. Capitula numerous apically and in upper leaf axils in lateral racemes or panicles; rachis and peduncles 1–2 mm or capitula subsessile, densely capitate stipitate glandular hairy; peduncles with 1 or 2 linear bractlets. Involucres cylindric or narrowly campanulate, 10–11 × 3–4 mm; phyllaries 5, oblong-lanceolate, ca. 1.5 mm wide, outside sparsely or densely glandular puberulent, margin ciliate, narrowly scarious, apically rather acute or obtuse. Florets 5, often longer than involucres; corolla yellow, 8–9 mm, with ca. 4 mm tube and campanulate limb; lobes lanceolate. Anthers exserted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes brown, cylindric, 3–4 mm, glabrous, ribbed. Pappus brown, ca. 8 mm. Fl. Sep.

• Riversides in valleys; ca. 2400 m. Yunnan (Lijiang).

16. Parasenecio albus Y. S. Chen, Ann. Bot. Fenn. 48: 34. 2011.

无毛蟹甲草 wu mao xie jia cao

Rhizomes procumbent, with fascicled fibrous roots. Stem solitary, erect, ca. 50 cm tall, 4–6 mm in diam. at base, angulate,

subglabrous except on synflorescence branches, paniculate synflorescences branched above, upward subcurved. Basal leaves withered and fallen at anthesis. Lower stem leaf petioles 4–6.5 cm, not winged, hispidulous, rather expanded at base but without auricle; leaf blade triangular-hastate, 7.5–15 × 10–18 cm, base broadly cordate or subcordate, shortly decurrent, margin with fine or stout teeth, teeth triangular and mucronulate, apex long acute or acuminate; lateral lobes furcate, acute or 2-lobulate; basal lobes longer, narrowly triangular. Upper stem leaves similar, gradually smaller. Uppermost leaves shortly petiolate, sometimes ovate or narrowly ovate, basally 3-veined, palmately divaricate, connected before margins, lateral and reticulate veins slightly prominent on both surfaces, base rounded. Capitula numerous, terminal and in upper leaf axils, pyramidal paniculate; synflorescence branches spreading, sparsely or densely yellow pubescent; peduncles 1.5–2 mm, hispidulous, basally with linear-lanceolate bractlets; bractlets 3–7 mm, rarely to 15 mm or shorter than 3 mm. Involucres cylindric, 9–11 × 2–3 mm; phyllaries 5, linear-lanceolate, 1.5–2 mm wide, outside pubescent, margin narrowly scarious, apically acute. Florets 5 or 6; corolla yellow, often exceeding involucre, with 3.5–4.5 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 2 mm, apically sparsely puberulent. Anthers exserted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindric, ca. 4 mm, glabrous, ribbed. Pappus white, equaling corolla lobes. Fl. Jul, fr. Sep.

• Forests, thickets on slopes, meadows, riversides; 800–2300 m. Chongqing (Nanchuan), Fujian, Guangxi, Guizhou, Hubei, Hunan, Jiangxi.

This species was originally described as *Cacalia subglabra* C. C. Chang (*Parasenecio subglaber* (C. C. Chang) Y. L. Chen), but Y. S. Chen (loc. cit.) demonstrated that the holotype of *C. subglabra*, *Z. S. Chung 83429* (IBSC), as designated in the protologue, presumably in error, is in fact a specimen of the species currently known as *Ligularia stenocephala*, into the synonymy of which the names *C. subglabra* and *P. subglaber* must therefore be placed. Y. S. Chen published the new name *P. albus* for the species originally described as *C. subglabra*, designating as the holotype *Z. S. Chung 83438* (IBSC), which was annotated as "*Cacalia subglabra* Chang" by C. C. Chang and, as it agrees perfectly with the description and illustration in his protologue, was evidently his intended holotype.

17. Parasenecio vespertilio (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 44. 1999 [*"vespertilo"*].

川鄂蟹甲草 chuan e xie jia cao

Senecio vespertilio Franchet, J. Bot. (Morot) 8: 359. 1894; *Cacalia vespertilio* (Franchet) Handel-Mazzetti.

Plants 90–120 cm tall. Stem erect, robust, distinctly sulcate, simple, glabrous in lower part, sparsely hispidulous and brown glandular hairy. Leaves few, long petiolate; petiole 15–20 cm, stout, not winged, shortly hairy and brown glandular hairy above; blade abaxially pale green, adaxially dark green, pentagonal-reniform, 20–22 × ca. 30 cm, abaxially hispidulous on veins, adaxially sparsely hispidulous, basally 7–9-veined, lateral veins upward furcate and laxly reticulate, base broadly deeply cordate, margin undulate-toothed, teeth mucronulate, apex shortly acute or rounded. Upper leaf petioles short, ca. 10 cm; leaf blades cordate or pentagonal-cordate, smaller, margin undulate-dentate, teeth mucronulate, apex hornlike acuminate. Capitula numerous, terminal, arranged in panicle ca. 50 × 20 cm, spreading at anthesis; peduncles 2.5–3.5 cm, slender, with 2 or 3 linear bractlets, sparsely puberulent and brown glandular hairy. Involucres cylindric or narrowly campanulate, 1.3–1.5 cm × 5–7 mm; phyllaries 8(or 9), olivaceous, oblong-lanceolate, outside sparsely puberulent and glandular hairy, margin narrowly scarious, apically acuminate or acute. Florets 16–19; corolla yellow, 8–10 mm, with 3–3.5 mm tube and broadly tubular limb; lobes ovate-lanceolate, apically puberulent. Anthers exserted from corolla, basally long caudate. Style branches excurved, truncate, penicillate-papillose. Achenes cylindric, 5–6 mm, glabrous, ribbed. Pappus white, ca. 9 mm. Fl. Jul–Aug, fr. Sep.

• Forest margins, canal sides, shaded places on mountains; 1200–2400 m. Chongqing (Chengkou), W Hubei (Shennongjia).

3. Parasenecio ser. **Ainsliaeiflori** Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 329. 1999 [*"Ainsliiflorae"*].

兔儿风花系 tu er feng hua xi

Leaves polygonal or reniform, 5–7-lobed or coarsely toothed. Capitula many, small, sessile or with very short peduncles. Involucres cylindric; phyllaries 2–5. Florets 3–5. Pappus white or yellowish brown.

• Three species: China.

18. Parasenecio ambiguus (Y. Ling) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 45. 1999.

两似蟹甲草 liang si xie jia cao

Rhizomes robust, with numerous fibrous roots. Stem solitary, erect, striate, 80–150 cm tall, sparsely hairy or glabrous below, adpressed shortly pubescent in upper part. Leaves long petiolate; petiole not winged, 10–18 cm, glabrous; blade abaxially pale green, adaxially green, polygonal or reniform-triangular, abaxially sparsely shortly hairy, glabrescent, adaxially glabrous, 5–7-veined, lateral veins divaricately branched, base cordate or truncate, margin undulate-toothed, apex acute. Upper leaves smaller, shortly petiolate. Uppermost leaves narrowly ovate, bractlike, entire or laxly denticulate. Capitula small, very many, terminal and in upper leaf axils, arranged in ca. 10 cm, branched, broad panicles, sessile or subsessile, often with 1 subulate bractlet; rachis puberulent or subglabrous below. Involucres cylindric, ca. 5 × 1 mm; phyllaries 3 or 5, rarely 4, distinctly striate, linear, subleathery, glabrous, barbate, margin scarious, apically obtuse. Florets 3 or 5, rarely 4; corolla white, 4–5 mm with slender tube and broadly tubular limb; lobes lan-

ceolate. Anthers exserted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes brownish, cylindric, 3–4 mm, glabrous. Pappus sordid white or yellow-brown, 4–5 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Forest understories, forest margins, thickets, grasslands on slopes, valleys; 1200–2400 m. Hebei, Henan, Shaanxi, Shanxi.

1a. Leaves papery; phyllaries and florets 3, rarely 4 ..... 18a. var. *ambiguus*
1b. Leaves thickly papery, petioles stout; phyllaries and florets 5, rarely 4 ..... 18b. var. *wangianus*

18a. Parasenecio ambiguus var. **ambiguus**

两似蟹甲草(原变种) liang si xie jia cao (yuan bian zhong)

Cacalia ambigua Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 2: 528. 1934; *Koyamacalia ambigua* (Y. Ling) H. Robinson & Brettell.

Leaves papery. Phyllaries and florets 3, rarely 4.

• Forest understories, forest margins, thickets, grasslands on slopes; 1200–2400 m. Hebei, Henan, Shaanxi, Shanxi.

18b. Parasenecio ambiguus var. **wangianus** (Y. Ling) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 47. 1999.

王氏两似蟹甲草 wang shi liang si xie jia cao

Cacalia ambigua var. *wangiana* Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 14. 1937.

Leaves thickly papery; petioles stout. Phyllaries and florets 5, rarely 4.

• Valleys; ca. 1700 m. Shanxi (Huoxian).

19. Parasenecio ainsliaeiflorus (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 47. 1999.

兔儿风蟹甲草 tu er feng xie jia cao

Senecio ainsliaeiflorus Franchet, J. Bot. (Morot) 8: 361. 1894; *Cacalia ainsliaeiflora* (Franchet) Handel-Mazzetti; *C. leucanthema* (Dunn) Y. Ling; *Koyamacalia leucanthema* (Dunn) H. Robinson & Brettell; *S. leucanthemus* Dunn.

Rhizomes robust, with numerous fibrous roots. Stem solitary, erect, 60–100 cm tall, striate, glabrous below, yellow-brown puberulent in upper part and on branches of synflorescences. Lower leaves fallen by anthesis. Median leaves 5–8, long petiolate; petiole 5–10 cm, not winged; blade cordate-reniform or orbicular-reniform, 8–12(–20) × 8–12(–20) cm, abaxially shortly pubescent on veins, adaxially laxly adpressed shortly hairy or subglabrous, veins abaxially prominent, basally 5-veined, lateral upward furcately branched, base broadly cordate or subtruncate, margin often triangularly 5–7-lobed, irregularly serrate, apex acute. Upper leaves homomorphic to lower leaves but smaller, broadly ovate, 3–5-lobed, shortly petiolate. Capitula small, numerous, terminal or in upper leaf axils, racemose or compound racemose; synflorescence branches spreading; peduncles short or very short. Involucres cylindric, 6–8 × 1.5–2 mm; phyllaries 5, linear or linear-lanceolate, outside glabrous, margin scarious, apically obtuse or rounded, puberulent. Florets 5; corolla white, ca. 8 mm, with slender tube, and broadly tubular limb; lobes triangular-lanceolate. Anthers exserted from corolla, basally long caudate. Style branches excurved, apically truncate, papillose. Achenes cylindric, 3–4 mm, glabrous, ribbed. Pappus white or sordid white, 5–6 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Forest margins, forest understories, thickets, grasslands on slopes; 1500–2600 m. Guizhou, W Hubei, Hunan, Sichuan.

Parasenecio ainsliaeiflorus differs from *P. ambiguus* by its peduncles, phyllaries, and florets 5 and its pappus white.

20. Parasenecio kangxianensis (Z. Ying Zhang & Y. H. Gou) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 49. 1999.

康县蟹甲草 kang xian xie jia cao

Cacalia kangxianensis Z. Ying Zhang & Y. H. Gou, Bull. Bot. Res., Harbin 3(1): 130. 1983.

Rhizomes unknown. Stem solitary, erect, ca. 70 cm tall, striate, glandular hairy, naked below, with 1 or 2 large leaves at middle. Leaves long petiolate; petiole not winged, 9–10 cm; blade suborbicular, ca. 15 × 17 cm, papery, both surfaces glabrous or subglabrous, basally 7-veined, lateral veins upward furcately branched, base cordate, triangularly 7-lobed, margin mucronulate-denticulate, apex acute. Upper leaves shortly petiolate, very small. Capitula few, usually at apex of stem in lax racemes or compound racemes, to 10 cm; peduncles 1–2 mm, sparsely arachnoid, with 1 or 2 bractlets. Involucres narrowly campanulate, 6–7 mm; phyllaries 5, linear-lanceolate, outside subglabrous, with veinlets, margin scarious, apically acute. Florets 5; corolla yellow, 5–6 mm, with slender tube and tubular-campanulate limb; lobes lanceolate. Anthers exserted from corolla, ca. 4 mm, basally caudate. Style branches truncate, papillose. Achenes yellow-brown, cylindric, 1–1.5 mm (immature), glabrous, ribbed. Pappus pale yellow-brown, 5–6 mm. Fl. and fr. Jul–Sep.

• Forest understories on slopes; ca. 1400 m. Gansu (Kangxian).

4. Parasenecio ser. **Rubescentes** Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 329. 1999.

红缨蟹甲草系 hong ying xie jia cao xi

Petiole not winged, not expanded at base; leaf blade broadly triangular or hastate. Involucres campanulate or narrowly campanulate; phyllaries 7–12. Florets 8–38. Pappus red-brown or white.

• Two species: China.

21. Parasenecio rubescens (S. Moore) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 49. 1999.

矢镞叶蟹甲草 shi zu ye xie jia cao

Senecio rubescens S. Moore, J. Bot. 13: 228. 1875; *Cacalia rubescens* (S. Moore) Matsuda.

Plants 50–80(–100) cm tall. Stems erect, green or sometimes purple tinged, distinctly striate, glabrous, simple. Basal leaves fallen at anthesis. Lower and median leaves long petiolate; petiole not winged, 3–4.5 cm, glabrous; blade abaxially pale green, adaxially green, broadly triangular, 10–18 × 5–16 cm, 3–5-lobed; lobes triangular, basal lobes sometimes rudimentary, both surfaces glabrous or puberulent on veins, base cuneate or truncate, margin stiffly mucronulate-denticulate, apex acute. Upper leaves shortly petiolate, gradually smaller upward. Uppermost leaf blades ovate-lanceolate, 5–10 × 3–6 cm, apex acuminate. Capitula numerous, terminal or in upper leaf axils in furcate broad panicle; peduncles ascending, 5–15 mm, stout, sparsely pubescent or subglabrous, with 1 or 2 linear bractlets. Involucres narrowly campanulate, 10–12 × 5–10 mm; phyllaries 7 or 8(–10), oblong or oblong-lanceolate, outside glabrous, margin scarious, apically obtuse or rather acute. Florets 8–10; corolla yellow, 7–8 mm, with ca. 3 mm tubular tube and limb; lobes lanceolate. Anthers exserted from corolla, basally caudate. Style branches excurved, obtuse or truncate, papillose. Achenes yellowish brown, cylindric, ca. 6 mm, glabrous, ribbed. Pappus white or reddish brown, ca. 7 mm. Fl. Jul–Aug, fr. Sep.

• Forest understories, forest margins, thickets in valleys; 800–1400 m. Anhui, Fujian, Hunan, Jiangxi.

22. Parasenecio matsudae (Kitamura) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 50. 1999 [*"matsudai"*].

天目山蟹甲草 tian mu shan xie jia cao

Cacalia matsudae Kitamura, J. Jap. Bot. 20: 196. 1944; *Koyamacalia matsudae* (Kitamura) H. Robinson & Brettell.

Stems robust, erect, distinctly striate, green or purple above, to 120 cm tall, ca. 1.2 cm in diam. at base, branched above; branches ascending or spreading, often divaricate. Leaves long petiolate; petiole ca. 10 cm, not winged, glabrous; lower leaves fallen by anthesis; median stem leaves large; blade abaxially gray-green, adaxially green, broadly pentagonal or hastate, 15–20(–30) × 8–25 cm; terminal lobes large, apically acute; lateral lobes narrowly triangular, small, obscurely angled, both surfaces glabrous, basally 3-veined, veins upward furcately branched, base broadly cuneate or truncate, margin mucronulate-denticulate. Capitula many, 2–2.5 cm when dry, terminal or in upper leaf axils, arranged in broad panicles; peduncles 2.5–5 cm, stout, apex often dilated; bractlets 1 or 2, linear or linear-lanceolate, glabrous. Involucres campanulate, 1.3–1.5 × 1.7–2 cm, not calyculate at base; phyllaries 12, oblong or oblong-lanceolate, subequal, sometimes ± connate, outside puberulent, margin scarious, apically obtuse. Florets ca. 38; corolla yellow, with slender, ca. 3 mm tube and limb; lobes lanceolate, ca. 2 mm. Anthers exserted from corolla, basally sagittate. Style branches excurved, obtuse, slightly dilated, papillose. Achenes yellow-brown, cylindric, ca. 6 mm, glabrous, ribbed. Pappus sordid red-brown, ca. 9 mm. Fl. Jul–Aug, fr. Sep.

• Roadsides, by canals on slopes; ca. 1000 m. Anhui, Zhejiang (Tianmu Shan).

4. Parasenecio sect. **Monanthi** (Kitamura) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 52. 1999 [*"Monanthae"*].

单花蟹甲草组 dan hua xie jia cao zu

Cacalia ser. *Monanthae* Kitamura, Acta Phytotax. Geobot. 7: 237. 1938.

Leaves ovate-triangular, ovate-cordate, or cordate, densely arachnoid, basally 3-veined or palmately 5–7-veined. Phyllaries 2–5. Florets 1–13. Pappus white.

About 25 species: China, Himalayan region, Japan; 24 species (23 endemic) in China.

23. Parasenecio latipes (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 52. 1999.

阔柄蟹甲草 kuo bing xie jia cao

Senecio latipes Franchet, J. Bot. (Morot) 8: 356. 1894; *Cacalia latipes* (Franchet) Handel-Mazzetti; *Koyamacalia latipes* (Franchet) H. Robinson & Brettell.

Rhizomes robust, ca. 2 cm in diam., with numerous fibrous roots. Stem solitary, erect or curved below, green or purple-tinged below, striate, 50–100 cm tall, sparsely shortly pubescent or subglabrous, simple or synflorescence branched. Leaves few; petiole 3–5 cm, basally expanded into an amplexicaul auricle; blade abaxially pale green, adaxially green, ovate-triangular or broadly triangular, 8–10 × 10–14 cm, stiffly papery, abaxially densely or sparsely arachnoid, or ± glabrescent, rarely shortly pubescent on veins, adaxially adpressed hirsutulous, base truncate or cuneate-decurrent into a broad or narrow wing, margin irregularly serrate, teeth mucronulate, apex acute or acuminate. Upper leaves shortly petiolate, gradually smaller upward, triangular or triangular-lanceolate. Uppermost leaves lanceolate or linear-lanceolate, margin subentire or finely 1- or 2-toothed. Capitula numerous, terminal or upper leaf axils in racemes or compound racemes, lateral, at first spreading, pendulous at anthesis; peduncles 2–3 mm, with 1–3 linear bractlets, arachnoid or subglabrous. Involucres cylindric, 6–8(–10) mm; phyllaries 3, oblong-lanceolate, outside glabrous, margin ciliate, narrowly scarious, apically obtuse or slightly acute. Florets 5 or 6; corolla yellow, 6–7 mm, with ca. 3 mm tube, and campanulate limb; lobes ovate-lanceolate. Anthers exserted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes cylindric, ca. 4 mm, glabrous, ribbed. Pappus white, ca. 6 mm. Fl. Jul–Aug, fr. Sep.

• Understories of *Abies* forests, forest margins, thickets; 3200–4100 m. SW and W Sichuan, NW Yunnan.

24. Parasenecio lidjiangensis (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 53. 1999.

丽江蟹甲草 li jiang xie jia cao

Cacalia lidjiangensis Handel-Mazzetti, Symb. Sin. 7: 1130. 1936.

Rhizomes shortly robust, 1.5–2 cm in diam., with many fibrous roots. Stem solitary, erect, usually red-purple below, distinctly striate, (30–)45–65 cm tall, often long naked except for few brown ovate scales, sparsely arachnoid at middle part. Leaves usually at middle to upper part; petiole as long as or shorter than blade, slender or expanded to 4–15 mm in diam. rounded auricle; blade adaxially green, thin, triangular or hastate-triangular, (5–)6–10 × 5–11 cm, abaxially densely white arachnoid-tomentose except on veins, adaxially densely hispidulous, veins furcate at base, lateral veins connected reticulately, abaxially prominent, base truncate or subcordate, cuneate-decurrent into narrow or broad petiole, subamplexicaul, margin equally deeply undulate-toothed, teeth mucronate, apex acute or acuminate, mucronulate. Upper leaves smaller, lanceolate or linear-lanceolate, shortly petiolate. Capitula 12–18, terminal or in upper leaf axils, arranged in racemes or compound racemes; bracts linear-lanceolate, ca. 1 cm; peduncles 2–5(–10) mm, pendulous, white arachnoid. Involucres cylindric or narrowly campanulate, 8–10 × 2–5 mm; phyllaries 6–8, linear-lanceolate, ca. 10 × 1.5–2 mm, glabrous, few veined, margin narrowly scarious, apically obtuse, barbate; bractlets ca. 1/3 as long as phyllaries. Florets 9–12(–14); corolla yellow, or rarely orange-yellow, 8–9 mm, with slender 3–4 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 2 mm, apically obtuse. Anthers exserted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes cylindric, 3–4 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Understories of *Pinus* or *Picea* forests on slopes; 3400–3500 m. Yunnan (Lijiang).

25. Parasenecio taliensis (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 55. 1999.

大理蟹甲草 da li xie jia cao

Senecio taliensis Franchet, J. Bot. (Morot) 8: 357. 1894; *Cacalia taliensis* (Franchet) Handel-Mazzetti.

Rhizomes subglobose, short, with many tomentose, fibrous roots. Stem solitary, erect, striate, 25–40 cm tall, slender, simple or sometimes laxly branched above, sparsely arachnoid or subglabrous, often naked in lower part. Leaves lax at middle to upper part, long petiolate; petiole not winged, 3–5(–8) cm, sparsely arachnoid or later glabrescent, not expanded at base; blade adaxially dark green, broadly ovate or ovate-oblate, 3–5 × 3.5–6(–7) cm, membranous or submembranous, abaxially densely white or gray-white tomentose, adaxially densely or sparsely hispidulous, veins abaxially prominent, basally 5-veined, lateral veins upward branched, base truncate or subcordate, margin inconspicuously undulate or irregularly triangular coarsely toothed, rarely subentire, teeth mucronulate, apex acute or obtuse. Upper leaves smaller, ovate or ovate-triangular, shortly petiolate. Capitula 5–7, terminal or in upper leaf axils, arranged in racemes or compound racemes; peduncles spreading or pendulous by anthesis, short, (3–)5–7 mm, slender, arachnoid, with 1 or 2 linear or linear-lanceolate bractlets. Involucres cylindric, 8–10 × 2–2.5 mm; phyllaries 5, linear-lanceolate, 1.3–2 mm wide, sparsely puberulent or subglabrous, margin narrowly scarious, apically obtuse, ciliate. Florets (6–)8 or 9; corolla yellow, 7–8 mm, with 2.5–3 mm tube and broadly tubular limb; lobes linear-lanceolate, 1.5–2 mm. Anthers exserted from corolla, basally long caudate. Style branches truncate, papillose. Achenes yellow-brown, cylindric, 4–4.5 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jul–Aug, fr. Sep.

• Open slopes, understories of *Abies* forests; 3000–3400 m. Yunnan (Dali, Zhongdian).

Parasenecio taliensis is similar to *P. lidjiangensis* but differs in having leaves 3 or 4, crowded at the middle; blade orbicular or broadly ovate, abaxially densely white arachnoid-tomentose; and petiole not winged, not expanded at the base.

26. Parasenecio jiulongensis Y. L. Chen, Acta Phytotax. Sin. 34: 645. 1996.

九龙蟹甲草 jiu long xie jia cao

Rhizomes procumbent or ascending, slender, with many fibrous roots. Stem solitary, erect, striate, scapiform, 30–35 cm tall, slender. Leaves 3 or 4, crowded near base, long petiolate, persistent at anthesis; petiole not winged, (3–)4–6 cm, glabrous, base slightly expanded, subamplexicaul; blade abaxially becoming purple-red when dry, adaxially green, broadly ovate-cordate or cordate, papery, abaxially laxly hispidulous or subglabrous, ciliate, adaxially glabrous, basally 3–5-veined, lateral veins upward furcately branched, base cordate or subtruncate, margin undulate-toothed, teeth mucronulate, apex obtuse or slightly acute, mucronulate. Capitula 8–10, in upper part of stem, arranged in spicate racemes; peduncles 2–4(–5) mm, with 1 or 2 linear or linear-lanceolate bractlets, excurved or pendulous, sparsely arachnoid or ± glabrescent. Capitula inserted on one side. Involucres cylindric, ca. 10 × 2–3 mm; phyllaries 5, linear or linear-lanceolate, ca. 10 × 0.5–1 mm, outside glabrous, margin narrowly scarious, apically acute or obtuse. Florets 5; corolla yellow, 5–6 mm, with slender 1.5–2 mm tube and narrowly campanulate limb; lobes lanceolate. Anthers exserted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes yellow-brown, cylindric, ca. 3 mm, glabrous, ribbed. Pappus white, 5–6 mm. Fl. and fr. Sep–Oct.

• Understories of *Picea* forests; ca. 2700 m. Sichuan (Jiulong).

27. Parasenecio tenianus (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 57. 1999.

盐丰蟹甲草 yan feng xie jia cao

Cacalia teniana Handel-Mazzetti, Symb. Sin. 7: 1129. 1936.

Plants with fascicled tomentose roots. Stem solitary, striate, erect, 55–65 cm tall, glabrous, long naked, with few scales. Leaves often crowded at middle of stems. Lower leaf petiole as long as blade or shorter, slender, not winged; blade broadly ovate-triangular or reniform-triangular, ca. 9 × 12–15 cm, with prominent angles on nearly basal margins, base truncate or slightly cordate, broadly cuneate-attenuate into petiole, apex

acute or shortly acute. Upper leaves shortly petiolate, gradually smaller upward, abaxially pale or becoming red-brown when dry, adaxially dark green, triangular or subpentagonal, narrow, papery when dry, basally 3-veined, rarely 5-veined, lateral veins extended-branched, both surfaces glabrous, veins prominent abaxially, margin cartilaginous mucronulate-denticulate, apex shortly acuminate. Capitula many, terminal or in upper leaf axils, arranged in lax racemes, pendulous; bracts linear-lanceolate, ca. 5 mm, submembranous; peduncles 3–5 mm, with 1 or 2 linear bractlets. Involucres cylindric, ca. 10 × 1.5–2 mm; phyllaries 3, linear-lanceolate, ca. 10 × 1.5 mm, glabrous, with many fine veins, margin narrowly scarious, apically acute or obtuse. Florets 2 or 3; corolla yellow, 8–10 mm, with ca. 4 mm tube and narrowly campanulate limb; lobes excurved, lanceolate, ca. 2 mm. Anthers exserted from corolla, basally long caudate. Style branches excurved, apically obtuse or slightly acute, papillose. Achenes cylindric, 3–4 mm, glabrous, ribbed. Pappus white, 7 or 8 mm. Fl. Aug–Sep.

• Understories of mixed forests; 2700–3200 m. Yunnan.

28. Parasenecio koualapensis (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 59. 1999.

瓜拉坡蟹甲草 gua la po xie jia cao

Senecio koualapensis Franchet, J. Bot. (Morot) 8: 356. 1894; *Cacalia koualapensis* (Franchet) Handel-Mazzetti; *S. leclerei* H. Léveillé.

Rhizomes short, stout, with tomentose fibrous roots. Stem solitary, erect, striate, 30–80 cm tall, simple, brown multicellular villous in lower part. Median and lower stem leaves 3 or 4; petiole not winged, 3–5 cm, densely brown villous; blade abaxially pale green, sometimes turning purple, adaxially green, broadly ovate-triangular or broadly ovate, rarely rhombic or cordate, 5–15(–18) × 6–15 cm, papery, abaxially yellow-brown villous especially on veins, adaxially adpressed hispidulous, base truncate or subrounded, rarely cordate, margin usually triangularly toothed, teeth mucronulate, sometimes inconspicuous, apex obtuse or shortly acute. Upper leaves shortly petiolate or subsessile, gradually smaller or very small, bracteal-leaflike, lanceolate or linear-lanceolate, entire. Capitula numerous, terminal or in upper leaf axils, arranged in simple or rarely branched narrow panicles; peduncles ca. 2 mm, on one side, spreading, pendulous later, with 1 or 2 linear bractlets. Involucres cylindric, 6–8 × 1.5–2 mm; phyllaries 5, linear-oblong, 1–1.5 mm wide, glabrous, margin narrowly scarious, apically obtuse or slightly acute. Florets 5; corolla yellow, ca. 8 mm, with slender, ca. 3 mm tube and tubular limb; lobes lanceolate. Anthers exserted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindric, 4–5 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Aug–Sep, fr. Oct.

• Understories of mixed forests on slopes; 2800–3200 m. Yunnan.

29. Parasenecio quinquelobus (Wallich ex Candolle) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 59. 1999.

五裂蟹甲草 wu lie xie jia cao

Rhizomes ascending or procumbent, with numerous yellow-brown tomentose fibrous roots. Stem solitary, erect or ± curved, 40–90 cm tall, sulcate, simple, synflorescence branched above, glabrous. Lower leaves fallen by anthesis; stem leaves many, 5–8. Median leaves large; petiole not winged, 2–8(–10) cm; blade abaxially gray-green, adaxially green, reniform-pentagonal to triangular or lanceolate, (4–)6–10 × 5–14 cm, abaxially arachnoid, later glabrescent, adaxially adpressed hispidulous, basally 3–5-veined, base broadly cordate or truncate, margin shallowly to deeply lobed, irregularly coarsely toothed, teeth mucronulate, apex acute, acuminate, or caudate-acute. Upper leaves smaller, shortly petiolate, triangular or narrowly triangular. Uppermost leaves narrowly lanceolate or linear, bracteal-leaflike, usually with many globose buds in upper leaf axils and on synflorescence branches. Capitula numerous, arranged in terminal narrow or broad panicles, spreading by anthesis, pendulous after anthesis; peduncles 1–2 mm, with 1 or 2 linear bractlets. Involucres cylindric, 7–8 mm; phyllaries 4 or 5, oblong, outside glabrous, apically obtuse or acute. Florets 4 or 5; corolla yellow, 6–7 mm, with 2.5–3 mm tube and broadly tubular limb; lobes lanceolate. Anthers exserted from corolla, shortly caudate. Style branches excurved, obtuse or truncate, papillose. Achenes cylindric, 4–5 mm, glabrous, ribbed. Pappus white, 5–6 mm. Fl. Aug, fr. Sep–Oct.

Understories of *Quercus* or *Abies* forests, alpine meadows; 2800–4100 m. SW Sichuan, Xizang, NW Yunnan [Bhutan, N India, Myanmar, Nepal].

1a. Leaf blade margin lobed in distal 1/3; capitula arranged in narrow panicles ..... 29a. var. *quinquelobus*

1b. Leaf blade margin 3-lobed in distal 3/4, lobes 2- or 3-lobed in distal 1/3; capitula arranged in broad panicles ..... 29b. var. *sinuatus*

29a. Parasenecio quinquelobus var. **quinquelobus**

五裂蟹甲草(原变种) wu lie xie jia cao (yuan bian zhong)

Prenanthes quinqueloba Wallich ex Candolle, Prodr. 7: 195. 1838; *Cacalia pentaloba* Handel-Mazzetti; *C. quinqueloba* (Wallich ex Candolle) Kitamura; *Koyamacalia quinqueloba* (Wallich ex Candolle) H. Robinson & Brettell; *Senecio quinquelobus* (Wallich ex Candolle) J. D. Hooker & Thomson ex C. B. Clarke (1876), not (Thunberg) Candolle (1838).

Leaf blade margin lobed in distal 1/3. Capitula arranged in narrow panicles.

Understories of *Quercus* or *Abies* forests, alpine meadows; 2800–4100 m. SW Sichuan, Xizang, NW Yunnan [Bhutan, N India, Myanmar, Nepal].

29b. Parasenecio quinquelobus var. **sinuatus** (H. Koyama) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 62–63. 1999.

深裂五裂蟹甲草 shen lie wu lie xie jia cao

Cacalia pentaloba var. *sinuata* H. Koyama, Acta Phytotax. Geobot. 30: 65. 1979.

Leaf blade margin 3-lobed in distal 3/4, lobes 2- or 3-lobed in distal 1/3. Capitula arranged in broad panicles.

Understories of *Abies* forests; 3000–3600 m. Xizang [Bhutan].

30. Parasenecio rockianus (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 63. 1999.

玉龙蟹甲草 yu long xie jia cao

Cacalia rockiana Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 634. 1937; *C. lidjiangensis* Handel-Mazzetti var. *acerina* H. Koyama; *Koyamacalia rockiana* (Handel-Mazzetti) H. Robinson & Brettell.

Rhizomes procumbent, with numerous fibrous roots. Stem solitary, erect or slightly curved below, often purple, striate, 35–50 cm tall, shortly pubescent or arachnoid in upper part. Leaves usually 5, crowded at middle of stem, paniculate synflorescence branched above. Petiole narrowly winged, 1.5–2 cm; leaf blade adaxially green, broadly triangular, 6–9 × 4–6 cm, base truncate or cuneate, middle 3-lobed, central lobe shallowly 3-lobed, lateral lobes shallowly 2-lobed; lobes to 2.5 cm wide, abaxially densely gray-white arachnoid-lanate, adaxially sparsely or densely furfuraceous-hispidulous, palmately veined, margin deeply undulate-toothed, teeth mucronulate, apex acuminate. Uppermost leaves narrowly lanceolate, 3-fid upward into bracts; bracts purple tinged, linear, 1–1.2 cm, acute or acuminate. Capitula mostly at apex of stem, arranged in lax racemes; peduncles 2–3 mm, densely arachnoid, pendulous. Involucres cylindric, 8–11 × 2–3 mm; phyllaries 4 or 5, pale green, linear or linear-lanceolate, 1.5–2 mm wide, margin ciliate, narrowly scarious, ± purple, apex obtuse or slightly acute. Florets 4 or 5; corolla yellow, 1–1.1 cm; tube ca. 1/2 as long as limb, slender; limb cylindric-campanulate; lobes excurved, linear-lanceolate. Anthers exserted from corolla, basally caudate. Style branches truncate. Achenes cylindric, ca. 3 mm, glabrous, ribbed. Pappus white, shorter than corolla. Fl. Aug, fr. Oct.

• Forest margins on slopes; ca. 2400 m. Yunnan (Lijiang, Weixi).

31. Parasenecio souliei (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 63. 1999.

川西蟹甲草 chuan xi xie jia cao

Senecio souliei Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 165. 1891; *Cacalia souliei* (Franchet) Handel-Mazzetti; *Koyamacalia souliei* (Franchet) H. Robinson & Brettell.

Rhizomes 1.3–1.4 cm in diam., with numerous tomentose fibrous roots. Stem solitary, erect, often purple-red, striate, (20–)30–60 cm tall, long naked in lower part, glabrous. Leaves usually at middle and lower part of stem; petiole expanded at base, with incised or divided auricle, subamplexicaul; blade reniform-triangular or broadly ovate, 5–6 × 4–5 cm, 3–5-lobed; lobes spreading, lobulate or irregularly toothed, abaxially white arachnoid-tomentose, adaxially densely brown hispidulous, 3-veined, veins abaxially prominent, base truncate or slightly cordate, decurrent into broadly winged petiole, apex acute or slightly acute. Upper leaves smaller, ovate or ovate-lanceolate, incised or lobulate at base. Capitula numerous, terminal or in upper leaf axils, arranged in lax racemose panicles, spreading, pendulous later; peduncles 2–5 mm, densely shortly pubescent, with 1–3 linear bractlets. Involucres cylindric or narrowly campanulate, ca. 7 × 3–4 mm; phyllaries 5, oblong-lanceolate, 1.5–2 mm, glabrous, margin narrowly scarious, apically obtuse or slightly acute, puberulent. Florets 8, rarely 10; corolla yellow, 6–7 mm, with slender, ca. 2 mm tube and narrowly campanulate limb; lobes lanceolate, ca. 1.5 mm. Anthers exserted from corolla, basally caudate. Style branches truncate, papillose. Achenes cylindric, ca. 3 mm, glabrous, ribbed. Pappus white, 5–6 mm. Fl. and fr. Aug–Sep.

• Understories of forests or thickets, grasslands, shaded and wet slopes; 3100–3700 m. SW and W Sichuan.

32. Parasenecio cyclotus (Bureau & Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 64. 1999.

轮叶蟹甲草 lun ye xie jia cao

Senecio cyclotus Bureau & Franchet, J. Bot. (Morot) 5: 74. 1891; *Cacalia cyclota* (Bureau & Franchet) Handel-Mazzetti; *Koyamacalia cyclota* (Bureau & Franchet) H. Robinson & Brettell.

Rhizomes robust, ca. 1.5 cm in diam. Stem solitary, erect, 80–100 cm tall, long naked, or with few ovate scales in lower part, sparsely arachnoid above, subglabrous below, sulcate. Lower leaves fallen by anthesis; petiole expanded into ca. 2.5 cm wide, entire or laxly toothed auricle; blade adaxially green, obovate-spatulate, 5–10(–16) × 3–8(–10) cm, papery, lyrate-pinnate; lobes ovate-oblong or obovate, abaxially sparsely or densely arachnoid-tomentose, or ± glabrescent, adaxially sparsely adpressed shortly hairy, base decurrent into broadly winged petiole, apex acute or shortly acute, unequally triangularly toothed, teeth mucronulate. Upper leaves smaller; uppermost leaves often rudimentary as linear or linear-lanceolate bracts. Capitula numerous, arranged in racemes, or sometimes 1- or 2-branched, lateral, pendulous; peduncles very short, 2–4 mm, with linear-lanceolate bractlets at base. Involucres cylindric, 8–10 × 2–3 mm; phyllaries 5 or 6, lanceolate, 8–10 × ca. 1.5 mm, puberulent, margin scarious, apically obtuse. Florets 5 or 6(or 7); corolla yellow, ca. 8 mm, with slender tube and ca. 3 mm, narrowly campanulate limb; lobes lanceolate. Anthers exserted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes yellow-brown, cylindric, ca. 4 mm, ribbed. Pappus white, 6–7 mm. Fl. and fr. Aug–Sep.

• Understories of forests on slopes, forest margins, grasslands, roadsides; 2200–3600 m. W Sichuan.

Parasenecio cyclotus is similar to *P. souliei* but differs in having leaves lyrate-pinnate, petiole with entire or toothed auricle ca. 2.5 cm wide, and florets 5 or 6.

33. Parasenecio roborowskii (Maximowicz) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 65. 1999.

蛛毛蟹甲草 zhu mao xie jia cao

Senecio roborowskii Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 487. 1882; *Cacalia adenocauloides* Handel-Mazzetti; *C. monantha* (Diels) Hayata; *C. roborowskii* (Maximowicz) Y. Ling; *C. tatsienensis* (Bureau & Franchet) Handel-Mazzetti; *Koyamacalia roborowskii* (Maximowicz) H. Robinson & Brettell; *Parasenecio monanthus* (Diels) C. I Peng & S. W. Chung; *S. monanthus* Diels; *S. tatsienensis* Bureau & Franchet.

Rhizomes robust, procumbent, with many fibrous roots. Stem solitary, erect, striate, 60–100 cm tall, simple, usually white arachnoid or later glabrescent. Petiole not winged, 6–10 cm, sparsely arachnoid; leaf blade adaxially green, narrowly triangular, 8–13 × 8–10 cm, rachis sparsely shortly hairy or subglabrous, abaxially white or gray-white arachnoid, basally 5-veined, lateral veins furcately branched, prominent on both surfaces, margin irregularly serrate, teeth mucronulate, apex acute or acuminate. Upper leaves smaller, similar to median leaves or narrowly ovate or narrowly triangular, but with short petioles. Capitula numerous, usually terminal or in upper leaf axils, arranged in pyramidal lax panicles on one side, spreading pendulous; peduncles ca. 3 mm, same as rachis arachnoid and shortly pubescent, with 2 or 3 linear or linear-lanceolate bractlets. Involucres cylindric, 8–13 × 1–1.5 mm; phyllaries 3(or 4), rarely 2, yellow-green, linear-oblong, glabrous, few finely veined, margin narrowly scarious, apically obtuse, puberulent. Florets usually 3 or 4, rarely 1 or 2; corolla white, 8–10 mm, with slender tube and ca. 3 mm broadly tubular limb; lobes lanceolate. Anthers exserted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindric, 3–4 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. Jul–Aug, fr. Sep–Oct.

• Understories of forests on slopes, forest margins, thickets, grasslands; 1700–3400 m. Gansu, Qinghai, Shaanxi, Sichuan, E Yunnan.

34. Parasenecio xinjiashanensis (Z. Ying Zhang & Y. H. Gou) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 66. 1999.

辛家山蟹甲草 xin jia shan xie jia cao

Cacalia xinjiashanensis Z. Ying Zhang & Y. H. Gou, Bull. Bot. Res., Harbin 3(1): 132. 1983.

Rhizomes slender, with many fibrous roots. Stem solitary, erect, striate, 40–75 cm tall, arachnoid or gradually glabrescent. Leaves usually crowded at middle part; petiole 6.5–8 cm, broadly or narrowly winged; blade thinly papery; median leaves broadly cordate, 8–10 × 10–12.5 cm, abaxially sparsely arachnoid on veins, later ± glabrescent, adaxially sparsely pubescent, base 3-veined, lateral veins furcate, veins prominent on both surfaces, base cordate, margin irregularly sharply serrate, teeth mucronulate, apex shortly acute or caudate-acuminate. Upper leaves smaller; petiole 3.5–5 cm, narrowly winged, not expanded at base. Capitula numerous, usually arranged in terminal racemes or branched in lower part, to 17 cm; peduncles 3–7 mm, slender, arachnoid and densely shortly glandular hairy, with 2 linear or linear-lanceolate bractlets. Involucres cylindric or narrowly campanulate, 9–11 × ca. 1.5 mm; phyllaries 3, linear-lanceolate, arachnoid or subglabrous, margin scarious, apically obtuse. Florets 3; corolla yellow, 6–7 mm; limb broadly tubular; lobes lanceolate. Anthers exserted from corolla, ca. 4 mm, basally caudate. Style branches excurved, truncate, papillose. Achenes brown, cylindric, 3–4 mm, glabrous, ribbed. Pappus white, 6–7 mm. Fl. Jun–Jul, fr. Aug.

• Understories of dense forests on slopes; 2300–2600 m. Shaanxi.

35. Parasenecio morrisonensis Ying Liu, C. I Peng & Q. E. Yang, Taxon 56: 583. 2007.

玉山蟹甲草 yu shan xie jia cao

Stem solitary, erect or curved, 47–70 cm tall, paniculate-branched above, glabrous below, upper part and branches crisped-pubescent. Leaves papery, sparsely distributed. Lower leaves long petiolate; petiole ca. 12 cm, not winged; blade abaxially pale green, adaxially green, subtriangular-reniform, ca. 13 × 19 cm, abaxially densely lanate, adaxially crisped-pubescent, base cordate, marginal teeth mucronulate, apex acute. Upper leaves smaller, shortly petiolate. Capitula numerous, arranged in terminal panicles; peduncles 1–3.5 mm, slender, with 1 or 2 subulate bractlets. Involucres cylindric, 8.5–11 mm, calyculate; phyllaries 2, narrowly oblong, 1.5–2 mm wide, glabrous, apex obtuse. Floret 1; corolla yellow, 8.5–10.5 mm; lobes lanceolate, ca. 1.5 mm. Achenes cylindric, ca. 5 mm, glabrous. Pappus white, 6–7 mm. Fl. Aug.

• Mountain summits; ca. 3000 m. Taiwan (Jiayi, Yilan).

36. Parasenecio profundorum (Dunn) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 68. 1999.

深山蟹甲草 shen shan xie jia cao

Senecio profundorum Dunn, J. Linn. Soc., Bot. 35: 507. 1903; *Cacalia profundorum* (Dunn) Handel-Mazzetti; *Koyamacalia profundorum* (Dunn) H. Robinson & Brettell.

Rhizomes procumbent, robust. Stem solitary, erect, 50–120 cm tall, often naked below, striate, sparsely arachnoid, later glabrescent, ferruginous-brown glandular, shortly pubescent. Leaves long petiolate; petiole 5–8 cm, basally subamplexicaul; blade broadly ovate or ovate-rhombic, membranous, abaxially sparsely arachnoid, later glabrescent, adaxially hispidulous, base truncate or slightly cordate, cuneately narrowed into winged petiole, apex acute or shortly acute, teeth densely mucronulate. Middle stem leaves 10–13 × 10–12 cm, basally 3-veined, lateral veins furcately branched, veins abaxially prominent. Upper leaves shortly petiolate, smaller. Capitula numerous, arranged in terminal lax panicles; peduncles slender, sparsely glandular shortly pubescent, with 1–3 linear bractlets. Involucres cylindric, 8–10 × ca. 3 mm; phyllaries 5, linear-lanceolate, 8–9 × 1.5–2 mm, glabrous or subglabrous, margin scabrous, apex obtuse, puberulent. Florets 5; corolla yellow, ca. 8 mm, with slender ca. 3 mm tube, broadly tubular; limb lobes lanceolate, 1.5–2 mm. Anthers exserted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindric, ca. 6 mm, glabrous, ribbed. Pappus white, shorter than corolla. Fl. and fr. Aug–Sep.

• Dense forests, forest margins on slopes, wet places in valleys, ravines, cliffs; 1000–2100 m. Chongqing, W Hubei, E Sichuan.

37. Parasenecio phyllolepis (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 69. 1999.

苞鳞蟹甲草 bao lin xie jia cao

Senecio phyllolepis Franchet, J. Bot. (Morot) 8: 360. 1894; *Cacalia hupehensis* Handel-Mazzetti; *C. phyllolepis* (Franchet) Handel-Mazzetti; *Koyamacalia hupehensis* (Handel-Mazzetti) H. Robinson & Brettell; *K. phyllolepis* (Franchet) H. Robinson & Brettell.

Rhizomes robust, with fascicled fibrous roots. Stem solitary, erect, 60–90 cm tall, simple, striate or sulcate, arachnoid,

long naked below, often purple tinged. Leaves ca. 5, usually crowded at middle part, long petiolate; petiole 8–12 cm, obscurely narrowly winged or nearly not winged; blade abaxially pale green, adaxially dark green, broadly ovate, ovate-triangular, or ovate-cordate, 10–16 × 8–10 cm, thinly papery, abaxially sparsely arachnoid, later glabrescent, adaxially sparsely brown hispidulous, veins prominent on both surfaces, basally 3-veined, lateral veins furcately branched, base cordate or cuneate, rarely truncate, margin unequally serrulate, teeth mucronulate, apex caudate-acuminate. Upper leaves smaller, ovate, shortly petiolate. Uppermost leaves bracteal, lanceolate or linear-lanceolate. Capitula numerous, terminal or in upper leaf axils, arranged in racemes or narrow racemose panicles; peduncles 6–10 mm, erect or pendulous, shortly hairy, with 2 or 3 unequal bractlets. Involucres cylindric or narrowly campanulate, 8–10 × 3–4 mm; phyllaries 5(or 6), green, oblong-lanceolate, 8–10 × 1.5–2 mm, herbaceous, sparsely shortly hairy or subglabrous, margin scarious, apically obtuse or slightly acute, puberulent. Florets 5 or 6; corolla yellow, 8–9 mm, with slender 3–4 mm tube and narrowly campanulate limb; lobes lanceolate. Anthers exserted from corolla, basally caudate. Style branches excurved or involute, truncate, papillose. Achenes yellow-brown, cylindric, 5–6 mm, glabrous, ribbed. Pappus white, 7–8 mm. Fl. and fr. Sep–Oct.

• Understories of forests on slopes, by canals; 1000–2500 m. Chongqing, W Hubei, E Sichuan.

38. Parasenecio ianthophyllus (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 71. 1999.

紫背蟹甲草 zi bei xie jia cao

Senecio ianthophyllus Franchet, J. Bot. (Morot) 8: 361. 1894; *Cacalia ianthophylla* (Franchet) Handel-Mazzetti.

Rhizomes short, slender, with few tomentose fibrous roots. Stem solitary, erect or oblique, 20–40 cm tall, slender, glabrous, striate, naked below. Stem leaves usually 2 or 3, crowded at middle part of stem; lower leaves fallen by anthesis, long petiolate; petiole not winged, 5–7 cm, sparsely arachnoid or glabrous; blade abaxially purple-blue or purple, adaxially green, thinly papery, broadly cordate-orbicular or ovate-cordate, 5–14 × 8–11 cm, abaxially sparsely arachnoid, later glabrescent, adaxially sparsely hispidulous, basally 5–7-veined, lateral veins upward furcately branched, veins prominent on both surfaces, base deeply cordate, margin unequally serrate, teeth mucronulate, apex acuminate or caudate. Capitula numerous, usually on one side, arranged in terminal large panicles, synflorescence branches spreading, glabrous or uppermost hispidulous; peduncles 2–4 mm, spreading or pendulous, densely shortly hairy. Involucres pink-purple, cylindric, 12–14 × 1.5–2 mm, glabrous, margin narrowly scarious, apically slightly acute. Florets 5 or 6; corolla yellow, ca. 8 mm; tube shorter than limb; lobes lanceolate. Anthers exserted from corolla, basally caudate. Style branches excurved, truncate, papillose. Achenes cylindric, glabrous. Pappus white, ca. 8 mm. Fl. Jul–Aug.

• Mixed or coniferous forests; 1400–1600 m. Chongqing (Chengkou), W Hubei.

Parasenecio ianthophyllus is easily distinguished by its stem leaves 2 or 3, often crowded at the middle, and blade broadly cordate-orbicular, abaxially blue-purple, with veins conspicuously prominent on both surfaces.

39. Parasenecio leucocephalus (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 71. 1999.

白头蟹甲草 bai tou xie jia cao

Senecio leucocephalus Franchet, J. Bot. (Morot) 8: 360. 1894; *Cacalia leucocephala* (Franchet) Handel-Mazzetti.

Rhizomes procumbent, with numerous tomentose fibrous roots. Stem solitary, erect, often purple tinged, conspicuously striate, 40–80 cm tall, naked below, glabrous, white arachnoid or later glabrescent above. Leaves long petiolate; lower leaves fallen by anthesis; petioles 4–9 cm, not winged, glabrous or subglabrous. Median leaves adaxially green, ovate-triangular or hastate-triangular, rarely cordate, 8–12 × 18–14 cm, abaxially white or gray-white arachnoid, adaxially hispidulous, palmately 3–5-veined, lateral veins upward furcate, veins prominent on both surfaces, base cordate or truncate, margin irregularly serrate, teeth mucronulate, apex shortly acute or caudate. Upper leaves smaller, petioles shorter. Capitula many, terminal and in upper leaf axils, arranged in narrow panicles; peduncles 2–17 mm, with 2 or 3 linear bractlets, densely tomentose. Involucres cylindric or cylindric-campanulate, 8–10 × 4–5 mm; phyllaries 5, oblong or oblong-lanceolate, 8–10 × 2–4 mm, white lanate, margin scarious, apically obtuse. Florets 10–13; corolla yellow, 8–11 mm, with slender ca. 3 mm tube and tubular limb; lobes lanceolate. Anthers exserted from corolla, basally long caudate. Style branches excurved, truncate, papillose. Achenes cylindric, 5–6 mm, glabrous, ribbed. Pappus white, 6–8 mm. Fl. Aug–Sep, fr. Oct.

• Forest understories, forest margins, grasslands; 1200–3000 m. Chongqing (Chengkou, Wushan), W Hubei.

Parasenecio leucocephalus is easily distinguished by its stems and leaves abaxially densely arachnoid; phyllaries rather broad, densely white lanate; and florets 10–13.

40. Parasenecio longispicus (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 72. 1999.

长穗蟹甲草 chang sui xie jia cao

Cacalia longispica Handel-Mazzetti, Acta Horti Gothob. 12: 301. 1938.

Rhizomes robust, with many fibrous roots. Stem solitary, erect, striate, to 100 cm tall, slender, stiff, strict, branched above, adpressed arachnoid and shortly glandular pubescent. Leaves long petiolate; petiole not winged, 3–5 cm. Median leaves papery, broadly cordate, 10–15 × 17–20 cm, abaxially gray-white tomentose, adaxially articulately shortly hairy, palmately 5-veined, lateral veins furcately branched, veins prominent on both surfaces, base cordate, margin deeply undulate-denticulate, teeth sometimes long mucronulate, apex shortly acute or obtuse. Uppermost leaves shortly petiolate, reniform, sometimes with buds in leaf axils. Capitula numerous, terminal and in upper leaf axils, arranged in raceme-panicles, or lateral synflorescences rudimentary, spreading or pendulous; rachis arachnoid, tomentose; bracts linear-lanceolate; uppermost bracts to 1 cm; peduncles 1–3 mm, usually with 1 bractlet. Involucres cylindric, 8–10 × 1.5–2 mm; phyllaries 3 or 4, green, linear, 10–

11 × ca. 1.5 mm, glabrous or sparsely pubescent. Florets 2–4; corolla yellow, ca. 8 mm, with slender, 2–3 mm tube and cylindric-campanulate limb; lobes lanceolate, ca. 1 mm. Anthers slightly exserted from corolla, ca. 5 mm, basally caudate. Style branches truncate, papillose. Achenes brown, cylindric, ca. 5 mm, rugulose. Pappus white. Fl. Jul–Aug, fr. Sep–Oct.

• Thickets, grasslands on slopes; 2000–3100 m. Sichuan.

41. Parasenecio bulbiferoides (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 73. 1999.

珠芽蟹甲草 zhu ya xie jia cao

Cacalia bulbiferoides Handel-Mazzetti, Symb. Sin. 7: 1131. 1936; *Koyamacalia bulbiferoides* (Handel-Mazzetti) H. Robinson & Brettell.

Plants ca. 85 cm tall, with fascicled fibrous roots. Stem solitary, erect, often becoming purple, stiff, finely sulcate, naked at base, sparsely arachnoid. Leaves lax; petioles 3–5 cm, not winged; leaf blade adaxially green, broadly triangular-ovate or broadly ovate, 6–12 × ca. 15 cm, herbaceous, abaxially sparsely arachnoid, glabrescent, adaxially sparsely shortly brown hairy on veins, palmately 5–7-veined and 1 or 2 lateral veins, base angular-cordate, margin undulate, stoutly toothed, or 9–11-lobulate, apex obtuse or shortly acute. Upper leaves shortly petiolate, all leaf axils with ovoid, ca. 7 mm scaly buds; buds brown, tomentulose. Capitula numerous, spreading, arranged in terminal racemes or compound racemes, to 40 cm; lower bracts with sparse buds; uppermost bracts to 8 mm; bracts lanceolate, ca. 6 mm, submembranous; peduncles 1–2 mm, tomentose, with 1 bractlet. Involucres cylindric-campanulate; phyllaries 5 or 6, lanceolate, 11–13 mm, glabrous, margin scarious, apically obtuse. Florets 8–10; corolla yellow, ca. 1 cm, with ca. 4 mm tube and cylindric, broader, ca. 6 mm limb; lobes linear, ca. 1 mm, involute. Anthers exserted from corolla, purple when dry, basally caudate. Style branches truncate, papillose, ovary glabrous, cylindric. Pappus white, shorter than corolla. Fl. Sep.

• Wet places in valleys; 1000–2200 m. W Hubei, Hunan (Hengshan), Shaanxi (Hanzhong).

42. Parasenecio petasitoides (H. Léveillé) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 75. 1999.

蜂斗菜状蟹甲草 feng dou cai zhuang xie jia cao

Senecio petasitoides H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 360. 1910; *Cacalia farfarifolia* Siebold & Zuccarini subsp. *petasitoides* (H. Léveillé) H. Koyama.

Rhizomes robust, with many fibrous roots. Stem solitary, erect, 100–150 cm tall, striate, sparsely arachnoid. Leaves long petiolate, papery; petiole 5–14 cm, not winged, shortly pubescent or subglabrous; median leaves adaxially green, broadly ovate-cordate, 9–16 × 12–20 cm, abaxially densely white arachnoid or later glabrescent, adaxially sparsely adpressed shortly hairy or subglabrous, palmately 5–7-veined, veins abaxially prominent, adaxially impressed, base deeply cordate, margin stoutly undulate-toothed, teeth mucronulate, apex acute or shortly acuminate. Upper leaves shortly petiolate, gradually smaller upward. Capitula numerous, usually arranged in crowded spicate racemes; peduncles ca. 9 mm, with 3 linear-lanceolate bractlets, arachnoid. Involucres cylindric, 1.2–1.4 cm; phyllaries 5, oblong-lanceolate, glabrous, margin scarious, apically rounded-obtuse. Florets 5–8; corolla yellow or white, ca. 8 mm, tube slender, ca. 3 mm, limb broadly tubular; lobes triangular. Anthers exserted from corolla, basally caudate. Style branches excurved, apically truncate, papillose. Achenes cylindric, 5–7 mm, glabrous, ribbed. Pappus white, 7–9 mm. Fl. Aug–Sep, fr. Oct.

• Wet places of forest understories on slopes, grasslands; 1700–2200 m. Guizhou, Sichuan.

43. Parasenecio hwangshanicus (Y. Ling) C. I Peng & S. W. Chung, Fl. Taiwan, ed. 2, 4: 1024. 1998.

黄山蟹甲草 huang shan xie jia cao

Cacalia hwangshanica Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 11. 1937; *C. bulbifera* (Maximowicz) Matsumura var. *piligera* Y. Ling; *Koyamacalia hwangshanica* (Y. Ling) H. Robinson & Brettell.

Plants erect, 25–50 cm tall. Rhizomes robust, ca. 2.5 cm in diam., with many fascicled tomentose fibrous roots. Stem solitary, simple, striate or sulcate, sparsely arachnoid, gradually glabrescent, naked in lower part, with 2 withered ovate scales. Leaves usually 3 or 4, crowded at middle part; petiole often shorter than leaf blade, petioles in lower part to 9 cm, obscurely narrowly winged, sparsely arachnoid or subglabrous, base expanded and subamplexicaul; leaf blade adaxially dark green, broadly reniform or ovate-orbicular, 6–12(–15) × 8–15 cm, membranous when dry, abaxially thinly white arachnoid, adaxially sparsely or on veins more densely brown strigillose, basally 3-veined, lateral veins furcate in 3–5 pairs, veins prominent on both surfaces, base cordate, shortly cuneate, decurrent into petiole, margin deeply undulate or equally finely toothed, teeth mucronulate, apex acute or rounded-obtuse. Upper leaves shortly petiolate, ovate-cordate, smaller, apex acute or slightly acute. Uppermost leaves bractlike, ovate or ovate-lanceolate. Capitula many, arranged in 8–18 cm lax panicles; rachis slender, arachnoid and brown shortly pubescent; peduncles 3–5 mm or subsessile, with 1 or 2 subulate bractlets. Involucres narrowly campanulate-cylindric, ca. 10 × 1.5–2 mm, margin broadly scarious, apically obtuse, puberulent. Florets 7 or 8; corolla yellow, ca. 8 mm; tube slender, ca. 3 mm; limb narrowly campanulate, 4–5 mm; lobes ovate-lanceolate, apex puberulent. Anthers exserted from corolla, basally shortly caudate. Style branches excurved, apically truncate, penicillate, papillose. Achenes brown, cylindric, 4–5 mm, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. Jun–Aug, fr. Sep.

• Grasslands at mountain summits, shaded wet places on slopes; 1500–1800 m. Anhui, Jiangxi, Taiwan, Zhejiang.

Parasenecio hwangshanicus is quite similar to *P. rufipilis* in aspect, but the latter differs in having petioles and stems red-brown villous; capitula arranged in dense narrow panicles, rachis densely arachnoid; and florets 5.

44. Parasenecio rufipilis (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 76. 1999.

红毛蟹甲草 hong mao xie jia cao

Senecio rufipilis Franchet, J. Bot. (Morot) 8: 359. 1894; *Cacalia rufipilis* (Franchet) Y. Ling; *Koyamacalia rufipilis* (Franchet) H. Robinson & Brettell.

Plants erect, 60–80 cm tall. Rhizomes robust, with many tomentose fibrous roots. Stem solitary, striate, simple, red-brown hyaline villous in lower part, white arachnoid-villous in upper part. Leaves long petiolate; lower leaves withered by anthesis; petiole not winged, 5–10 cm, red-brown villous. Median leaf blades broadly ovate-cordate or reniform, 7.5–13 × 8–19 cm, with red-brown hyaline glandular hairs, palmately 5–7-veined, veins raised abaxially, impressed adaxially, base deeply cordate, margin triangularly 5-lobulate or deeply serrate, apex acute. Upper leaves smaller, shortly petiolate. Capitula many, arranged in panicles at apex of stem; synflorescence branches crowded; rachis and peduncles white arachnoid; peduncles very short, with 1–3 triangular bractlets. Involucres cylindric, 10–13 × ca. 3 mm; phyllaries 5 or 6, linear-lanceolate, shortly brown pubescent, margin scarious, apically rounded-obtuse. Florets 5; corolla yellow, ca. 1 cm; tube slender, ca. 3 mm; limb broadly tubular; lobes triangular. Anthers exserted from corolla, basally caudate. Style branches excurved, apically truncate, papillose. Achenes cylindric, ca. 5 mm, glabrous, ribbed. Pappus white, ca. 1 cm. Fl. Jul–Aug, fr. Sep.

• Grasslands, thickets, forests on slopes; 1100–1800 m. Gansu, Henan, Shaanxi, Sichuan.

Parasenecio rufipilis differs from *P. dasythyrsus* and *P. bulbiferoides* by its plants red-brown hyaline glandular pubescent; leaf axils without scaly buds; capitula more dense, larger; and peduncles and involucres red-brown villous.

45. Parasenecio tsinlingensis (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 77. 1999.

秦岭蟹甲草 qin ling xie jia cao

Cacalia tsinlingensis Handel-Mazzetti, Oesterr. Bot. Z. 85: 221. 1936.

Plants erect or sometimes curved, 35–70 cm tall. Stem solitary, striate, brown arachnoid or glabrate. Leaves long petiolate; petiole 10–15 cm, densely brown pubescent, base expanded and amplexicaul; lower leaves withered by anthesis; blade abaxially gray-green, adaxially green, reniform or ovate-cordate, 10–15 × 12–18 cm, thinly papery, abaxially sordid arachnoid and brown pubescent, sometimes subglabrous, adaxially sparsely shortly brown pubescent, basally 5–7-veined, lateral veins few, upward furcately branched, veins raised abaxially, impressed adaxially, base deeply cordate or broadly cordate, margin shallowly undulate-lobed at base, apex rounded-obtuse; lobes broadly triangular, obtuse or subrounded-toothed, teeth mucronulate. Upper leaves shortly petiolate, smaller. Capitula many, terminal, arranged in racemes or dense panicles; rachis and peduncle shortly brown pubescent. Involucres cylindric, 4–6 mm, base with 1 or 2 lanceolate bractlets; bractlets 5–15 mm, brown arachnoid, margin entire or sparsely toothed, apex acuminate; phyllaries 5, oblong or linear-lanceolate, glabrous, margin scarious, apically obtuse. Florets 5 or 6; corolla white, 4–5 mm; tube slender; lobes lanceolate. Anthers exserted from corolla, basally shortly caudate. Style branches excurved, apically truncate, papillose. Achenes brown, cylindric, ca. 3 mm, glabrous, ribbed. Pappus white, ca. 5 mm. Fl. Jul–Aug, fr. Sep.

• Understories of lax forests, shaded wet places in valleys; 1400–1800 m. Gansu, Shaanxi.

46. Parasenecio dasythyrsus (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 78. 1999.

山西蟹甲草 shan xi xie jia cao

Cacalia dasythyrsa Handel-Mazzetti, Acta Horti Gothob. 12: 296. 1938; *Koyamacalia dasythyrsa* (Handel-Mazzetti) H. Robinson & Brettell.

Plants 65–90 cm tall. Rhizomes procumbent, with fibrous roots. Stem solitary, straight or slightly curved, striate, long naked, articulate, glandular pubescent or subglabrous in lower part, arachnoid or shortly glandular hairy in upper part. Lower leaves often fallen by anthesis. Median leaves crowded, long petiolate; petiole 7–14 cm, not winged, glandular hairy; blade abaxially pale green, adaxially dark green, broadly ovate-cordate or cordate, 10–15 × 13–20 cm, thinly papery, palmately 7-veined, lateral veins furcately branched, abaxially sparsely arachnoid and glandular hairy, adaxially brown strigillose, base cordate, rarely subtruncate, basal margin with deeply undulate stout teeth, teeth mucronulate, apex acute or slightly obtuse. Upper leaves shortly petiolate, very small. Capitula many, apically in dense or lax narrow panicles; peduncles 3–4 mm, with 1–3 linear bractlets at base; rachis and peduncles arachnoid and glandular hairy; capitula spreading, pendulous later, arachnoid and glandular hairy. Involucres narrowly campanulate or cylindric; phyllaries 4 or 5, pale green and nitid, broadly linear-lanceolate, 10–12 × 1.5–2 mm, sparsely glandular hairy, margin narrowly scarious, apex slightly acute or obtuse. Florets 5 or 6; corolla orange, exserted from involucre; tube slender, as long as limb, or rather short; limb narrowly campanulate; lobes lanceolate, ca. 3 mm. Anthers exserted from corolla, basally long caudate. Style branches excurved, apically truncate, penicillate, papillose. Achenes cylindric, 2–3 mm (immature), glabrous. Pappus white, as long as corolla. Fl. and fr. Aug–Sep.

• Grasslands on slopes; 700–1200 m. Gansu, Shaanxi, Shanxi.

Parasenecio dasythyrsus is similar to *P. rufipilis* in aspect but differs by its articulate glandular hairs, orange florets, and longer peduncles.

5. Parasenecio sect. **Delphiniifolii** (H. Koyama) H. Koyama in Iwatsuki et al., Fl. Japan 3b: 48. 1995 [*"Delphiniifoliae"*].

翠雀叶组 cui que ye zu

Cacalia sect. *Delphiniifoliae* H. Koyama, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 2(2): 168. 1969.

Stem leaves many; blade palmately medially to deeply 5–7-lobed, palmately veined. Phyllaries 3–5, rarely 7 or 8. Florets 3–5, rarely 10–14. Pappus white or red-brown.

Nine species: Bhutan, China, Japan; six species (four endemic) in China.

47. Parasenecio delphiniifolius (Siebold & Zuccarini) H. Koyama in Iwatsuki et al., Fl. Japan 3b: 49. 1995.

翠雀蟹甲草 cui que xie jia cao

Cacalia delphiniifolia Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 190. 1846; *C. delphiniphylla* (H. Léveillé) Handel-Mazzetti; *C. pilgeriana* (Diels) Y. Ling subsp. *delphiniphylla* (H. Léveillé) H. Koyama; *Parasenecio delphiniphyllus* (H. Léveillé) Y. L. Chen; *P. tongchuanensis* Y. L. Chen; *Senecio delphiniphyllus* H. Léveillé; *S. syneilesis* Franchet & Savatier; *S. zuccarinii* Maximowicz.

Plants 80–150 cm tall; rhizomes not seen. Stem solitary, erect, striate, often becoming purple in lower part, shortly pubescent or subglabrous. Leaves petiolate; lower leaves withered by anthesis. Median leaves 3 or 4; petiole not winged, 4–6.5 cm, shortly yellow-brown hairy; blade broadly reniform or ovate-reniform, 9–15 × 11–18 cm, base truncate, palmately lobed, apex long caudate-acuminate; lobes 5–7, narrowly obovate or oblong-ovate, sometimes secondarily pinnately lobed, abaxially yellow-brown pubescent, adaxially adpressed shortly hairy, veins raised abaxially, impressed adaxially, basally 5-veined, lateral veins upward branched, margin sparsely serrate, teeth mucronulate, apex caudate or acuminate. Upper leaves shortly petiolate, small. Capitula many, terminal, arranged in narrow panicles; rachis and peduncle densely glandular shortly hairy; peduncles ca. 1 mm, with 1 or 2 linear or triangular bractlets. Involucres cylindric, 5–6 × 2–3 mm; phyllaries 5, oblong-lanceolate, 1–1.5 mm wide, sparsely shortly pubescent, margin narrowly scarious, apically obtuse or slightly acute. Florets 5; corolla yellow, ca. 8 mm; tube slender, ca. 3 mm; limb broadly tubular, lobes ovate-lanceolate. Anthers not exserted from corolla, basally long caudate. Style branches apically truncate, papillose. Achenes dark brown, cylindric, 4–5 mm, glabrous, ribbed. Pappus brownish, ca. 6 mm. Fl. Jul–Aug, fr. Sep–Oct.

Shaded wet places of forest understories, slopes; 1600–3200 m. Guizhou, E Yunnan [Japan].

48. Parasenecio pilgerianus (Diels) Y. L. Chen, Acta Phytotax. Sin. 33: 83. 1995.

太白蟹甲草 tai bai xie jia cao

Senecio pilgerianus Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 106. 1905; *Cacalia pilgeriana* (Diels) Y. Ling; *Koyamacalia pilgeriana* (Diels) H. Robinson & Brettell.

Plants erect, 60–100 cm tall. Rhizomes not dilated, with numerous fibrous roots. Stem solitary, striate, glabrous or sparsely arachnoid in lower part, shortly pubescent in upper part and synflorescence branches, long naked in lower part by anthesis. Lower leaves often withered by anthesis; leaves petiolate; petiole not winged, (8–)10–20 cm; blade abaxially pale green, adaxially green, reniform or broadly reniform, 15–22 × 20–30 cm, papery, palmately medially to deeply lobed; lobes 5–7, obovate or oblong, pinnately lobed, abaxially shortly hairy on veins, adaxially adpressed sparsely shortly pubescent, basally 5-veined, lateral veins upward furcate, base cordate or truncate, margin undulately toothed, teeth mucronulate, apex acute. Upper leaves shortly petiolate, smaller. Uppermost leaves very small, bractlike. Capitula many, usually arranged in crowded branched panicles; rachis and peduncle densely brown shortly hairy, subsessile, with 1 linear-lanceolate bractlet at base. Involucres cylindric, 5–6 × ca. 1.5 mm; phyllaries 3, linear-lanceolate, ca. 1 mm wide, striate, margin narrowly scarious, apically obtuse, puberulent. Florets 3; corolla white or pale yellow, 6–7 mm; tube slender, ca. 3 mm; limb broadly tubular. Anthers exserted from corolla, basally long caudate. Style branches excurved, slender, truncate, papillose. Achenes cylindric, 2–3 mm, glabrous, ribbed. Pappus yellow-brown, 5–6 mm. Fl. Jul–Aug, fr. Sep.

• Forests on slopes, shaded wet places, watersides in valleys; 1200–2500 m. Gansu, Qinghai, Shaanxi.

49. Parasenecio sinicus (Y. Ling) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 81. 1999.

中华蟹甲草 zhong hua xie jia cao

Cacalia sinica Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 7. 1937; *Koyamacalia sinica* (Y. Ling) H. Robinson & Brettell.

Plants erect, to 1 m tall. Rhizomes short, stout, with numerous fibrous roots. Stem solitary, striate, glabrous, naked in lower part, with withered scales or fibrous, with many leaves in lower 1/2. Leaves large; petiole 10–12 cm, narrowly winged; leaf blade abaxially pale, adaxially green, reniform or broadly ovate-triangular, 10–20 × 12–24 cm, thinly papery, usually palmately deeply 5–7-lobed; lobes lanceolate or elliptic-lanceolate, abaxially glabrous, adaxially brown strigose on veins, basally 3–5-veined, lateral veins furcate near base, veins raised abaxially, impressed adaxially, base cordate or subcordate, margin stiffly ciliate and sparsely cartilaginous mucronulately or undulately finely toothed, apex acuminate; central lobe larger, lateral lobes often 1-lobulate, lobule obliquely triangular. Upper leaves smaller, hastately 3-lobed. Uppermost leaves shortly petiolate, very small. Capitula many, terminal or in upper leaf axils, arranged in large, broad panicles to 15–20 cm; peduncles 8–15 mm, stout; rachis shortly brown hairy, base with 2 or 3 subulate bractlets. Involucres cylindric; phyllaries 7 or 8, linear-lanceolate or linear, 8–10 × ca. 1 mm, outside glabrous, apex acute, puberulent. Florets 10–14; corolla yellow or purple, ca. 8 mm; tube slender, ca. 3 mm; limb broadly tubular, lobes triangular-lanceolate, ca. 1.5 mm. Anthers exserted from corolla, basally shortly caudate. Style branches excurved, apically truncate, penicillate, papillose. Achenes brown, oblong-cylindric, 5–6 mm, glabrous, ribbed. Pappus red-brown, 7–8 mm. Fl. Jul–Aug, fr. Sep.

• Shaded wet places of forest understories on slopes, forest margins by canal sides; 1000–2000 m. Henan, Shaanxi.

Parasenecio sinicus is similar to *P. pilgerianus* but differs in having leaves palmately shallowly to deeply 5–7-divided, lobes pinnately shallowly lobed; peduncles very short; and phyllaries and florets 3 or 4.

50. Parasenecio dissectus Y. S. Chen, Ann. Bot. Fenn. 48: 166. 2011.

湖北蟹甲草 hu bei xie jia cao

Herbs, perennial, to 1 m tall. Rhizomes short, with numerous elongate fibrous roots. Stem solitary, erect, striate, glabrous. Leaves petiolate; petiole 2.5–9.5 cm, glabrous; blade green on both surfaces, orbicular-ovate, 16–27 × 15–35 cm, thinly papery, palmately and deeply (5 or)6–9-lobed; lobes lanceolate or elliptic-lanceolate, both surfaces glabrous, basally 3- or 4-veined, lateral veins furcate near base, veins raised abaxially, impressed adaxially, base subcordate, margin undulately finely toothed, apex acuminate; central lobe larger, lateral lobes often 1-lobulate, lobule obliquely triangular; upper leaves gradually smaller, ovate, usually 5-lobed, with shorter petioles; uppermost leaves shortly petiolate, oblong, 13–15 cm × 8–10 mm, 3-lobed; lobe margin entire, apex acuminate. Capitula numerous, discoid, arranged in panicles ca. 20 cm; peduncles 4–6 mm, slender; rachis shortly hairy, base with 2 or 3 subulate bractlets. Involucres cylindric, 10–12 × ca. 3 mm; phyllaries 5, linear, 7–8 × ca. 1 mm, outer surface glabrous, margin membranous, apex acute. Florets bisexual, 5; corolla tube ca. 4 mm; limb broadly tubular, ca. 4 mm; lobes 5, lanceolate, ca. 1 mm. Anthers exserted from corolla, basally shortly caudate. Style branches excurved, penicillate, papillose, apically truncate. Achenes brown, cylindric, ca. 3 mm, glabrous, longitudinally ribbed. Pappus white, ca. 8 mm.

• Hubei (?Fangxian).

Parasenecio dissectus is known only from the type gathering, *A. Henry 6487*, which was made in 1885–1888 in Hubei, possibly in Fangxian. It is similar to *P. sinicus* but differs in having leaves larger, phyllaries and florets 5, achenes shorter, and pappus white.

51. Parasenecio palmatisectus (Jeffrey) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 82. 1999.

掌裂蟹甲草 zhang lie xie jia cao

Plants erect, 50–100 cm tall. Rhizomes robust, with numerous tomentose fibrous roots. Stem solitary, striate. Leaves long petiolate; lower leaves fallen by anthesis; petiole not winged, 4–7 cm, sparsely shortly pubescent or subglabrous; median leaf blade abaxially pale green or gray-green, adaxially green, broadly ovate-orbicular or pentagonal-cordate, 5–14 × 7–14 cm, abaxially white crisped-hairy or only pubescent on veins, adaxially sparsely adpressed shortly hairy or glabrous, pinnate-palmately 5–7-divided; lobes oblong, oblong-lanceolate, or spatulate, rarely linear, 2–9 × 2–4 cm, pinnately lobed, or unequally 2–4-denticulate; terminal lobe larger, lateral lobes narrow and small. Upper leaves smaller, same as middle leaves, shorter petiolate. Capitula many, arranged in terminal racemes or lax panicles, spreading or pendulous after anthesis; peduncles 3–5(–7) mm, with 1 or 2 linear bractlets. Involucres cylindric, 8–10 × 2.5–3 mm; phyllaries 4, green or sometimes becoming purple, linear-oblong, margin narrowly scarious, apically obtuse. Florets 4 or 5, rarely 6 or 7; corolla yellow, 8–12 mm; tube slender, ca. 3 mm; limb narrowly campanulate, lobes ovate-lanceolate. Anthers exserted from corolla, basally caudate. Style branches excurved, apically truncate, papillose. Achenes cylindric, 5–6 mm, glabrous, ribbed. Pappus white, 5–6 mm. Fl. Jul–Aug, fr. Sep–Oct.

Forest understories, forest margins, thickets on slopes; 2400–3800 m. SW and W Sichuan, E Xizang, NW Yunnan [Bhutan].

1a. Stems, rachis, peduncles, and phyllaries sparsely shortly pubescent or subglabrous; leaves abaxially pubescent only on veins ..... 51a. var. *palmatisectus*

1b. Upper stems, rachis, peduncles, and phyllaries shortly glandular pubescent or glandular hairy; leaves abaxially white crisped-hairy ..... 51b. var. *moupinensis*

51a. Parasenecio palmatisectus var. **palmatisectus**

掌裂蟹甲草(原变种) zhang lie xie jia cao (yuan bian zhong)

Senecio palmatisectus Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 128. 1916; *Cacalia palmatisectus* (Jeffrey) Handel-Mazzetti; *Koyamacalia palmatisecta* (Jeffrey) H. Robinson & Brettell.

Stems, rachis, peduncles, and phyllaries sparsely shortly pubescent or subglabrous. Leaves abaxially pubescent only on veins.

• Forest understories, forest margins, thickets on slopes; 2600–3800 m. SW and W Sichuan, E Xizang, NW Yunnan.

51b. Parasenecio palmatisectus var. **moupinensis** (Franchet) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 82. 1999.

腺毛掌裂蟹甲草 xian mao zhang lie xie jia cao

Senecio quinquelobus (Thunberg) Candolle var. *moupinensis* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 40. 1887; *Cacalia palmatisectus* var. *moupinensis* (Franchet) H. Koyama; *C. palmatisectus* f. *pilipes* H. Koyama; *C. palmatisectus* var. *pubescens* (Jeffrey) C. Y. Wu; *C. pentaloba* Handel-Mazzetti var. *moupinensis* (Franchet) Handel-Mazzetti; *Senecio moupinensis* (Franchet) C. C. Chang; *S. palmatisectus* var. *pubescens* Jeffrey.

Upper stems, rachis, peduncles, and phyllaries shortly glandular pubescent or glandular hairy. Leaves abaxially white crisped-hairy.

Forests, forest margins, secondary thickets on slopes; 2400–2900 m. SW and W Sichuan, E Xizang [Bhutan].

52. Parasenecio tripteris (Handel-Mazzetti) Y. L. Chen, Fl. Reipubl. Popularis Sin. 77(1): 85. 1999.

昆明蟹甲草 kun ming xie jia cao

Cacalia tripteris Handel-Mazzetti, Acta Horti Gothob. 12: 300. 1938.

Plants (30–)50–90 cm tall. Rhizomes short, stout, 1.5–2 cm in diam., with numerous brown fibrous roots. Stem solitary, green or base purple-tinged striate, stiff, glabrous. Lower leaves small or withered by anthesis; other leaves usually crowded at middle, gradually smaller. Petiole ca. 1/2 as long as blade, unequally shortly winged, without auricle at base; leaf blade abaxially pale green, adaxially dark green, broadly ovate, 7–10 × 6–11 cm, both surfaces glabrous, palmately veined, veins distinctly raised adaxially, base slightly cordate, truncate, or broadly cuneate, palmately 3–7-divided, lobes broadly obovate-spatulate, apex obtuse or slightly acute, terminal lobe ± lobed, lateral lobes 2-lobed or divided, margin sparsely toothed or

mucronulate only, thicker in texture. Capitula many, terminal or arranged in upper leaf axils in a branched narrow panicle; branches obliquely ascending; capitula upward arranged in racemes, pendulous, glabrous or sparsely shortly pubescent; bracts of lower part similar to leaves, but smaller; upper bracts linear or linear-lanceolate, 5–6 mm; peduncles (2–)3–5 mm, slender, with 1–3 subulate-linear bractlets, pendulous. Involucres cylindric, 8–9 × 1.5–2 mm; phyllaries 3, pale brown, linear-lanceolate or narrowly lanceolate, 7–9 × 1–1.5 mm, herbaceous, glabrous, margin narrowly or broadly scarious, apically obtuse or slightly acute, puberulent. Florets 3 or 4; corolla yellow, 6–7 mm; limb broadly tubular; lobes lanceolate, ca. 2 mm. Anthers exserted from corolla, basally long caudate. Style branches truncate, papillose. Achenes yellow-brown, cylindric, 4–5 mm, glabrous, ribbed. Pappus white, ca. 5 mm. Fl. Jul–Aug, fr. Oct.

• Lax forests or grasslands on slopes; 1900–3100 m. Yunnan.

Parasenecio tripteris is similar to *P. palmatisectus* but differs in the leaf thickness, the type of division of leaves, and the numbers of phyllaries and florets.

99. LIGULARIOPSIS Y. L. Chen, Acta Phytotax. Sin. 34: 631. 1996.

假橐吾属 jia tuo wu shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, perennial. Rhizomes robust, short, with many fibrous roots. Stem with relict petioles at base. Leaves alternate, papery, basal leaves persistent by anthesis, long petiolate, oblong-cordate or broadly ovate-cordate, base cuneate, decurrent into winged petiole; petiole basally expanded and subamplexicaul, but not vaginate. Median leaves similar to lower leaves but smaller, shortly petiolate; petiole winged, gradually expanded from middle to base into leaflike ovate auricles, amplexicaul. Capitula discoid, in terminal racemes; peduncles with 2 bractlets. Involucres cylindric or narrowly campanulate, 1.5–2 mm in diam., not calyculate; phyllaries uniseriate, 4, linear-lanceolate, margin narrowly scarious. Receptacle foveolate. Florets 4, discoid, distinctly overtopped by disk, bisexual; corolla yellow, tubular limb narrowly campanulate, 5-lobed; lobes lanceolate, apex acute. Anthers linear, exserted from corolla, basally obtuse, apex with lanceolate appendages, antheropodium cylindric. Style branches excurved, obtuse or truncate, papillose. Achenes cylindric, glabrous, ribbed. Pappus purple-brown, uniseriate, serrulate, caducous.

• One species: China.

This genus is not only in aspect but also in the head arrangement closely related to *Ligularia*; however, it differs by its petioles winged, expanded and subamplexicaul, but not vaginate at base; capitula discoid, in terminal racemes; and florets 4, all tubular. The genus is also related to *Parasenecio* but differs by its anthers obtuse, not caudate at base; stem leaf base with relict petioles; and basal leaves persistent by anthesis.

1. Ligulariopsis shichuana Y. L. Chen, Acta Phytotax. Sin. 34: 632. 1996.

假橐吾 jia tuo wu

Cacalia longispica Z. Ying Zhang & Y. H. Guo, Fl. Tsinling. 1(5): 422. 1985, not Handel-Mazzetti (1938).

Rhizomes short, stout, with many fibrous roots. Stem solitary, erect, 60–100 cm tall, green or becoming purple in lower part, striate, arachnoid and shortly pubescent, glabrescent, base often with withered relict petioles; basal leaves persistent by anthesis, long petiolate; petiole 9–20 cm, basally expanded and subamplexicaul; blade abaxially pale green, oblong-cordate or broadly ovate-cordate, 5.5–13(–16) × 6.5–14.5 cm, papery, abaxially sparsely arachnoid, or later ± glabrescent, adaxially glabrous, midvein stout, lateral veins furcately branched, raised abaxially, impressed adaxially, base deeply cordate, cuneate-decurrent into ca. 1 cm wide winged petiole, margin serrate, apex shortly acuminate or obtuse. Middle stem leaves similar to lower leaves but smaller; petiole shorter, broadly winged, base distinctly expanded into ovate, leaflike, amplexicaul, large auricle, margin brown ciliate. Upper leaves sessile, ovate-lanceolate to lanceolate, base expanded into a denticulate-amplexicaul auricle, apex acute or acuminate. Capitula many, discoid, arranged in terminal 20–25(–50) cm racemes; rachis and peduncle densely arachnoid and glandular hairy; peduncles 2–3 mm, with 2 or 3 linear or subulate bractlets. Involucres cylindric or narrowly campanulate, 6–7 × 1.5–2 mm; phyllaries 4, green or becoming purple, linear-lanceolate, 0.5–1 mm, sparsely glandular hairy, margin narrowly scarious, apically slightly acute or obtuse, puberulent. Florets tubular, 4, distinctly overtopping involucres; corolla yellow, ca. 6 mm; limb narrowly campanulate; lobes lanceolate. Anthers exserted from corolla, 3–4 mm, basally obtuse. Style branches excurved, apically truncate, papillose. Achenes brown, cylindric, 3–4 mm, glabrous. Pappus purple-brown or purple. Fl. Jul, fr. Aug–Sep.

• Forests on slopes, grasslands; 1500–2100 m. Gansu, Shaanxi.

100. SYNEILESIS Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 165. 1859.

兔儿伞属 tu er san shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, perennial, robust. Basal leaves peltate, palmately parted, long petiolate, densely crisped-hairy when young. Cotyledon involute before blade opens; stem leaves alternate, petiole basally amplexicaul. Capitula discoid; florets tubular, many, arranged in terminal corymb or panicles. Involucres narrowly tubular or cylindric, base with 2 or 3 linear bractlets; phyllaries 5, unequal, inner

phyllaries broader, outer phyllaries narrow. Receptacle flat, glabrous, alveolate. Florets pale white to pale red, bisexual, fertile, irregularly lobed. Anthers basally hastate, appendages shortly acute. Style branches elongate, outside hairy, apically obtuse or triangular. Achenes cylindric, glabrous, many ribbed. Pappus many, unequal or subequal, finely bristly; seedlings with a single cotyledon.

Seven species: E Asia, mainly in China, Japan, and Korea; four species (three endemic) in China.

1a. Capitula arranged in panicles; leaves 12–20(–25) cm in diam. ..... 4. *S. subglabrata*
1b. Capitula arranged in flat-topped corymbs.
2a. Leaf segments narrow, 2.5–8 mm wide ..... 1. *S. aconitifolia*
2b. Leaf segments usually broader than 8 mm.
3a. Leaves submembranous when dry; synflorescence branches spreading ..... 2. *S. australis*
3b. Leaves subleathery when dry; synflorescence branches not spreading ..... 3. *S. hayatae*

1. Syneilesis aconitifolia (Bunge) Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 165. 1859.

兔儿伞 tu er san

Cacalia aconitifolia Bunge, Enum. Pl. China Bor. 37. 1833; *Senecio aconitifolius* (Bunge) Turczaninow.

Herbs, erect, 70–120 cm tall. Rhizomes procumbent, short, with many fibrous roots. Stem purple-brown, simple, glabrous. Stem leaves usually 2(or 3). Lower leaves long petiolate, peltate; petiole 10–16 cm, not winged, glabrous, base amplexicaul; blade abaxially gray, adaxially pale green, 20–30 cm in diam., palmately parted, segments 7–9, twice 2- or 3-fid, lobes 2.5–8 mm wide, linear-lanceolate, initially reflexed, closed umbraculiform, densely arachnoid-tomentose, later open umbraculiform, glabrescent, apex acuminate, irregularly acute. Median leaf petioles 2–6 cm; blades smaller, 12–24 cm in diam.; segments 4 or 5. Uppermost leaves sessile or shortly petiolate, bractlike, lanceolate. Capitula many, discoid, arranged in dense compound corymbs, 6–7 mm in diam.; peduncles 5–16 mm, with few linear bractlets. Involucres tubular, 9–12 × 5–7 mm, glabrous at base, margin scarious. Florets 8–10; corolla pink-white, ca. 1 cm, with narrow, 3.5–4 mm tube and narrowly campanulate limb; lobes 5. Anthers purple, basally shortly hastate. Style branches elongated, compressed, apically obtuse, penicillate-puberulent. Achenes cylindric, 5–6 mm, glabrous, ribbed. Pappus of capillary-like bristles, sordid white to reddish, 8–10 mm. Fl. Jun–Jul, fr. Aug–Oct.

Forest margins on slopes, roadsides; 500–1800 m. Anhui, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Jiangsu, Liaoning, Shaanxi, Shanxi, Zhejiang [Japan, Korea, Russia (Far East)].

The roots and whole plant are used medicinally to relax and activate the tendons, alleviate pain around the waist and of the lower extremities, and to treat injuries.

2. Syneilesis australis Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 5. 1937.

南方兔儿伞 nan fang tu er san

Herbs, erect, to 1 m tall. Rhizomes robust, with many fascicled roots. Stem solitary, stiff, sulcate, base villous, glabrate, ca. 5 mm in diam. Median leaves laxly arranged; lower stem leaves long petiolate; petiole 3–8 cm, basally subamplexicaul; blade abaxially gray-green, adaxially green, orbicular, 30–40 cm in diam., submembranous, base broadly peltate (ca. 2 cm), palmately parted; segments oblong-lanceolate, lower segment sometimes entire, other segments lobed or linear-lanceolate, 2–3 cm wide, abaxially shortly pubescent, glabrate, adaxially glabrous, palmately veined, veins raised, distinctly reticulate, margin sparsely serrate, teeth mucronulate, apex acute, rarely 2-fid. Upper leaves shortly petiolate, palmately parted or 2-lobed. Uppermost leaves bractlike, linear-lanceolate, ca. 5 cm, sparsely serrate. Capitula discoid, many, arranged in terminal compound corymbs; branches spreading, 2–3 cm, rarely to 8 cm, sparsely pubescent; peduncles ca. 6 mm, with 3 or 4 linear-lanceolate bractlets. Involucres cylindric; phyllaries 5, oblong-lanceolate, ca. 10 × 2–3.5 mm, apex sparsely villous. Florets 10, all tubular, fertile; corolla 9–10 mm; limb campanulate, ca. 7 mm, lobes lanceolate, ca. 2 mm, apex puberulent. Anthers exserted from corolla, basally hastate. Style branches excurved, apically penicillate-puberulent. Achenes cylindric, 4–5 mm, glabrous, ribbed. Pappus of many bristles, white or reddish. Fl. Feb–Aug, fr. Oct.

• Forest margins on slopes, roadsides; 700–900 m. Anhui, Zhejiang.

Syneilesis australis is distinguished from *S. aconitifolia* by its larger, submembranous, basally broadly peltate leaves, with broader segments, and synflorescence branches spreading.

3. Syneilesis hayatae Kitamura, J. Jap. Bot. 10: 702. 1934.

台湾兔儿伞 tai wan tu er san

Senecio intermedius Hayata, J. Coll. Sci. Imp. Univ. Tokyo 22: 208. 1906, not Wight (1846); *Cacalia intermedia* Hayata (1919), not (Candolle) Kuntze (1891); *Syneilesis intermedia* Kitamura.

Herbs, rhizomatous. Rhizomes procumbent, short. Stem erect, 80–160 cm tall, ca. 7 mm in diam. in lower part, glabrous, sometimes with bulblets in leaf axils, corymbose branched in upper part. Stem leaves 2, lower leaves long petiolate; petiole to 20 cm, not winged, base amplexicaul; blade peltate-orbicular, ca. 35 cm in diam., subleathery, palmately parted; segments 5–9, 2-fid, lobules 15–20 mm wide, margin irregularly serrate, apex acute. Middle stem leaves smaller, segments few, shortly petiolate. Upper leaves distant, bractlike, linear-lanceolate, gradually smaller upward, apex acuminate. Capitula many, 8–10 mm in diam., arranged in terminal compound corymbs; peduncles 5–16 mm; bracts linear, 3–4 mm. Involucres tubular, 9–10 mm, base with 3 or 4 linear bractlets; phyllaries uniseriate, 4 or 5, oblong, glabrous, margin scarious, apically obtuse. Florets 14–16; corolla white, 1–1.3 cm; tube narrow, 4–5 mm, apex 5-lobed. Anthers black-purple, basally hastate. Ovary cylindric, glabrous. Style branches elongate, apically triangular, puberulent. Pappus of many bristles, reddish, ca. 1 cm, subequal. Fl. May.

• Forest understories; 300–500 m. Taiwan (Miaoli, Xinzhu).

4. Syneilesis subglabrata (Yamamoto & Sasaki) Kitamura, J. Jap. Bot. 10: 702. 1934.

高山兔儿伞 gao shan tu er san

Cacalia intermedia Hayata var. *subglabrata* Yamamoto & Sasaki, J. Soc. Trop. Agric. 3: 242–243. 1931; *C. subglabrata* (Yamamoto & Sasaki) Kitamura.

Stem erect, striate, 50–85 cm tall, glabrous, synflorescence branched in upper part, shortly pubescent. Stem leaves 3 or 4, lower leaves peltate; petiole 4–5 cm, basally white villous at nodes; blade abaxially gray, adaxially green, orbicular, 12–20(–25) cm in diam., thick, palmately 5–7-parted, segments obovate, twice 2-parted, lobules lanceolate, 1–1.5 cm wide, both surfaces sparsely pubescent, margin sparsely acutely toothed, apex acuminate. Upper leaves gradually smaller upward, palmately parted or 3-fid, bractlike, linear-lanceolate. Capitula many, arranged in terminal panicles, ca. 10 × 6–8 mm; peduncles 1–4 mm, densely shortly pubescent, with 3 linear bractlets at apex. Involucres tubular, ca. 8.5 × 5–7 mm; phyllaries uniseriate, 5, oblong, ca. 8.5 × 2–3 mm, thick, outside glabrous, apically obtuse, puberulent. Florets 6–8; corolla 8–9 mm, 5-lobed; tube narrow, 2–2.5 mm. Anthers black-purple, basally hastate. Ovary cylindric, glabrous. Style branches elongate, apically puberulent. Pappus of many bristles, sordid white, 7–8 mm. Fl. Jun, fr. Sep.

• Alpine areas in mountains; 1700–2800 m. Taiwan.

101. TUSSILAGO Linnaeus, Sp. Pl. 2: 865. 1753.

款冬属 kuan dong shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, scapigerous. Rhizomes perennial, repent or procumbent. Leaves developed after anthesis; basal leaves ovate or triangular-cordate. Scapes few, with many bractlike leaves. Capitulum 1, heterogamous, radiate. Involucres campanulate; phyllaries 1- or 2-seriate, equal, lanceolate, apically acuminate. Receptacle flat, glabrous. Florets yellow; ray florets female, numerous, fertile; disk florets functionally male, few; corolla tubular, 5-lobed. Anthers entire or subauriculate at base, filaments apically with equally sized cells. Style entire, apically obtuse, stigma papillose. Achenes narrowly cylindric, 5–10-ribbed. Pappus of many fine bristles, white.

One species: temperate N Africa, Asia, Europe.

1. Tussilago farfara Linnaeus, Sp. Pl. 2: 865. 1753.

款冬 kuan dong

Plants perennial. Rhizomes long creeping, subterranean, brown. Fruiting stems 5–10 cm tall, densely white lanate, with scale-shaped alternate purple-violet bracteate leaves. Basal leaves appearing after anthesis, long petiolate; petiole 5–15 cm, white lanate; blade orbicular-cordate, 3–12 × 3–14 cm, abaxially densely white tomentose, palmately reticulate veined, margin undulate, unequally toothed. Capitula solitary, terminal, 2.5–3 cm in diam., nodding (or drooping) before and after anthesis. Involucres campanulate, 1.5–1.8 cm at fruiting; phyllaries 1- or 2-seriate, linear, white villous, glabrate, sometimes black glandular hairy, apically obtuse, often purple tinged. Ray florets female, many seriate, yellow, radiate; stigma 2-fid. Disk florets few, functionally male; corolla tubular, 5-lobed; anthers sagittate at base; stigma capitate, usually sterile. Achenes cylindric, 3–4 mm. Pappus white, 1–1.5 cm.

Wet places, forest understories, valleys; 600–3400 m. Anhui, Gansu, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Nei Mongol, Ningxia, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [India, Nepal, Pakistan, Russia; N Africa, SW Asia, W Europe].

The immature capitula and leaves of *Tussilago farfara* are used medicinally for relieving coughs and improving breathing; the plants are also used as honey plants and are widely cultivated in medicinal gardens in China.

102. PETASITES Miller, Gard. Dict. Abr., ed. 4, [1056]. 1754.

蜂斗菜属 feng dou cai shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Nardosmia Cassini.

Herbs, perennial, subdioecious. Rhizomes as stems robust, node-shaped or at least more robust in lower part. Basal leaves long petiolate; blade broadly cordate or reniform-cordate, margin incised or basally lobed, parallel to furcate. Stem leaves bract-shaped, sessile, subamplexicaul. Capitula radiate, disciform or discoid, hetero- or homogamous. Involucres campanulate, basally with bractlets; phyllaries 1–5-seriate, equal. Receptacle flat, glabrous, peltate. Florets in female capitula fertile; corolla filiform, apex obliquely truncate or ± indistinctly radiate, or lamina longer; functionally male florets: corolla tubular, 5-toothed; anthers entire or obtuse at base, or rarely shortly hastate; style apically clavate, conical, 2-fid, style in female florets filiform, 2-fid. Achenes cylindric, glabrous, ribbed. Pappus of many bristles, white.

Nineteen species: Asia, Europe, North America; six species (two endemic) in China.

1a. Leaves palmate-pinnately divided (segments not to middle), reniform, terminal segment 3-lobed, segments with incised, mucronulate teeth; involucres ovate-oblong, synflorescences corymbose and densely paniculate; female florets indistinctly radiate ..... 1. *P. tatewakianus*

1b. Leaves undivided, angular or toothed, ± reniform.

2a. Capitula numerous, arranged in cymose panicles or panicles, bracteal leaves ovate-oblong, lanceolate, or ovate-lanceolate, apex acute or acuminate.

3a. Involucres of female capitula campanulate, 8–9 mm, style exserted from corolla, male capitula with peduncles 10–15 mm, peduncles of female capitula stout, 7–15 mm ..... 2. *P. formosanus*

3b. Involucres of female capitula subcylindric, 10–12 mm, peduncles as long as capitula or longer, to 8 cm ..... 3. *P. tricholobus*

2b. Capitula few, racemose or corymbose, rarely 2- or 3-branched in lower part, bracteal leaves oblong or ovate-lanceolate.

4a. Leaves papery, reniform, 3–5.5 × 5–9 cm; capitula 6–9, arranged in corymbs; peduncles slender, 1–4(–6) cm; involucres obconic, 8–10 mm, female florets shortly radiate, 2- or 3-toothed ..... 4. *P. rubellus*

4b. Leaves thin, larger, deeply cordate or orbicular-reniform; capitula numerous, arranged in corymbs or racemes; peduncles ca. 5.5 cm.

5a. Bracteal leaves oblong or ovate-lanceolate, apex obtuse; capitula arranged in dense, terminal corymbs, racemose after anthesis; phyllaries narrowly oblong, apex obtuse ..... 5. *P. japonicus*

5b. Bracteal leaves broadly ovate, stem leaves and lower bracteal leaves lanceolate, apex acuminate; capitula racemose; phyllaries 11–15, linear, apex obtuse or slightly acute ..... 6. *P. versipilus*

1. Petasites tatewakianus Kitamura, Acta Phytotax. Geobot. 9: 64. 1940.

掌叶蜂斗菜 zhang ye feng dou cai

Rhizomes long, creeping, 4–10 mm. Scapes of male florets ca. 50 cm tall, of female florets over 50 cm tall, arachnoid-crisped throughout. Bracteal leaves sessile, ovate-oblong, 4–4.5 × 1.5–1.6 cm, densely crisped, parallel veined, margin entire, apex obtuse. Upper bracts oblong, rudimentary. Leaves all basal, long petiolate; petiole 20–30 cm, initially crisped-villous, glabrescent; blade adaxially green, reniform or orbicular-reniform, 19–23 × 20–40 cm, or broader, palmately dissected (not to middle); segments 7–9, cuneate, terminal segment usually 3-lobed, with mucronulate teeth, abaxially densely white crisped, hairs thin, adaxially crisped-puberulent. Male capitula corymbose or paniculate; peduncles 4–8 cm. Synflorescences of male capitula ca. 40 cm, heterogeneous; involucres ca. 7 × 10–14 mm; female florets numerous, filiform, ca. 6 mm, apex truncate, style ca. 8 mm, 2-fid; male florets ca. 6.5 mm, tube narrow, ca. 3.5 mm. Female capitula homogeneous or heterogeneous; ray florets female. Central florets male, purplish or white; involucres hemispheric, ca. 10 × 10 mm, base with linear-lanceolate bracts; phyllaries uniseriate, imbricate, narrowly oblong, crisped-pubescent, apex obtuse. Female florets fertile, filiform, ca. 10 mm; lamina ca. 1 mm, style 2-fid. Male florets: corolla tubular, ca. 10.5 mm, tube narrow, ca. 6 mm, lobes ca. 3 mm; anthers basally 2-fid; filaments nodiform dilated; style slightly exceeding corolla, apex clavately dilated, with small ring below stigma 2-fid, puberulent. Achenes cylindric, 3–3.5 mm, glabrous, apex truncate. Pappus in female florets white, 9–12 mm, finely bristly. Pappus in male florets few, ca. 7 mm, bristly. Fl. Jun–Jul.

Sandy and stony banks of forest rivers and streams, forming huge thickets. Heilongjiang [Russia (Far East, Sakhalin)].

2. Petasites formosanus Kitamura, Acta Phytotax. Geobot. 2: 177. 1933.

台湾蜂斗菜 tai wan feng dou cai

Rhizomes long creeping, ca. 1 cm in diam., with many fibrous roots. Stems scapiform, few, fascicled, erect, 25–30 cm tall, simple, densely brown shortly pubescent and arachnoid-lanate. Basal leaves long petiolate; petiole 15–30 cm, base dilated, glabrous; blade adaxially green, cordate or reniform, 5–8 × 7–12 cm, abaxially sparsely arachnoid-pubescent especially on veins, adaxially shortly pubescent, basally palmately veined, thicker, base deeply or slightly cordate, margin with mucronulate teeth, apex rounded. Stem leaves sessile, bractlike, oblong-lanceolate or oblong, rarely ovate-oblong, 2–4(–6) × 1–1.8 cm, densely arachnoid, parallel veined, base subamplexicaul, margin entire, apex acute or acuminate. Capitula numerous, arranged in a paniculate synflorescence; synflorescence of male capitula 8–10 cm wide, synflorescence of female capitula 7–8 cm wide; peduncles 5–20 mm, slender, shortly brown pubescent; bracts 2–5, linear or linear-lanceolate, 4–5 mm. Involucres campanulate, 8–9 × 10–14 mm; phyllaries uniseriate, purple when dry, oblong or oblong-lanceolate, 3- or 4-veined, apex acute or acuminate, sparsely puberulent. Florets in male capitula mostly or entirely male; corolla tubular, 7–10 mm; limb campanulate–funnel-shaped, 5-lobed; lobes ovate, 1–1.5 mm; anthers basally obtuse; style dilated in upper part, 2-fid below stigma, papillose; corolla in female florets filiform, 8–9 mm, apex irregularly 4-lobed; lobes linear, unequal, ca. 2.5 mm; style filiform, exceeding corolla, apex 2-fid. Male florets few in female capitula; peduncles 7–15 mm, stout. Achenes cylindric, glabrous. Pappus of many capillary-like bristles, white, ca. 6 mm. Fl. May.

• Grasslands on mountains; 1500–2500 m. Taiwan.

3. Petasites tricholobus Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 52. 1883.

毛裂蜂斗菜 mao lie feng dou cai

Ligularia petelotii Merrill; *Petasites himalaicus* Kitamura;

P. mairei H. Léveillé; *P. petelotii* (Merrill) Kitamura; *P. vaniotii* H. Léveillé.

Plants subdioecious. Rhizomes short, with numerous fibrous roots, thinly arachnoid-lanate. Scapes emerging from rhizomes in early spring. Stems of female synflorescences 27–60 cm tall, with scale-shaped leaves; bracteal leaves ovate-lanceolate, 3–4 cm, basal leaves long petiolate; blade broadly reniform-cordate, 2–8 cm, both surfaces white lanate, or later ± glabrescent, palmately veined, margin finely toothed, with cartilaginous mucronulate teeth. Male capitula arranged in terminal corymbs or panicles; corolla tubular, segments lanceolate; style exceeding corolla, stigma capitate, slightly branched. Female capitula densely arranged in terminal cymose panicles, 8–12 mm in diam.; peduncles 1–2.5(–8) cm, with 1 to few lanceolate bracteal leaves; involucres campanulate, 10–12 mm; phyllaries uniseriate, 10–12, lanceolate or lanceolate-oblong, ca. 7 mm, calyculate; corolla apically 4- or 5-lacerate; segments unequal, filiform or subulate; style exceeding corolla, stigma 2-fid. Achenes cylindric, glabrous. Pappus of many fine bristles in female florets, in male few, shorter than corolla. Fl. Apr–Jun.

Roadsides, by streams in valleys; 700–4300 m. Gansu, Guizhou, Henan, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Vietnam].

The plants of *Petasites tricholobus* are used medicinally as in *P. japonicus*.

4. Petasites rubellus (J. F. Gmelin) Toman, Folia Geobot. Phytotax. 7: 391. 1972.

长白蜂斗菜 chang bai feng dou cai

Tussilago rubella J. F. Gmelin, Syst. Nat., ed. 13[bis], 2: 1225. 1792; *Nardosmia saxatilis* Turczaninow; *Petasites saxatilis* (Turczaninow) Komarov.

Rhizomes repent, thin, with fibrous roots. Stem solitary, erect, 5–25 cm tall, simple, arachnoid in upper part. Basal leaves small, long petiolate; petiole 3–10 cm, densely crisped-pubescent, base slightly expanded; blade abaxially pale green, adaxially green, reniform or reniform-cordate, 3–5.5 × (4–)5–9 cm, thickly papery, with short, thick hairs on petiole and especially on veins abaxially, base slightly cordate, margin acutely toothed, teeth emarginate, apex rounded. Stem leaves scale-shaped, ovate-lanceolate, 1.5–2 × 0.5–1 cm, glabrous, shortly white ciliate on margin, parallel veined, basally amplexicaul, apically obtuse or slightly acute. Capitula 6–9, arranged in corymbs; peduncles 1–4(–6) cm, slender, with linear bractlets. Involucres conical, 8–10 × 5–10 mm; phyllaries biseriate, subequal, narrowly oblong, 1–1.5 mm wide, glabrous or nearly so, apically obtuse. Male florets few, sterile; corolla yellow, ca. 9 mm; tube 3.5–4 mm; limb campanulate, 5-denticulate, lobes ovate-oblong; style basally 2-fid, stigma branches clavate, apex acute, puberulent. Female florets white, 6–7 mm, shortly radiate, apically 2- or 3-denticulate. Achenes oblong, 3–3.5 mm, truncate, constricted at bases. Pappus of many fine bristles, white, 9–11 mm. Fl. and fr. May–Jul.

Alpine regions, adjacent forests, forest margins; 1800–2800 m. Jilin (Changbai Shan), Liaoning [Korea, Mongolia, Russia (Far East, Siberia)].

5. Petasites japonicus (Siebold & Zuccarini) Maximowicz, Award 34th Demidovian Prize, 212. 1866.

蜂斗菜 feng dou cai

Nardosmia japonica Siebold & Zuccarini, Fl. Jap. 181. 1843; *Petasites albus* A. Gray (1857), not Linnaeus (1753); *P. liukiuensis* Kitamura; *P. spurius* Miquel; *Tussilago petasites* Thunberg.

Rhizomes creeping, with subterranean procumbent branches, with membranous ovate scales, and numerous fibrous roots. Stems 15–30 cm tall, basally 7–10 mm in diam., simple, densely or laxly shortly brown pubescent. Basal leaves long petiolate; blade adaxially green, orbicular or reniform-orbicular, 15–30 × 15–30 cm, papery, abaxially arachnoid, later glabrescent, adaxially crisped-pubescent when young, base cordate, margin finely toothed. Bracteal leaves oblong or ovate-oblong, 3–8 cm, parallel veined, apically obtuse. Male scapes with numerous capitula (20–30) crowded in a terminal corymb, homogamous; involucres tubular, ca. 6 × 7–8(–10) mm, base with lanceolate bracts; phyllaries biseriate, subequal, narrowly oblong, glabrous, apically obtuse; all florets tubular, functionally male; corolla white, 7–7.5 mm, tube ca. 4.5 mm; anthers basally obtuse; style clavately thickened with small ring below stigma, apex 2-fid. Female scape 15–20 cm tall, densely bracteate, often elongated after anthesis, ca. 70 cm tall, in dense corymbs, rarely branched; capitula homogamous; florets numerous, corolla filiform, ca. 6.5 mm, apex obliquely truncate; stigma distinctly exserted from corolla, capitate, 2-fid, papillose. Achenes cylindric, ca. 3.5 mm, glabrous. Pappus of many fine bristles, white, ca. 12 mm. Fl. Apr–May, fr. Jun.

Streamsides, grasslands, thickets. Anhui, Fujian, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Zhejiang [Japan, Korea, Russia (Far East)].

The rhizomes of *Petasites japonicus* are used medicinally for treating injuries, trauma, swelling, and fractures, and for detoxification of snakebites. The stalk is cultivated as a vegetable, and the young immature capitula are delicious.

6. Petasites versipilus Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 289. 1920.

盐源蜂斗菜 yan yuan feng dou cai

Rhizomes with numerous fibrous roots. Flowering scape solitary, 5–15 cm tall, slender, 3–4 mm in diam.; bracts broadly ovate to narrowly lanceolate, ca. 2 cm, abaxially and marginally crisped-hairy, apex long acuminate. Leaves long petiolate, broadly reniform, ca. 2 × as long as broad, subleathery, palmately veined, base deeply cordate, abaxially and petiole crisped, glabrate, densely glandular furfuraceous, margin sparsely cartilaginous, finely mucronate-toothed. Capitula numerous, arranged in lax racemes. Female capitula campanulate, 10–11 mm, narrow; phyllaries brown, 10–15, linear, 1–1.5 mm wide, glabrous, 3-veined, margin broadly brown scarious, apically obtuse or slightly acute, base with few bractlets; peduncles erect or pendulous, slender, apically dilated; florets numerous, exceeding involucres; female florets filiform, 4.5–7 mm; lobes 5, 0.5–0.8 mm; ovary glabrous; style very short, 2-lobed; pap-

pus white, shorter than corolla, connected in a short ring at base. Male florets tubular; tube slender, 2–4 mm; limb campanulate, 2–2.5 mm; lobes ovate, margin involute; anthers very short, base with small auricle; ovary hairy; style not exceeding corolla, stigma clavate; pappus shorter than those in female florets. Fl. Apr–Jun.

• Alpine grassy slopes, forest understories, thicket margins; 2700–3800 m. SW Sichuan, NW Yunnan.

2. Subtribe TEPHROSERIDINAE

狗舌草亚族 gou she cao ya zu

Chen Yilin (陈艺林 Chen Yi-ling), Liu Ying (刘莹), Yang Qiner (杨亲二); Bertil Nordenstam, Charles Jeffrey

Antheropodia cylindric, narrow, without enlarged marginal basal cells; anther endothecial tissue with cell wall thickenings polar, or polar and radial, cells short; stigmatic areas of disk floret styles confluent, contiguous or discrete. $x = 24$, 30, rarely 13.

Three genera and ca. 100 species: Asia, Europe, North America; three genera and 60 species (48 endemic) in China.

1a. Leaves pinnately lobed ..... 105. *Nemosenecio*
1b. Leaves palmately lobed or unlobed.
2a. Disk floret corolla limb campanulate, rarely funnelform; leaves palmately veined, rarely pinnately veined; endothecial cell wall thickenings polar, or radial and polar; involucres calyculate or not; phyllaries 8–17 ..... 103. *Sinosenecio*
2b. Disk floret corolla limb funnelform, never campanulate (except in *T. koreana*); leaves pinnately veined, never palmately veined; endothecial cell wall thickenings polar and radial; involucres not calyculate; phyllaries 13–25 ..... 104. *Tephroseris*

103. SINOSENECIO B. Nordenstam, Opera Bot. 44: 48. 1978.

蒲儿根属 pu er gen shu

Chen Yilin (陈艺林 Chen Yi-ling), Liu Ying (刘莹), Yang Qiner (杨亲二); Bertil Nordenstam, Charles Jeffrey

Herbs, perennial, rarely annual or biennial, erect, rhizomatous, sometimes stoloniferous, with fibrous roots. Stems scapiform, subscapiform, or leafy, often villous or arachnoid-tomentose, at least when young. Leaves simple, petiolate, all or mostly radical or both radical and stem leaves present; radical leaves rosulate, persistent at anthesis except in some species with leafy stems; blade orbicular or reniform to ovate, rarely ovate-oblong or elliptic, palmately or rarely pinnately veined, moderately deeply to shallowly palmately lobed, toothed, angled, or subentire, basally cordate to subtruncate or rarely rounded or cuneate; petioles of basal leaves sometimes expanded or winged, petioles of stem leaves sometimes winged, base usually expanded into conspicuous, subamplexicaul, entire or toothed auricle. Capitula solitary to numerous, arranged in terminal subumbelliform simple or compound corymbose cymes, heterogamous, radiate, pedunculate. Involucres not calyculate or very occasionally calyculate, cylindric, obconic, or campanulate to broadly campanulate; receptacle flat or convex, alveolate or ciliate; phyllaries (7 or)8–13(–17), uniseriate (or nearly so), linear to ovate, usually lanceolate, apex and on upper margins ciliate or fimbriate-ciliate, margins scarious. Ray florets 6–18, usually 13; lamina yellow, usually oblong or lanceolate-oblong, 4–10-veined, apically shortly dentate. Disk florets numerous; corolla yellow, limb campanulate, lobes 5. Anthers oblong, basally rounded to obtuse, rarely shortly obtuse-sagittate; antheropodia cylindric, somewhat broader than filament, cells uniform; endothecial cell wall thickenings polar, or polar and radial. Style branches recurved, short, truncate or slightly convex, with apical papillae. Achenes cylindric or obovoid-cylindric, ribbed, glabrous or shortly pubescent on ribs, papillate or smooth. Pappus capillary-form, uniform, white, persistent or rarely caducous, present in all florets, absent from ray florets, or absent from all florets. $x = 24$, 30, rarely 13.

Forty-one species: all occurring in China, mainly in the C and SW regions, only two extending into Myanmar, Thailand, and Vietnam; 41 species (39 endemic) in China.

Several lines of evidence (morphological, cytological, and molecular) strongly indicate that *Sinosenecio* as circumscribed herein is still not a monophyletic group and needs a further re-circumscription, even after *S. koreanus* has been transferred to the genus *Tephroseris* and *S. hainanensis* established as a new genus of its own, i.e., *Hainanecio*. It seems that only those *Sinosenecio* species with $x = 30$ and with strictly polar endothecial cell wall thickenings should be retained in the genus *Sinosenecio* as redefined, whereas those with $x = 24$ (rarely 13), and with polar and radial endothecial cell wall thickenings may be described as a new genus or transferred to the genus *Nemosenecio*. No formal taxonomic treatment at the generic level, however, is made herein pending further study.

1a. Pappus absent in all florets, absent at least in ray florets.
2a. Pappus absent in ray florets only, present in disk florets; ovaries and achenes glabrous in ray florets, pubescent in disk florets ..... 23. *S. oldhamianus*
2b. Pappus absent in all florets; ovaries and achenes glabrous in all florets, rarely sparsely glandular.
3a. Leaf blade pinnately veined, cuneate, truncate, or rounded at base ..... 29. *S. jishouensis*

3b. Leaf blade palmately veined, cordate at base.
4a. Capitula small; involucres 2–3 mm in diam. ..... 28. *S. phalacrocarpoides*
4b. Capitula large; involucres more than 5 mm in diam.
5a. Petioles of radical leaves not expanded at base; peduncles not dilated distally; receptacle hairy.
6a. Stem scapiform; leaves all basal or subbasal, rosulate.
7a. Capitula usually 1 or 2; leaf blade ovate, broadly ovate-orbicular, or reniform, 2–4(–5) × 2.2–5.5 cm, margin subentire to repand-dentate, apex acuminate or shortly caudate ..... 10. *S. homogyniphyllus*
7b. Capitula usually 2–9 in subumbelliform corymb; leaf blade ovate or broadly ovate, 4–9 × 4.5–9.5 cm, margin repand or sinuate-dentate, apex rounded ..... 11. *S. chienii*
6b. Stem not scapiform, with 2–5 stem leaves.
8a. Capitula solitary; leaf blade 1.7–5.5 × 2–6.5 cm, adaxially glabrous or very sparsely pubescent, shiny ..... 12. *S. yilingii*
8b. Capitula solitary or several; leaf blade 5–9 × 5–10 cm, adaxially pubescent, not shiny ..... 13. *S. sichuanicus*
5b. Petioles of radical leaves expanded at base; peduncles distally dilated; receptacle usually glabrous.
9a. Stem scapiform; leaves all basal or subbasal, rosulate ..... 41. *S. qii*
9b. Stem leafy; both basal and stem leaves present.
10a. Leaf blade abaxially and phyllaries thinly arachnoid-tomentose at least when young; achenes sparsely glandular ..... 27. *S. phalacrocarpus*
10b. Leaf blade and phyllaries not arachnoid-tomentose; achenes glabrous.
11a. Leaf blade irregularly 3–5-lobed or repand-dentate; plants stoloniferous or not stoloniferous.
12a. Phyllaries abaxially fulvous villous, glandular puberulent, or subglabrous; plants with long stolons or not stoloniferous ..... 24. *S. globiger*
12b. Phyllaries abaxially purplish red puberulent; plants with short stolons ..... 25. *S. leiboensis*
11b. Leaf blade regularly 7–9-lobed to 1/4–1/2; plants not stoloniferous.
13a. Leaf blade 7–9-lobed to 1/2, at first sparsely puberulent, later glabrescent on both surfaces; lobes oblong-lanceolate; veins yellowish green ..... 26. *S. palmatisectus*
13b. Leaf blade 7–9-lobed to 1/4–1/3, adaxially pubescent with spreading hairs, abaxially pubescent or sometimes glabrescent; lobes deltoid; veins white ..... 30. *S. albonervius*
1b. Pappus present in all florets, at least when young.
14a. Ovaries and achenes pubescent.
15a. Petioles of stem leaves basally auriculate.
16a. Stem slender, erect or flexuous; stem leaves 1–3; leaf blade adaxially villous with spreading hairs, leaf auricles smaller in size ..... 14. *S. latouchei*
16b. Stem somewhat stouter, erect; stem leaves 3–7; leaf blade adaxially pubescent with appressed hairs or sparsely or densely white tomentose, leaf auricles larger in size ..... 15. *S. jiuhuashanicus*
15b. Petioles of stem leaves basally expanded or winged but not auriculate.
17a. Petioles of stem leaves basally expanded; leaf blade adaxially pubescent or glabrescent, abaxially densely white tomentose, or villous or glabrescent ..... 16. *S. guangxiensis*
17b. Petioles of stem leaves basally winged; leaf blade abaxially sparsely arachnoid, later glabrescent ..... 19. *S. hunanensis*
14b. Ovaries and achenes glabrous.
18a. Leaf blade pinnately veined.
19a. Leaf blade ovate-oblong or elliptic, base cuneate, sparsely puberulent on both surfaces ..... 39. *S. trinervius*
19b. Leaf blade ovate-oblong, base cordate, floccose-tomentose on both surfaces ..... 36. *S. changii*
18b. Leaf blade palmately veined.
20a. Capitula solitary.
21a. Leaf blade ovate-cordate; capitula 4–5 cm in diam.
22a. Leaf blade abaxially densely white lanate; pappus hairs few, shorter than corolla tube, soon deciduous ..... 5. *S. cyclaminifolius*
22b. Leaf blade abaxially densely fulvous tomentose; pappus hairs numerous, equaling or exceeding corolla tube, persistent ..... 6. *S. hederifolius*
21b. Leaf blade orbicular or reniform-orbicular; capitula 2–3 cm in diam.
23a. Stem without bracts on upper part ..... 7. *S. rotundifolius*
23b. Stem with several small bracts on upper part.
24a. Leaf blade 0.8–1.7 × 0.8–2 cm, dark green above; stem subglabrous ..... 40. *S. nanchuanicus*
24b. Leaf blade 3–6 × 4–6 cm, green above; stem fulvous villous ..... 3. *S. dryas*
20b. Capitula usually 2 to many.
25a. Stem leafy, usually with at least 4 stem leaves only slightly smaller than basal leaves, rarely fewer.
26a. Petioles of stem leaves basally auriculate.

27a. Plants 20–75 cm tall; leaf blade 2–5 × 3–8 cm; stem villous-pubescent especially basally; pappus 5–6 mm ..... 20. *S. euosmus*
27b. Plants 35–140 cm tall; leaf blade 4–14 × 6–17 cm; stem sparsely pubescent; pappus 3–4 mm .... 33. *S. denticulatus*
26b. Petioles of stem leaves basally expanded but not auriculate.
28a. Leaf blade ovate-cordate, not divided, margin denticulate ..... 31. *S. baojingensis*
28b. Leaf blade reniform, orbicular-reniform, broadly flabellate, or suborbicular, repand-dentate or palmately lobed.
29a. Plants less than 25 cm high; leaf blade 2.5 × 3 cm or less, both surfaces glabrous ..... 17. *S. wuyiensis*
29b. Plants more than 30 cm high; leaf blade 3–6 × 4–6 cm, abaxially variously pubescent.
30a. Leaf blade repand-dentate, sparsely villous or glabrescent abaxially ..... 32. *S. hupingshanensis*
30b. Leaf blade palmately lobed, arachnoid or white tomentose abaxially.
31a. Leaf blade 7–9-lobed to 1/2; lobes oblong; phyllaries not purplish on upper margin ..... 22. *S. fangianus*
31b. Leaf blade shallowly 5–7-lobed, or undivided, only denticulate; lobes broadly deltoid or ovate-deltoid, denticulate; phyllaries purplish on upper margin ..... 21. *S. sungpanensis*
25b. Stem scapiform or subscapiform, leafless or with fewer than 4 stem leaves, otherwise with only lanceolate or linear bracts or at most a few reduced, bractlike leaves markedly smaller than radical leaves.
32a. Capitula cylindric; phyllaries 8–10.
33a. Leaf blade ovate-cordate or suborbicular.
34a. Leaf blade ovate-cordate, densely lanate with fulvous hairs or sericeous ..... 1. *S. eriopodus*
34b. Leaf blade suborbicular, villous with reddish brown hairs or sometimes glabrescent ..... 2. *S. villifer*
33b. Leaf blade reniform.
35a. Stem leaves 1 or 2 near base; leaf blade smaller, 4–9 × 5–8 cm, arachnoid abaxially ..... 9. *S. subrosulatus*
35b. Stem leaves absent or with a bractlike leaf on upper part; leaf blade of basal leaves larger, 7–20 × 5–22 cm, villous abaxially ..... 8. *S. ligularioides*
32b. Capitula campanulate; phyllaries more than 10.
36a. Rhizome collar and stem base densely sericeous-villous; capitula 1–3, up to 3 cm in diam. ..... 4. *S. subcoriaceus*
36b. Rhizome collar and stem base not densely sericeous-villous; capitula few or many, usually 1–2 cm in diam.
37a. Stem villous with reddish brown hairs, more densely so on lower part; leaf blade ciliate at margin.
38a. Leaf blade orbicular or suborbicular, base cordate or subtruncate, margin shortly ciliate ..... 38. *S. confervifer*
38b. Leaf blade broadly ovate or broadly elliptic, base truncate or rounded, margin long ciliate ..... 37. *S. bodinieri*
37b. Stem subglabrous, sparsely arachnoid, or arachnoid-tomentose; leaf blade not ciliate at margin.
39a. Stem arachnoid-tomentose; leaf blade densely white tomentose abaxially.
40a. Leaf blade green adaxially, regularly 7–9-palmatilobed to middle ..... 35. *S. septilobus*
40b. Leaf blade whitish or pale green adaxially, hardly divided, repand, or irregularly shallowly lobed ..... 34. *S. fanjingshanicus*
39b. Stem subglabrous or sparsely arachnoid; leaf blade usually not white tomentose abaxially, rarely so and later glabrescent.
41a. Leaf blade broadly flabellate or suborbicular, dentate or palmately lobed to 1/2, lobes apically 2- or 3-denticulate, glabrous on both surfaces ..... 17. *S. wuyiensis*
41b. Leaf blade reniform or suborbicular, regularly 5–7-palmatilobed, lobes ovate-triangular, glabrous on both surfaces or sometimes white tomentose abaxially and later glabrescent ..... 18. *S. saxatilis*

1. Sinosenecio eriopodus C. Jeffrey & Y. L. Chen, Kew Bull. 39: 226. 1984.

毛柄蒲儿根 mao bing pu er gen

Senecio eriopodus Cummins, Bull. Misc. Inform. Kew 1908: 18. 1908, not Klatt (1888).

Herbs, scapigerous. Rhizomes 5–6 mm in diam., densely lanate with long fulvous hairs or sericeous. Stems solitary, erect or somewhat flexuous, to 60 cm tall, lanate with fulvous hairs or sericeous, simple or branched above middle. Leaves few, radical, long petiolate; petiole 5–22 cm, villous with fulvous hairs or sericeous; blade ovate-cordate, 6–13 × 4–10 cm, thickly papery, abaxially densely lanate with fulvous hairs or sericeous, adaxially sparsely sericeous-villous and densely adpressed puberulent, palmately 7–9-veined, veins prominent abaxially, obscure adaxially, base cordate, margin repand-dentate with mucronulate teeth, apex acute or subobtuse, mucronulate. Capitula 8–13 arranged in terminal corymbs, ca. 2 cm in diam.; peduncles 2–4 cm, densely tomentose, ± glabrescent, with a basal linear bract; bracteoles 3 or 4, linear-subulate, membranous. Involucres cylindric, broadly campanulate when flattened, 6–8 × 5–7 mm, not calyculate; phyllaries 8, oblong-lanceolate, 1.5–

3.2 mm wide, glabrescent after anthesis, apex acute, subacute, or acuminate. Ray florets 6–10; corolla tube ca. 3 mm; lamina yellow, oblong, 8–15 × 2–2.5 mm, 4-veined, apically obtuse and 3-denticulate. Disk florets numerous; corolla yellow, 6–11 mm, with 3–4 mm tube and campanulate limb; lobes ovate-triangular, apically acute, papillose. Anthers ca. 2 mm, basally obtuse to rounded, appendages ovate-oblong. Style branches ca. 0.8 mm, apex truncate, papillose. Achenes cylindric, ca. 3 mm, smooth, glabrous, ribbed. Pappus white, ca. 6 mm. Fl. Apr–Jun, fr. May–Jul. $2n = 60$*.

• Woods, in bushes, on dry rocks near mountain summits; 300–1600 m. E Chongqing, W Hubei, NW Hunan, C Sichuan.

Sinosenecio eriopodus is similar to *S. villifer* but is easily distinguished by the ovate-cordate leaf blade, which is abaxially densely lanate with fulvous hairs or sericeous. Specimens from Shizhu, E Chongqing, previously referred to *S. villifer*, belong to this species. Specimens from Luding, W Sichuan, previously identified as this species, actually belong to *S. subrosulatus*.

2. Sinosenecio villifer (Franchet) B. Nordenstam, Opera Bot. 44: 51. 1978 [*"villiferus"*].

紫毛蒲儿根 zi mao pu er gen

Senecio villifer Franchet, J. Bot. (Morot) 8: 362. 1894 [*"villiferus"*]; *Ligularia villifera* (Franchet) Diels.

Herbs, scapigerous. Rhizomes stout, to 10 mm in diam., clad in persistent blackish brown petiole bases. Stems solitary, erect, scapiform, 25–40 cm tall, with or without few villous bracts, villous with long reddish brown hairs. Leaves few, radical, rosulate, long petiolate; petiole 9–11 cm, densely villous or pubescent with long reddish brown hairs; blade suborbicular, 3.5–8.5 × 3.5–11 cm, papery or subleathery, both surfaces villous or pubescent with reddish brown hairs, sometimes glabrescent by anthesis, base cordate, margin shallowly repand-dentate with deltoid mucronulate teeth. Capitula radiate, usually 5–8 in terminal subumbelliform corymbs; peduncles 1–2.5 cm, villous with long reddish brown hairs, with basal bract and 2–4 bracteoles; bracteoles linear-subulate, 5–10 mm, membranous, densely villous, 1-veined, apically acute. Involucres cylindric, obconic-ovoid when flattened, 6–8 × 7–10 mm, not calyculate; phyllaries 8–10, ovate-lanceolate, 7–8 × 1.5–2 mm, herbaceous, sparsely villous and shortly glandular hairy, margin scarious, apically acute or subacute, purple-reddish, ciliate. Ray florets 8–10, ca. 14 mm; corolla tube ca. 3.5 mm; lamina yellow, ovate-oblong, ca. 11 × 2–2.2 mm, 7-veined, apically 3-denticulate. Disk florets numerous; corolla yellow, ca. 7 mm, with 3–3.5 mm tube and campanulate limb; lobes oblong-ovate, apically acute. Anthers oblong, ca. 2.5 mm, basally obtuse, appendages ovate-oblong. Style branches recurved, ca. 1 mm. Achenes (immature) cylindric, 2–2.2 mm, smooth, glabrous. Pappus white, ca. 6 mm. Fl. Apr–Jun, fr. Jun–Jul. $2n = 60$*, 90*.

• Woods on slopes; 900–1700 m. Chongqing (Chengkou), Sichuan (Tongjiang, Wanyuan, Xuanhan).

Sinosenecio villifer is similar to *S. eriopodus* and *S. dryas*. From the former, it differs in the suborbicular leaf blade villous with reddish brown hairs or sometimes glabrescent, and from the latter it differs in the rhizomes stout, the capitula 5–8 in terminal subumbelliform corymbs, and the phyllaries 8–10.

3. Sinosenecio dryas (Dunn) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 231. 1984.

川鄂蒲儿根 chuan e pu er gen

Senecio dryas Dunn, J. Linn. Soc., Bot. 35: 504. 1903.

Herbs, scapigerous. Rhizomes 3–6 mm in diam., with distinct brown villous internodes and slightly swollen nodes, clad in persistent brown petiole bases. Stems solitary, erect, scapiform, 15–33 cm tall, simple, densely brown villous, usually with 3–5 bracts; bracts ovate-lanceolate or linear-lanceolate, 5–10 mm, membranous, densely brown villous, apex acute or acuminate. Leaves several, radical, rosulate, long petiolate; petiole 5–10 mm, densely villous, with brown or reddish brown hairs; blade abaxially green or purplish, adaxially green, orbicular, 3–6 × 3–6 cm, shortly palmately 5–7-lobed, papery, abaxially brown villous on veins or subglabrous, adaxially at first sparsely villous, glabrescent, base cordate, palmately 5-veined, veins prominent abaxially; lobes ovate-triangular, apically callose-mucronulate lobed; terminal lobe rather larger than lateral lobes and sometimes shortly 3-lobulate, apex obtuse. Capitula solitary, terminal, 2.5–3 cm in diam. Involucres campanulate, obconic-campanulate when flattened, (6–)8–10 × 6–8 mm, not calyculate; phyllaries 10–13, lanceolate or oblong-lanceolate, 8–10 × 2–2.5 mm, herbaceous, densely villous and shortly glandular hairy, margin scarious, apically acuminate and green or reddish purple. Ray florets 10–13, ca. 14 mm; corolla tube ca. 3.5 mm; lamina yellow, ovate-oblong, ca. 11 × 2–2.2 mm, 7-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 7 mm, with 3–3.5 mm tube and campanulate limb; lobes oblong-ovate, ca. 2 mm, apex acute, papillose. Anthers oblong, ca. 2.5 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 1 mm. Achenes (immature) cylindric, 3–3.5 mm, smooth, glabrous. Pappus white, 4–6 mm. Fl. May–Jun, fr. Jul–Aug. $2n = 60$*.

• Stony slopes, wooded cliffs; 2000–2100 m. E Chongqing (Wushan), W Hubei.

Sinosenecio dryas is similar to *S. villifer* but differs in having plants and leaves smaller, rhizomes slender, and capitula strictly solitary.

4. Sinosenecio subcoriaceus C. Jeffrey & Y. L. Chen, Kew Bull. 39: 232. 1984.

革叶蒲儿根 ge ye pu er gen

Herbs, scapigerous. Rhizomes ca. 5 mm in diam., clad in persistent brownish petiole bases, collar densely sericeous-villous. Stems 1–3, erect, scapiform, 10–40 cm tall, slender, simple, sericeous-villous at base, laxly so in lower part, subglabrous or glabrous in upper part. Leaves several, radical, rosulate, long petiolate; petiole 10–20 cm, sparsely villous or subglabrous; blade abaxially pale green or purplish, adaxially green, orbicular, 3–6.5 × 3–8 cm, subleathery, abaxially glabrous or sparsely villous on veins, adaxially glabrous, palmately veined, base deeply or sometimes shallowly cordate, margin irregularly repand-dentate with broadly deltoid, obtuse, apiculate teeth. Capitula 2.5–3 cm in diam., 1–3 in terminal corymbs; peduncles elongate, slender, with basal bract and 2 or 3 brac-

teoles in upper part; bracteoles linear, 8–15 mm, sparsely villous, apex acute. Involucres broadly campanulate, hemispheric when flattened, 8–10 × 6–10 mm, calyculate with 4 or 5 linear bracteoles; phyllaries 16 or 17, oblong-linear, 2–2.5 mm wide, herbaceous, tomentose at base or glabrous, margin narrowly scarious, apically purplish, ciliate, and acuminate. Ray florets 10–13; corolla tube 5–5.5 mm, glabrous; lamina yellow, ovate-oblong, 16–18 × ca. 2.2 mm, 7-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6.5 mm, with ca. 3.5 mm tube and funnelform campanulate limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 2.5 mm, base obtuse to rounded, appendages ovate-oblong. Style branches ca. 1 mm. Achenes cylindric, ca. 4.5 mm, smooth, glabrous. Pappus white or sometimes yellowish at base, ca. 6 mm. Fl. Apr–Jun, fr. May–Jul. $2n = 60$*.

• On rocks below waterfalls, by streams, woods, shaded places; 800–1800 m. Chongqing (Fengdu, Nanchuan).

Sinosenecio subcoriaceus can be easily distinguished by its relatively larger and fewer capitula. Populations from different habitats vary greatly in plant and leaf size. Individuals growing in woods are up to 40 cm tall, with larger (up to 8 cm wide) and abaxially green leaf blades, whereas those growing on rocks below waterfalls are no more than 15 cm tall, with smaller (ca. 3 cm wide), sometimes abaxially purplish leaf blades.

5. Sinosenecio cyclaminifolius (Franchet) B. Nordenstam, Opera Bot. 44: 50. 1978.

仙客来蒲儿根 xian ke lai pu er gen

Senecio cyclaminifolius Franchet, J. Bot. (Morot) 8: 362. 1894.

Herbs, scapigerous, stoloniferous. Rhizomes procumbent or ascending, slender, with fibrous roots. Stems solitary or few, erect, scapiform, equaling or exceeding leaves, 10–30 cm tall, tomentose, with white or fulvous hairs, ± glabrescent, simple, with a few brown broadly ovate bracts at or near base. Leaves radical, rosulate, long petiolate; petiole 4–22 cm, arachnoid-tomentose, later glabrescent; blade adaxially green, ovate-cordate or rarely suborbicular, 3.5–8 × 3.5–7.5 cm, abaxially densely white lanate, adaxially sparsely arachnoid-tomentose, glabrescent, palmately 5-veined, veins conspicuous abaxially, base narrowly cordate, margin shallowly repand-dentate with mucronulate teeth, apex obtuse, mucronulate. Capitula solitary, terminal, to 5 cm in diam.; scape with a few bracteoles; bracteoles purplish, ovate-lanceolate, membranous, margin entire or sparsely denticulate, apex acute or acuminate. Involucres obconic-campanulate, 12–15 × 10–14 mm, not calyculate; phyllaries ovate or ovate-oblong, purplish red and ciliate on upper margin and apex, densely lanate, or ± glabrescent, apex obtuse to subacute. Ray florets ca. 15; corolla tube ca. 3 mm; lamina yellow, ovate-oblong or oblong, 20–25 × ca. 5 mm, 5–8-veined, apically obtuse and 3-denticulate. Disk florets many; corolla yellow, with ca. 1.5 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 2 mm, apically acute. Anthers ca. 2.5 mm, basally obtuse; appendages ovate-lanceolate. Style branches 1–1.5 mm, truncate, papillose. Achenes (immature) cylindric, 2–2.5 mm, smooth, glabrous. Pappus scant, ca. 3 mm, soon deciduous. Fl. Apr–May, fr. May–Jun.

• Woods, streamsides, rocky places, grasslands; 1300–1900 m. Chongqing (Chengkou, Wuxi), Sichuan (Wanyuan).

Sinosenecio cyclaminifolius is readily distinguished by its stoloniferous habit and few short, quickly deciduous pappus bristles. The longer, more copious, persistent pappus bristles and the absence of stolons clearly separate *S. hederifolius* from it. In geographical range, *S. cyclaminifolius* is almost sympatric with *S. villifer*, but it differs markedly from the latter in having leaf blades ovate-cordate, abaxially densely white lanate, and capitula solitary, up to 5 cm in diam.

6. Sinosenecio hederifolius (Dümmer) B. Nordenstam, Opera Bot. 44: 50. 1978.

单头蒲儿根 dan tou pu er gen

Gerbera hederifolia Dümmer, Gard. Chron., ser. 3, 52: 482. 1912 [*"hederaefolia"*]; *Cremanthodium hederifolium* (Dümmer) C. C. Chang; *Senecio goodianus* Handel-Mazzetti.

Herbs, scapigerous. Rhizomes short, stout, 5–6 mm in diam., clad in persistent brown petiole bases. Stems solitary, erect, scapiform, 13–30 cm tall, densely fulvous tomentose, glabrescent to ± glabrous, simple. Leaves radical, long petiolate; petiole stout, 3–7 cm, densely fulvous tomentose; blade adaxially green, broadly ovate or ovate-cordate, 3–7 × 2.7–5.5 cm, thickly papery, abaxially densely fulvous tomentose, adaxially ± glabrous, palmately 5–7-veined, veins inconspicuous, margin entire, repand, or dentate with deltoid teeth, apex rounded. Capitula solitary, terminal, 4–5 cm in diam., scape with few linear-lanceolate bracteoles in upper part. Involucres cylindric, obconic-campanulate when flattened, 8–10 × 5–8 mm, not calyculate; phyllaries ca. 15, ovate-oblong or linear-oblong, 8–10 × 2.5–3 mm, densely white tomentose, glabrescent to ± glabrous, margin broadly scarious, apically acute, purplish and fimbriate-ciliate. Ray florets 10–13; corolla tube 3–3.5 mm; lamina yellow, oblong or oblanceolate-oblong, 5–9-veined, apically 3-denticulate, obtuse to rounded. Disk florets numerous; corolla yellow, ca. 7.5 mm, with ca. 3.5 mm tube and campanulate limb; lobes ovate-oblong, ca. 2 mm, apically acute. Anthers oblong, ca. 2.8 mm, basally obtuse to rounded, appendages ovate-lanceolate. Style branches ca. 0.8 mm, truncate, papillose. Achenes cylindric, 4–5 mm, smooth, glabrous, ribbed. Pappus white, ca. 7 mm. Fl. Apr–May, fr. May–Jun. $2n = 60$*.

• Woods on slopes, limestone cliffs; 500–2000 m. NE Chongqing, SE Gansu, W Hubei, SW Shaanxi, NE Sichuan.

Sinosenecio hederifolius is similar in leaf shape to *Gerbera* but completely different in floral structure.

7. Sinosenecio rotundifolius Y. L. Chen, Acta Phytotax. Sin. 26: 53. 1988.

圆叶蒲儿根 yuan ye pu er gen

Herbs, scapigerous. Rhizomes stout, clad in persistent petiole bases, densely sericeous-lanate, with few fibrous roots. Stems solitary, erect, purplish, scapiform, ca. 20 cm tall, simple, sparsely fulvous pubescent in upper part. Radical leaves rosulate, long petiolate; petiole 3–5 cm, slender, basally expanded, brown sericeous-lanate; blade abaxially pale green, adaxially

green or deep green, orbicular or rarely reniform-orbicular, 1.5–2 × 1.5–2 cm, abaxially sparsely fulvous arachnoid, glabrescent to glabrous, adaxially glabrous, palmately 5–7-veined, veins ± raised abaxially, base cordate, margin subentire or sometimes repand, teeth mucronulate, apex rounded. Capitula terminal, solitary, radiate, 1.5–2 cm in diam. Involucres campanulate, 6–7 × 7–8 mm, not calyculate, densely tomentose below capitulum; phyllaries 13–15, oblong-lanceolate, 1–1.5 mm wide, glabrous, margin narrowly scarious, apically acuminate, purplish, puberulent. Ray florets 11–13, rarely 15; tube 3–3.5 mm; lamina yellow, oblong, 2.5–3 mm wide, 4-veined, apically denticulate. Disk florets numerous; corolla yellow, 5–6 mm, with ca. 2 mm tube and campanulate limb; lobes ovate-lanceolate, apically acuminate, puberulent. Anthers oblong, 2.5–3 mm, basally obtuse. Style branches recurved, apically truncate, papillose. Achenes cylindric, ca. 3 mm, smooth, glabrous, ribbed. Pappus white, 5–6 mm. Fl. May–Jun, fr. Jun–Jul. $2n = 60$*.

• Woods, in bushes; 2400–3000 m. Gansu (Wenxian), Sichuan (Songpan).

Sinosenecio rotundifolius is somewhat similar to *S. dryas* in leaf shape and the solitary capitula, but it differs by its rhizomes with short internodes and stem without bracts. In *S. dryas*, the rhizomes have very long internodes, and the stem bears 3–5 lanceolate bracts. The two species also differ in habitat preference and geographical range.

8. Sinosenecio ligularioides (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 50. 1978.

橐吾状蒲儿根 tuo wu zhuang pu er gen

Senecio ligularioides Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 640. 1937.

Herbs, scapigerous. Rhizomes robust, densely lanate at collar with fulvous silky hairs. Stems solitary, exceeding leaves, ca. 50 cm tall, ca. 4 mm in diam. at base, fulvous villous, simple, sometimes with 1 bractlike leaf in upper part. Leaves radical, rather few, rosulate, long petiolate; petiole stout, to 35 cm, sparsely reddish villous; blade adaxially pale green, reniform, 7–20 × 5–22 cm, thickly papery, abaxially sparsely pubescent-villous, adaxially glabrous, palmately 5–7-veined, with numerous ascending furcate secondary veins, prominently reticulate abaxially, base cordate, margin irregularly coarsely dentate with large deltoid callose-mucronulate teeth. Capitula ca. 1.5 cm in diam., rather numerous (5–26) in flat-topped terminal corymbs; peduncles 1–4.5 cm, slender, pubescent-villous, bracteate at base and few bracteate below capitula; bracts and bracteoles linear or linear-lanceolate, 5–12 mm. Involucres cylindric, campanulate when flattened, ca. 8 × 5–6 mm, not calyculate; phyllaries 8, oblong, 1.5–2 mm wide, herbaceous, glabrous or subglabrous, conspicuously 3-veined, margin broadly scarious, apically obtuse to subacute, purplish red, and puberulent. Ray florets ca. 8; corolla tube ca. 4 mm, glabrous; lamina yellow, oblong, ca. 8 × 2–2.2 mm, 4-veined, apically 3-denticulate. Disk florets numerous; corolla yellow, 6–6.5 mm, with ca. 3 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1.5 mm, apex acute. Anthers linear-oblong, ca. 2 mm, base obtuse to rounded. Style branches recurved, truncate, papillose. Achenes cylindric, ca. 2.5 mm, smooth, glabrous, ribbed. Pappus white, ca. 6 mm. Fl. Jun–Jul, fr. Jul–Aug. $2n = 60$*.

• Grassy or rocky slopes; 1600–2300 m. Sichuan (Baoxing, Emei, Hongya).

Recognizable by the large, reniform leaves, *Sinosenecio ligularioides* is very similar to *Ligularia*, but the petioles are not sheathing at the base.

9. Sinosenecio subrosulatus (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 51. 1978.

莲座蒲儿根 lian zuo pu er gen

Senecio subrosulatus Handel-Mazzetti, Acta Horti Gothob. 12: 293. 1938.

Herbs, subscapigerous. Rhizomes procumbent, slender, ca. 3 mm in diam., clad in scalelike persistent petiole bases. Stems solitary, erect, or ascending in lower part, scapiform, 20–35 cm tall, at first arachnoid-tomentose, glabrescent to subglabrous, simple. Leaves radical or subradical, rosulate, long petiolate; petiole 6–8 cm, slender, densely arachnoid-tomentose, glabrescent to glabrous, basally expanded; blade adaxially green or dark green, reniform, 4–9 × 5–8 cm, membranous, abaxially at first grayish or fulvous arachnoid, ± glabrescent, adaxially glabrescent, base cordate, margin subentire, repand or sometimes dentate with deltoid mucronulate teeth. Capitula 1.5–2 cm in diam., 2–5 in lax terminal corymbs; peduncles 1–6 cm, slender, sparsely arachnoid and puberulent, bracteate at base and 2- or 3-bracteolate in upper part; bracts and bracteoles linear-subulate or linear. Involucres cylindric, obconic or campanulate when flattened, 5–8 × 3–5 mm, not calyculate. Phyllaries ca. 10, lanceolate or oblong-lanceolate, 5–7 × 1–1.5 mm, herbaceous, glabrous or sparsely pubescent at base, margin narrowly scarious, apically acute, dark purple and ciliate. Ray florets 8–10; corolla tube 4.4–5 mm; lamina yellow, linear-oblong, 10–11 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets numerous; corolla yellow, 8–9 mm, with 4–4.5 mm tube and campanulate limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers linear-oblong, ca. 3 mm, base obtuse to rounded, appendages ovate-lanceolate. Style branches ca. 1.5 mm. Achenes cylindric, ca. 2.8 mm, smooth, glabrous. Pappus white, 8–9 mm. Fl. Jun–Jul, fr. Jul–Aug. $2n = 60$*.

• Woods, grassy slopes; 2700–4100 m. S Gansu, Sichuan.

10. Sinosenecio homogyniphyllus (Cummins) B. Nordenstam, Opera Bot. 44: 50. 1978.

肾叶蒲儿根 shen ye pu er gen

Senecio homogyniphyllus Cummins, Bull. Misc. Inform. Kew 1908: 17. 1908; *Sinosenecio lobatus* S. W. Liu & T. N. Ho.

Herbs, scapigerous. Rhizomes ca. 2 mm in diam., densely villous with long fulvous hairs and clad in persistent brownish petiole bases. Stems solitary, erect, scapiform, 10–30 cm tall, simple, sparsely villous, with long fulvous hairs, especially at base and near apex, usually with 1–4 linear-spatulate bracts in upper part. Leaves few to several, radical, rosulate, long peti-

olate; petiole 2.5–9 cm, densely villous, with long fulvous hairs or sometimes subglabrous; blade abaxially green or purple, adaxially green, ovate, broadly ovate-orbicular, or reniform, 2–4(–5) × 2.2–5.5 cm, membranous, sparsely villous on both surfaces, palmately 5–7-veined, base cordate, margin repand-dentate or subentire, with obscure mucronulate teeth, apex rounded. Capitula ca. 2 cm in diam., solitary or 2(–7) arranged in lax terminal subumbelliform corymbs; peduncles 2–3.5 cm, slender, with a basal linear bract and a few linear-spatulate bracteoles in upper part. Involucres obconic, 4–5 × 3–6 mm, not calyculate; phyllaries 7–10, rarely 13, oblong or oblong-lanceolate, 1–1.5 mm wide, herbaceous, dark green, or purplish in upper part, apex obtuse to acuminate and fimbriate-ciliate. Receptacle rather convex, hairy. Ray florets 8–17, ca. 12.5 mm; corolla tube ca. 3 mm, glabrous; lamina oblong, 9–9.5 × 3–3.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4.5 mm, with ca. 1.2 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute. Anthers linear-oblong, ca. 2 mm, basally obtuse to rounded, appendages ovate-lanceolate. Style branches recurved, ca. 0.8 mm. Achenes obovoid-cylindric, 2–2.5 mm, smooth, glabrous. Pappus absent, rarely of several hairs, soon deciduous. Fl. Apr–Jul, fr. Jun–Aug. $2n = 60$*.

• Woods, streamsides, shaded places, on rocks; 1200–2900 m. SW and W Sichuan.

11. Sinosenecio chienii (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 49. 1978.

雨农蒲儿根 yu nong pu er gen

Senecio chienii Handel-Mazzetti, Oesterr. Bot. Z. 88: 311. 1939; *S. homogyniphyllus* Cummins var. *subumbellatus* C. C. Chang.

Herbs, scapigerous. Rhizomes ca. 4 mm in diam., villous with long fulvous hairs and clad at nodes with persistent brownish petiole bases. Stems solitary or paired, erect, scapiform, 20–30 cm tall, simple, fulvous villous or ± glabrescent. Leaves few to several, radical, rosulate, long petiolate; petiole 10–15 cm, rather stout, fulvous villous, ± glabrescent; blade abaxially pale green or purplish, adaxially green or dark green, ovate or broadly ovate, 4–9 × 4.5–9.5 cm, submembranous, abaxially sparsely villous and glabrescent, adaxially sparsely fulvous pilose, basally palmately 5–7-veined, veins prominent, base cordate, margin repand or sinuate-dentate with broadly deltoid callose-apiculate teeth, apex acuminate or shortly caudate, apiculate. Capitula ca. 2.5 cm in diam , 2–9 in terminal subumbelliform corymbs; peduncles 2.5–7 cm, slender, with a basal bract and 1–5 linear bracteoles. Involucres obconic-campanulate, 6–7 × 3.5–5 mm, not calyculate; phyllaries 8–10, lanceolate, 4–5 × 1.5–2 mm, herbaceous, sparsely villous or subglabrous, obscurely 3-veined, apically fulvous ciliate and purplish, acute to obtuse. Receptacle slightly convex, alveolate-ciliate. Ray florets ca. 10, ca. 12 mm; corolla tube 1.5–2 mm; lamina oblong, 8–10 × 2.5–3.5 mm, 4-veined, apically 3-denticulate and obtuse. Disk florets many; corolla yellow, ca. 4 mm, with ca. 1.5 mm tube and broadly campanulate limb; lobes lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, ca. 1.5 mm, appendages ovate-oblong, basally obtuse to rounded. Style branches recurved, ca. 0.7 mm. Achenes obovoid-cylindric, ca. 2.7 mm, smooth, glabrous. Pappus absent or rarely of several ca. 1.5 mm hairs, soon deciduous. Fl. Apr–Jul, fr. May–Aug. $2n = 60$*.

• Woods, streamsides, grasslands, damp places; 800–2800 m. W Sichuan.

The record of the occurrence of *Sinosenecio chienii* in Lijiang, NW Yunnan, is a mistake resulting from the incorrect note of the collecting locality of a specimen.

Sinosenecio chienii is closely related to *S. homogyniphyllus*, and they are largely sympatric in geographical range. It differs from *S. homogyniphyllus* mainly by its larger, ovate or broadly ovate leaves, acuminate or shortly caudate at the apex and with repand or sinuate-dentate margin. Although both species are readily distinguishable from each other as to populations from Emei, Hongya, and Tianquan, their delimitation becomes rather obscure in other sites, e.g., Baoxing, Leibo, Mabian, and Shifang. Further studies are needed to clarify their relationships.

12. Sinosenecio yilingii Y. Liu & Q. E. Yang, Bot. Stud. 51: 270. 2010.

艺林蒲儿根 yi lin pu er gen

Herbs, subscapigerous. Rhizome 2–3 mm in diam. Stems solitary or sometimes several, erect, 10–40 cm tall, simple, densely sericeous at base, sparsely sericeous or glabrescent in upper part. Leaves several, both radical and stem leaves present. Radical leaves usually 1–3, long petiolate; petiole 4–9 cm, densely sericeous at base, sparsely so or glabrescent in upper part; blade abaxially pale green, adaxially green to dark green, shiny, reniform or broadly ovate, 1.7–5.5 × 2–6.5 cm, thinly leathery to membranous, glabrous or very sparsely pubescent on both surfaces, palmately veined, base cordate or deeply so, margin repand or dentate with mucronulate teeth, apex obtuse or sometimes acute. Stem leaves 2–5, smaller, with shorter petioles. Capitula solitary, terminal, 2.5–3 cm in diam.; peduncle sparsely sericeous or glabrescent in lower part, densely sericeous in upper part. Involucre obconic, 7–10 × 5–7 mm, not calyculate; phyllaries 11–13, green, oblong or oblong-lanceolate, 1.5–2.5 mm wide, herbaceous, subglabrous, apex acute or acuminate, fimbriate-ciliate. Ray florets ca. 13; corolla tube ca. 2.5 mm, glabrous; lamina yellow, oblong-elliptic, ca. 10 × 3 mm, 6- or 7-veined, apically 3-dentate. Disk florets many; corolla yellow, ca. 4 mm, with ca. 3 mm tube and campanulate limb; lobes ovate-lanceolate. Anthers ca. 2 mm, base obtuse, appendages ovate-oblong. Style branches ca. 1 mm. Achenes obovoid-cylindric, ca. 1.5 mm, smooth, glabrous. Pappus absent. Fl. May–Jun, fr. Jun–Jul. $2n = 60$*.

• Deciduous broad-leaved forests; 2100–2200 m. Sichuan (Baoxing).

Sinosenecio yilingii resembles *S. homogyniphyllus* but is readily distinguishable by the presence of 2–5 stem leaves, the adaxially shiny leaf blades, and the strictly solitary capitula. They are also somewhat different in phenology when they grow together. At the type locality of *S. yilingii*, both species occur in the same ravine. However, individuals of *S. yilingii* usually grow in shaded places along forest margins or on streamside rocks and flower in May and June, while those of *S. homogyniphyllus* prefer more open, sunny places and flower in June and July.

13. Sinosenecio sichuanicus Y. Liu & Q. E. Yang, Bot. Stud. 52: 219. 2011.

四川蒲儿根 si chuan pu er gen

Herbs, subscapigerous, with radical and 2 or 3 stem leaves; stolons absent. Rhizomes 6–7 mm in diam. Stems solitary or several, erect, 20–30 cm tall, simple, densely fulvous sericeous at base, sparsely so in upper part. Leaves several, both radical and stem leaves present. Radical leaves 1 or 2, long petiolate; petiole 6–14 cm, pubescent, densely sericeous at base; blade abaxially pale green, adaxially green, cordate or broadly cordate to reniform in outline, 5–9 × 5–10 cm, submembranous, both surfaces pubescent, palmately veined, base deeply cordate to cordate, margin repand or sinuate-dentate with mucronulate teeth, apex acuminate or acute, apiculate. Stem leaves 2 or 3, smaller, with shorter petioles. Capitula solitary or several, 3.5–4 cm in diam.; peduncles 4–8 cm, sparsely fulvous sericeous in lower part, fulvous sericeous in upper part. Involucres obconic-campanulate, 5–8 × 8–12 mm, ecalyculate. Phyllaries 13, green, oblong or oblong-lanceolate, ca. 8 × 2–3 mm, herbaceous, fulvous sericeous, apex acuminate or acute and fimbriate-ciliate. Ray florets 12 or 13; corolla tube ca. 2 mm, glabrous; lamina yellow, oblong-elliptic, 18–20 × 4–5 mm, 4–7(–9)-veined, apically 3-denticulate. Disk florets many; corolla ca. 4 mm; tube ca. 3 mm; limb campanulate; lobes ovate-lanceolate. Anthers ca. 2 mm, base obtuse, appendages ovate-oblong. Style branches ca. 1 mm, apex truncate. Achenes obovoid-cylindric, ca. 1.5 mm, smooth, glabrous. Pappus absent or rarely of several 1.5–2 mm hairs, soon deciduous. Fl. May, fr. Jun. $2n = 60$*.

• Grasslands, in mosses on streamside rocks in deciduous broad-leaved forests; 1300–2400 m. Sichuan (Emei, Hongya).

Sinosenecio sichuanicus resembles *S. chienii* in leaf shape and the epappose achenes but differs in having stem leaves 2 or 3, leaf blade pubescent on both surfaces, and lamina larger. Although both species are overlapping in geographical distribution and occupy basically the same elevational range, they have not as yet been found to co-occur in the same community.

The four species *Sinosenecio chienii*, *S. homogyniphyllus*, *S. sichuanicus*, and *S. yilingii* all have obconic-campanulate involucres, ± hairy receptacles, and glabrous and epappose achenes, and are essentially sympatric in geographical distribution. They constitute a very natural group of species.

14. Sinosenecio latouchei (Jeffrey) B. Nordenstam, Opera Bot. 44: 50. 1978.

白背蒲儿根 bai bei pu er gen

Senecio latouchei Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 128. 1916.

Herbs, subscapigerous. Rhizomes 6–10 mm in diam., collar densely lanate-tomentose with long fulvous hairs and clad in persistent petiole bases. Stems solitary, slender, erect or somewhat flexuous, subscapiform, 15–35 cm tall, simple or branching into synflorescence, villous or floccose-tomentose, with brown or white hairs, glabrescent. Radical leaves few, rosulate, long petiolate; petiole 4–16 cm, villous, base slightly expanded; blade adaxially green, suborbicular, 2.5–5 × 3–6 cm, papery, abaxially densely villous, ± white tomentose, rarely glabrescent, adaxially villous with spreading hairs, palmately 5–7-veined, veins rather prominent, base cordate, margin palmately coarsely dentate or sublobed, with ovate-deltoid, conspicuous mucronulate teeth or lobes. Stem leaves 1–3; petiole 1.5–4 cm, basally auriculate; blades similar to basal ones, 1.5–3.3 × 1.5–3 cm. Uppermost stem leaves small, bractlike, 3–5-lobed, or sometimes entire, apically acute. Capitula usually 1–4, arranged in terminal corymbs, 2–2.5 cm in diam.; peduncles 2.5–6 cm, slender, sparsely tomentose or villous, glabrescent, bracteate at base, usually with 1 bracteole in upper part; bracts and bracteoles linear-subulate, 5–10 mm, acute or bracts sometimes lobed. Involucres campanulate, ca. 7 × 7 mm, not calyculate; phyllaries ca. 13, oblong-lanceolate, 6–7 × 1.5–2 mm, herbaceous, sparsely arachnoid to glabrous, inconspicuously 3–5-veined, margin broadly scarious, apically acute to obtuse, purplish red and ciliate. Ray florets 11–13; corolla tube 3.5–4 mm, glabrous; lamina yellow, oblong, 7–10 × 2.5–3 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, 4–5 mm, with 2–2.5 mm tube and campanulate limb; lobes lanceolate, 1–1.2 mm, apically acute. Anthers ca. 1.3 mm, basally obtuse, appendages ovate-triangular. Style branches ca. 0.8 mm. Achenes ca. 2 mm, puberulent, papillate. Pappus white, ca. 4 mm. Fl. Mar–May, fr. May–Jun. $2n = 48$*.

• Wet places, canal sides, damp valleys, wet rocky cliffs, woods; 200–400 m. Fujian (Nanping, Shaowu, Wuyi), Jiangxi (Lichuan, Nanfeng, Ningdu).

Sinosenecio latouchei is closely related to *S. jiuhuashanicus* but differs in the stem slender, erect or flexuous; stem leaves 1–3; leaf blade adaxially villous with spreading hairs; and leaf auricles smaller in size.

15. Sinosenecio jiuhuashanicus C. Jeffrey & Y. L. Chen, Kew Bull. 39: 257. 1984.

九华蒲儿根 jiu hua pu er gen

Herbs, subscapigerous or with leafy stems. Rhizomes 5–8 mm in diam., collar white tomentose and clad in remains of persistent petiole bases. Stems solitary or several, erect, 13–40 cm tall, simple, villous with multicellular hairs and white with ± deciduous floccose tomentum. Radical leaves few, rosulate, long petiolate; petiole 3.5–6 cm, densely brown villous and ± arachnoid-tomentose, basally expanded; blade orbicular, 2–5 × 2–6 cm, abaxially white floccose-tomentose, adaxially adpressed pubescent and at first sparsely to densely white tomentose, palmately 5–7-veined, base cordate, margin repand-dentate, with broad mucronulate teeth. Stem leaves 3–7, rarely 2; blade similar to basal ones; petiole winged in lower part, expanded into rounded subamplexicaul auricle; auricles larger or smaller upward; uppermost leaves sometimes sessile, blade confluent with auricle. Capitula usually 3–9 arranged in terminal corymbs, ca. 2 cm in diam.; peduncles 1–8 cm, densely white tomentose, not bracteate. Involucres campanulate, ca. 7 × 8 mm, not calyculate; phyllaries ca. 13, oblong-lanceolate, ca. 7 × 1.5–2 mm, white arachnoid-tomentose, ± glabrescent, margin broadly scarious, apically acute or acuminate, reddish purple and ciliate. Ray florets ca. 15; corolla tube 1.5–2 mm; lamina yellow, oblong, 7.5–8 × 1.5–1.7 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 6 mm, with 1–1.5 mm tube and campanulate limb; lobes ovate-oblong,

ca. 1 mm, apically acute. Anthers ca. 1.2 mm, basally obtuse to rounded, appendages lanceolate. Style branches ca. 0.8 mm. Achenes cylindric, ca. 2 mm, sparsely puberulent, papillate. Pappus white, ca. 2 mm. Fl. Mar–May, fr. May–Jun. $2n = 48$*.

• Canal sides, shaded wet places, woods, on rocks near mountain summits; 200–1700 m. Anhui, E Hunan, Jiangxi.

Sinosenecio jiuhuashanicus is closely related to *S. latouchei* but differs in the stem somewhat stouter, erect; stem leaves 3–7; leaf blade adaxially pubescent with appressed hairs, or sparsely or densely white tomentose; and leaf auricles larger in size.

16. Sinosenecio guangxiensis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 254. 1984.

广西蒲儿根 guang xi pu er gen

Herbs, scapigerous or subscapigerous. Rhizomes 5–10 mm in diam., collar densely fulvous tomentose and clad in persistent petiole bases. Stems solitary, erect, subscapiform, 10–35 cm tall, slender, simple, brown villous in lower part, sparsely so to subglabrous in upper part. Radical leaves few, rosulate, long petiolate; petiole 2–6 cm, rather stout, densely fulvous villous, basally somewhat expanded; blade adaxially green or deep green, suborbicular or reniform, 2–7 × 2.5–9 cm, thickly papery or subleathery, abaxially densely white tomentose or sometimes sparsely villous and glabrescent, and then often deep purplish red, adaxially sparsely to sometimes densely fulvous hispid, palmately 5–7-veined, base cordate, margin coarsely repand or dentate with ovate-deltoid or shallowly ovate-deltoid mucronulate teeth. Stem leaves usually 1–5, similar to radical ones but smaller upward on stem and with shorter petioles slightly expanded but not auriculate at base. Uppermost leaves bractiform, few, linear or linear-lanceolate, 1–1.5 cm, apically acute. Capitula (1 or)2–7 or more arranged in terminal corymbs, 1.5–1.8 cm in diam.; peduncles 1–5.5 cm, slender, sparsely puberulent or subglabrous, usually bracteate at base and 1–3-bracteolate in upper part; bracts and bracteoles linear, 3–6 mm, apically callose-mucronulate. Involucres campanulate, hemispheric when flattened, 5–8 × ca. 7 mm, calyculate; calyculus of 8–10 bracteoles; bracteoles linear, 3–5 mm, apically callose-mucronulate. Phyllaries ca. 13, oblong-lanceolate, 6–7 × 1.5–2.5 mm, herbaceous, glabrous or subglabrous, apically ± acute, reddish purple and ciliate. Ray florets ca. 13, uniseriate; corolla tube ca. 2.5 mm, glabrous; lamina yellow, oblong or broadly oblong, ca. 7 × 2–3 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets: corolla yellow, 3.5–4 mm, with ca. 2 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1 mm, apically acute. Anthers ca. 1.3 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 0.7 mm. Achenes cylindric, 1.5–2 mm, ribs pubescent, papillate. Pappus white, 3.5–4 mm. Fl. May–Oct, fr. Jun–Nov. $2n = 48$*.

• Forests, streamsides, wet rocky places on mountain summits; 800–2300 m. Guangxi, SW Hunan (Chengbu, Dong'an, Jiangyong).

Sinosenecio guangxiensis shows great variation within and between populations with respect to plant size and leaf size, shape, and indumentum. It is similar to *S. latouchei* and *S. jiuhuashanicus* in posture, leaf shape, and achene morphology but readily recognizable by the petioles of stem leaves basally expanded but not auriculate and the calyculus of 8–10 bracteoles.

17. Sinosenecio wuyiensis Y. L. Chen, Acta Phytotax. Sin. 26: 51. 1988.

武夷蒲儿根 wu yi pu er gen

Herbs, rhizomatous, with leafy stems or subscapigerous. Rhizomes slender, clad in persistent petiole bases. Stems erect or oblique, (6–)10–23 cm tall, slender, simple or rarely branched, sparsely arachnoid in lower part, glabrous above. Radical leaves rosulate, long petiolate; petiole 3–5 cm, basally slightly expanded; blade abaxially purplish red or green, adaxially green, broadly flabelliform or suborbicular, 1.5–2.5 × 1.5–3 cm, papery or subleathery, both surfaces glabrous, palmately 5–7-veined, coarsely dentate or palmately lobed to 1/2, base cordate or truncate; lobes broadly oblong, 5–6 × 6–7 mm, apically 2- or 3-denticulate. Stem leaves 2–4(or 5), similar to radical ones; blade 1.5–2.5 cm, shortly petiolate; petiole slightly expanded and subamplexicaul at base; uppermost leaves sessile, bractlike, oblanceolate to linear, margin 3–5-lobulate or sometimes entire. Capitula usually 1–3, rarely more, arranged in terminal subcorymbs, ca. 2 cm in diam.; peduncles 2–3.5 cm, slender; bracteoles linear, 5–15 mm, margin entire or sometimes 2- or 3-denticulate. Involucres campanulate, hemispheric when flattened, 5–6 × 8–10 mm; phyllaries ca. 13, oblong-lanceolate, 1–1.5 mm wide, herbaceous, sparsely pubescent or subglabrous, inconspicuously 3-veined, margin scarious, apically acute, purplish and ciliate. Ray florets 13 or 14; corolla tube ca. 2 mm; lamina yellow, oblong, 10–11 × 2–3 mm, apically 3-denticulate. Disk florets numerous, 3.5–4 mm, with ca. 1.5 mm tube and campanulate limb; lobes ovate-lanceolate. Anthers oblong, basally obtuse, ca. 1.3 mm. Style branches recurved. Achenes cylindric, ca. 2 mm, glabrous, papillate. Pappus white, 2–3 mm. Fl. Apr–Sep. $2n = 48$*.

• Montane meadows, rocky cliffs; 1200–2200 m. Fujian (Chong'an), Jiangxi.

In the protologue of *Sinosenecio wuyiensis*, the achenes were incorrectly described as sparsely puberulent.

18. Sinosenecio saxatilis Y. L. Chen, Acta Phytotax. Sin. 33: 76. 1995.

岩生蒲儿根 yan sheng pu er gen

Herbs, scapigerous or subscapigerous. Rhizomes short, slender, clad in persistent black-brown petiole bases. Stems solitary, erect, 3–12 cm, simple, glabrous or subglabrous. Radical leaves several, rosulate, long petiolate; petiole slender, densely yellow lanate, basally slightly expanded, pilose at upper part; blade abaxially purplish, adaxially green, reniform or suborbicular, 0.5–1 × 1–1.5 cm, subleathery, both surfaces glabrous or sometimes white tomentose abaxially and later glabrescent, inconspicuously palmately 5-veined, base cordate or rarely subtruncate, margin reflexed when dry, palmately regularly 5(–7)-lobed; lobes ovate-triangular, apex acute, mucronulate. Stem leaves 1–3, lower leaves similar to radical leaves but smaller, shortly petiolate, 3–5-lobed; uppermost ones sessile, oblanceolate or spatulate, or sometimes bract-shaped, linear, 2–3 mm. Capitula solitary, sometimes 2, 10–15 mm in diam. Involucres broadly campanulate, ca. 5 × 7–8 mm, not calyculate; phyllaries 11–13, oblong-lanceolate, ca. 1 mm wide, herbaceous, ob-

scurely 3-veined, glabrous, margin narrowly scarious, apically acute or rather acute. Ray florets 11–13; corolla tube ca. 2 mm; lamina yellow, oblong, 5–6 × ca. 1.5 mm, 5-veined, apically 3-denticulate. Disk florets many; corolla yellow, 3–3.5 mm, with ca. 1 mm tube and campanulate limb; lobes ovate-lanceolate, apically acute. Anthers oblong, basally obtuse. Style branches recurved. Achenes cylindric, ca. 1 mm, glabrous, papillate. Pappus white, ca. 2 mm. Fl. May–Jun, fr. Jun–Jul. $2n = 48$*.

• Mountain summits, on rocks, among grasses; 1200–1700 m. Guangdong (Ruyuan), Hunan (Lanshan, Yizhang).

Sinosenecio saxatilis resembles *S. wuyiensis* in posture, plant size, achene morphology, and habitat preference, but it differs in its leaf blade reniform or suborbicular, regularly 5–7-palmatilobed, lobes ovate-triangular, sometimes abaxially white tomentose and later glabrescent. These two species, together with *S. guangxiensis*, *S. jiuhuashanicus*, and *S. latouchei*, all have śmaller chromosomes and papillate achenes and most likely constitute a very natural group of species.

19. Sinosenecio hunanensis (Y. Ling) B. Nordenstam, Opera Bot. 44: 50. 1978.

湖南蒲儿根 hu nan pu er gen

Senecio hunanensis Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 15. Jan 1937, not Handel-Mazzetti (Nov 1937).

Herbs, with leafy stems. Rhizomes 5–6 mm in diam., clad in remains of petiole bases, tomentose at collar. Stems solitary, erect, ca. 40 cm, simple, sparsely arachnoid, glabrescent to glabrous. Radical leaves few, rosulate, long petiolate; petiole 12–15 cm, sparsely arachnoid, basally expanded; blade reniform, ca. 4 × 5 cm, membranous, both surfaces thinly arachnoid but soon ± glabrous, palmately 5-veined, base cordate, margin palmately shallowly duplicate-lobed or duplicate-dentate into ca. 9 deltoid, apically callose-mucronulate, laterally dentate short lobes or coarse teeth. Stem leaves 3, smaller, with narrow lobes and teeth, shortly petiolate; petiole winged at base, wings shortly decurrent. Capitula 5 or 6 arranged in terminal subumbelliform corymb; peduncles ca. 2 cm, densely fulvous puberulent, with filiform bract. Involucres cupuliform, 6–8 mm in diam., not calyculate; phyllaries ca. 13, elliptic-oblong, 7–8 × ca. 2.5 mm, herbaceous, margin scarious, glabrous, apex acute and ciliate. Ray florets ca. 10; corolla tube ca. 3.5 mm, glabrous; lamina yellow, oblong-linear, ca. 13 × 2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with slender tube and funnelform limb; lobes lanceolate, apically acute. Anthers oblong, basally obtuse; appendages lanceolate. Style branches recurved. Achenes cylindric, ca. 1.5 mm, puberulent. Pappus white, ca. 4.5 mm. Fl. Mar.

• Forest margins on slopes. Hunan (Yizhang).

Sinosenecio hunanensis is currently known only from a single locality. The type specimen consists of one plant with the synflorescence missing. The species is similar to *S. euosmus* in leaf shape and texture but differs by the petioles of stem leaves winged at base, the wings shortly decurrent, and the achenes puberulent. Geographically, they are also disjunct. From *S. sungpanensis* it differs in the puberulent achenes and ± glabrous leaves. On the basis of geographical distribution and the puberulent achenes, this species seems more closely related to *S. latouchei* and *S. jiuhuashanicus*, but it is easily distinguished by the leaves not white tomentose and the petiole not auriculate at the base.

20. Sinosenecio euosmus (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 50. 1978.

耳柄蒲儿根 er bing pu er gen

Senecio euosmus Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 148. 1925; *S. acerifolius* C. Winkler (1893), not K. Koch (1861), nor Hemsley (1881); *S. cortusifolius* Handel-Mazzetti; *S. doryotus* Handel-Mazzetti; *S. winklerianus* Handel-Mazzetti; *Sinosenecio cortusifolius* (Handel-Mazzetti) B. Nordenstam; *S. doryotus* (Handel-Mazzetti) B. Nordenstam; *S. winklerianus* (Handel-Mazzetti) B. Nordenstam.

Herbs, stoloniferous, with leafy stems. Rhizomes ascending or procumbent, slender. Stems solitary, erect, 20–75 cm or taller, ca. 6 mm in diam. at base, simple, ± villous or arachnoid-tomentose, especially in lower part, sometimes glabrescent in upper part. Radical leaves withered by anthesis; median stem leaves long petiolate; blade adaxially green, ovate, broadly ovate, or reniform, 2–5 × 3–8 cm, abaxially arachnoid-tomentose or villous on veins or rarely subglabrous, adaxially villous, sparsely arachnoid, shortly pubescent, or subglabrous, base shallowly cordate to subtruncate, margin shallowly to sometimes rather deeply palmately divided into 5–13 lobes or large teeth; lobes subdeltoid, shallowly crenate or shallowly to deeply mucronulate-dentate, apex rounded to acute. Upper leaves smaller. Uppermost leaves linear, bractlike. Petiole 1–2 × as long as blade, ± villous arachnoid or subglabrous, those of lower leaves not auriculate, slightly expanded at base, those of median and upper leaves usually gradually expanded into ovate or orbicular, entire or dentate subamplexicaul auricles, rarely all leaves inconspicuously auriculate. Capitula 5–15 or more arranged in terminal subumbelliform corymbs or compound corymbs; peduncles 0.5–5.5 cm, slender, sparsely to densely ascending villous, sometimes with a linear basal bract, without or sometimes with a subulate bracteole. Involucres subcampanulate, 4–6 × 2.5–6.5 mm, not calyculate; phyllaries ca. 13, lanceolate or linear-lanceolate, ca. 1 mm wide, herbaceous, glabrous or subglabrous, margin membranous, apically acute, purplish and ciliate. Ray florets 10–13; corolla tube ca. 2 mm, glabrous; lamina yellow, oblong or linear-oblong, 3.5–4 × ca. 1.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4 mm, with ca. 2 mm tube and campanulate limb; lobes oblong, apically acute. Anthers ca. 1.5 mm, basally obtuse to rounded, appendages lanceolate. Style branches ca. 1 mm. Achenes cylindric, ca. 1.8 mm, smooth, glabrous. Pappus white, 5.5–6 mm. Fl. Jun–Aug, fr. Jul–Sep. $2n = 48$*.

Woods, grasslands, streamsides; 1800–4000 m. Gansu, Hubei, Shaanxi, Sichuan, Yunnan [Myanmar].

Sinosenecio euosmus is a rather widespread species, which shows great variation in the size and shape of leaf auricles, the indumentum along the stem, and the degree of division of leaves. Its close putative relatives include *S. fangianus*, *S. sungpanensis*, and perhaps also *S. oldhamianus*.

21. Sinosenecio sungpanensis (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 51. 1978.

松潘蒲儿根 song pan pu er gen

Senecio sungpanensis Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 62: 149. 1925.

Herbs, stoloniferous, with leafy stems. Rhizomes 6–8 mm in diam., clad in persistent brown petiole bases. Stems solitary, erect, 40–50 cm tall, 5–6 mm in diam. at base, simple, purplish below, at first sparsely white arachnoid-tomentose, glabrescent. Radical leaves withered by anthesis; lower stem leaves long petiolate; petiole 6–7 cm, somewhat white arachnoid, basally expanded; blade adaxially green, reniform, 3–3.5 × 4–4.5 cm, abaxially densely white tomentose, adaxially sparsely shortly pubescent to subglabrous, palmately divided into 5–7 lobes, or undivided, only denticulate; lobes broadly deltoid or ovate-deltoid, usually coarsely few denticulate and apiculate. Upper stem leaves similar, but shortly petiolate, smaller. Uppermost leaves lanceolate, margin denticulate or entire. Capitula 2–2.5 cm in diam., usually 4 or 5 arranged in terminal subumbelliform corymbs; peduncles 2–5 cm, sparsely arachnoid, basally bracteate and sometimes with a median subulate bracteole. Involucres broadly campanulate, ca. 10 × 7–12 mm, not calyculate; phyllaries 15–17, oblong-elliptic, 2–2.5 mm wide, herbaceous, sparsely villous, glabrescent, upper margin purplish red and ciliate, apically acute. Ray florets 12 or 13; corolla tube 4.5–5 mm, glabrous; lamina yellow, oblong, ca. 9 × 2 mm, apically 3-denticulate. Disk florets many; corolla yellow, 6.5–7 mm, with ca. 3.8 mm tube and campanulate limb; lobes lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 1.5 mm, basally obtuse to rounded, appendages lanceolate. Style branches ca. 1 mm. Achenes cylindric, ca. 1.8 mm, glabrous, papillate. Pappus white, 5.5–6 mm. Fl. Jun–Jul, fr. Jul–Aug. $2n = 48$*.

• Montane meadows, woods; 3300–4300 m. Sichuan (Hongyuan, Songpan).

Sinosenecio sungpanensis differs from *S. euosmus* in the leaf blade abaxially white tomentose, involucres larger, and petiole bases only expanded but never auriculate. It is very similar to *S. fangianus* in posture, the palmately lobed leaf blade abaxially white tomentose, the petioles basally expanded but never auriculate, and the achenes glabrous yet papillate. It differs from *S. fangianus* in the leaf blade shallowly 5–7-lobed or undivided, only denticulate, the lobes broadly deltoid or ovate-deltoid, and the phyllaries purplish on upper margin.

22. Sinosenecio fangianus Y. L. Chen, Acta Phytotax. Sin. 26: 52. 1988.

植夫蒲儿根 zhi fu pu er gen

Herbs, stoloniferous, with leafy stems. Rhizomes 4–5 mm in diam. Stems solitary, erect, 30–60 cm tall, simple, sparsely white pubescent. Radical leaves withered by anthesis, petiolate; blade adaxially green, reniform, 3–6 × ca. 6 cm, abaxially white arachnoid or pilose, ciliate on margin, adaxially glabrous or sparsely pilose, palmately 5-veined, base deeply cordate, 7–9-palmatilobed nearly to middle; lobes oblong, 1.5–2.5 × 1–2 cm, margin entire or sometimes 2- or 3-denticulate. Median and upper stem leaves similar to lower leaves, but smaller; petioles of lower leaves 3–7 cm, basally expanded, sparsely shortly pubescent. Uppermost leaves small, bractlike, 3–5-lobed or entire, shortly petiolate or subsessile. Capitula radiate, usually 4 or 5 arranged in terminal corymb, rarely solitary, 2–2.5 cm in diam.; peduncles 1.5–2 cm, slender, sparsely shortly pubescent with 1 bract. Involucres campanulate, 4–5 × 5–7 mm, not calyculate; phyllaries ca. 15, lanceolate or broadly lanceolate, 1.5–2 mm wide, glabrous, 1–3-veined, margin white ciliate and narrowly scarious, apically acuminate. Ray florets ca. 13; corolla tube ca. 2 mm; lamina yellow, oblong or linear-oblong, 8–10 × 1–1.5 mm. Disk florets many, yellow, with 1.5–2 mm tube and campanulate limb; lobes ovate-lanceolate, apically puberulent. Anthers oblong, ca. 1.5 mm, basally obtuse. Style branches recurved. Achenes cylindric, ca. 1 mm, glabrous, papillate. Pappus white, ca. 3 mm. Fl. Jun–Jul, fr. Jul–Aug.

• Grassy slopes, forest margins, in bushes, canal sides in ravines; 2300–3200 m. Sichuan (Lixian, Maowen).

Sinosenecio fangianus differs from *S. sungpanensis* by the leaves 7–9-palmatilobed to the middle, the lobes oblong, and the phyllaries not purplish on upper margin.

23. Sinosenecio oldhamianus (Maximowicz) B. Nordenstam, Opera Bot. 44: 50. 1978.

蒲儿根 pu er gen

Senecio oldhamianus Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 16: 219. 1871; *S. martini* Vaniot; *S. savatieri* Franchet; *Sinosenecio savatieri* (Franchet) B. Nordenstam.

Herbs, annual or biennial, rhizomatous, with leafy stems. Stems solitary or few, erect, 40–80 cm or taller, sparsely villous and arachnoid, glabrescent to subglabrous. Radical leaves withered by anthesis, long petiolate; lower stem leaf petioles 3–6 cm, white arachnoid, basally somewhat expanded; blade adaxially green, ovate-orbicular or suborbicular, 3–5(–8) × 3–6 cm, membranous, abaxially white arachnoid, sometimes ± glabrescent, adaxially sparsely arachnoid or subglabrous, palmately 5-veined, base cordate, margin shallowly to deeply duplicate-dentate or duplicate-serrate with mucronulate teeth, apex obtuse to acute, acuminate and mucronulate. Upper leaves shortly petiolate, smaller, with ovate or ovate-deltoid, basally cuneate blades; uppermost leaves ovate or ovate-lanceolate. Capitula numerous, arranged in compound terminal corymbs; peduncles 1.5–3 cm, slender, sparsely pubescent, usually with a basal linear bract. Involucres broadly campanulate, 3–4 × 2.5–4 mm, not calyculate; phyllaries ca. 13, oblong-lanceolate, ca. 1 mm wide, herbaceous, with membranous margins, white arachnoid or puberulent to glabrous, apically acuminate and sometimes purplish. Ray florets ca. 13; corolla tube 2–2.5 mm, glabrous; lamina yellow, oblong, 8–9 × 1–2 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets numerous; corolla yellow, 3–3.5 mm, with 1.5–1.8 mm tube and campanulate limb; lobes ovate-oblong, ca. 1 mm, apically acute. Anthers oblong, 0.8–0.9 mm, basally obtuse, appendages ovate-oblong. Style branches recurved. Achenes cylindric, ca. 1.5 mm, smooth and glabrous in ray florets, puberulent and papillate in disk florets. Pappus absent in ray florets, in disk florets white, 3–3.5 mm. Fl. Jan–Dec. $2n = 26$*.

Forest margins, streamsides, wet rocky and grassy places, margins of cultivated fields; 400–2100 m. Anhui, Chongqing, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [Myanmar, Thailand, Vietnam].

Sinosenecio oldhamianus is a rather derived species in the genus with respect to floral morphology, chromosome number, and habit. Its achenes have differentiated into two types: those in ray florets larger in size, glabrous, and epappose, and those in disk florets smaller, puberulent, and pappose. Its chromosome number is $2n = 26$, the lowest in the genus. It is the only annual or biennial species of *Sinosenecio* and is the commonest and most widespread one to exhibit weedy tendencies.

24. Sinosenecio globiger (C. C. Chang) B. Nordenstam, Opera Bot. 44: 50. 1978 [*"globigerus"*].

匍枝蒲儿根 pu zhi pu er gen

Herbs, long stoloniferous or not stoloniferous, with leafy stems. Rhizomes 6–10 mm in diam., clad in persistent petiole bases; stolons slender, distally leafy or remotely leafy at nodes. Stems 1(–3), erect, 30–80 cm tall, to 6 mm in diam. at base, not branched below synflorescence, sparsely arachnoid, fulvous villous, or glandular. Radical leaves several, rosulate, long petiolate; petiole 6–15 cm, sparsely to densely villous or glandular with long hairs, rarely subglabrous, basally expanded; blade abaxially pale green, adaxially green, ovate-cordate, broadly ovate, or reniform, 2.5–21 × 3–22 cm, papery, abaxially sparsely pubescent or glabrous, adaxially sparsely fulvous puberulent, palmately veined, base deeply to shallowly cordate, margin palmately 3–5-lobed; lobes broadly deltoid, mucronulate, apex obtuse-acuminate-mucronulate. Stem leaves usually 3–5, similar to radical ones, progressively smaller upward and shorter petiolate. Capitula 2–3 cm in diam., (2–)5–15 arranged in terminal and axillary subumbelliform corymbs; peduncles 2–13 cm, not bracteate, slightly dilated at apex, sparsely fulvous villous, puberulent, or glandular pilose, rarely subglabrous. Involucres obconic-campanulate, 6–7 × 3–8 mm, not calyculate; phyllaries ca. 13, oblong, 1.5–2 mm wide, fulvous villous, glandular villous, pilose, or glabrescent, obscurely 3-veined, apically obtuse to rather acute, ciliate in upper part. Ray florets 13, uniseriate; corolla tube 2–2.5 mm, glabrous; lamina yellow, oblong or oblong-elliptic, 10–11 × 3–4 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 4 mm, with 1.5–1.8 mm tube and campanulate limb; lobes oblong-lanceolate, ca. 1 mm. Anthers oblong, 1.5–2 mm, basally obtuse; appendages ovate-lanceolate. Style branches recurved. Achenes cylindric, ca. 2 mm, smooth, glabrous. Pappus absent. Fl. Apr–Jun, fr. May–Jul. $2n = 48^*, 72^*$.

• Wet shaded places, streamsides, woods, roadsides, forest margins; 500–2100 m. Chongqing, Guizhou, W Hubei, Hunan, Jiangxi, E Sichuan, N Yunnan.

Sinosenecio globiger resembles *S. phalacrocarpus* but differs by the stolons (if present), abaxial surface of leaves, and phyllaries not arachnoid-tomentose and the achenes glabrous.

1a. Involucres 5–8 mm in diam.; indumentum of peduncles and phyllaries not glandular; stolons present and long, or absent, if present then usually not leafy in basal and middle parts, but densely leafy in upper part ..... 24a. var. *globiger*

1b. Involucres 3–5 mm in diam.; indumentum of peduncles and phyllaries glandular; stolons present but shorter, remotely leafy at nodes ..... 24b. var. *adenophyllus*

24a. Sinosenecio globiger var. **globiger**

匍枝蒲儿根(原变种) pu zhi pu er gen (yuan bian zhong)

Senecio globiger C. C. Chang, Sunyatsenia 6: 21. 1941 [*"globigerus"*]; *Sinosenecio guizhouensis* C. Jeffrey & Y. L. Chen.

Stolons present and long, or absent, if present then usually not leafy in basal and middle parts, but densely leafy in upper part. Involucres 5–8 mm in diam. Indumentum of peduncles and phyllaries not glandular. Fl. Apr–Jun, fr. May–Jul. $2n = 48^*, 72^*$.

• Wet shaded places, streamsides, woods; 500–2000 m. Chongqing, Guizhou, W Hubei, Hunan, Jiangxi, E Sichuan, N Yunnan.

Two types of plants have been observed within *Sinosenecio globiger* var. *globiger*, one with stolons and the other without. The two types have almost the same geographical distribution, but, so far, both types were found to co-occur only in one site of SW Hubei. They seem to have differentiated to some extent in habitat preference, flowering time, and also in some morphological characters. The stoloniferous type has long stolons and a simple synflorescence, flowers in May and June, and grows in woods, whereas the estoloniferous type has a branched synflorescence, flowers in April, and usually grows along streamsides. At this site, only one individual was found to be a possible hybrid between the two types. Further studies are needed to determine if the two types are worthy of formal taxonomic recognition.

24b. Sinosenecio globiger var. **adenophyllus** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 240. 1984.

腺苞蒲儿根 xian bao pu er gen

Stolons present, shorter, remotely leafy at nodes. Involucres smaller, 3–5 mm in diam. Peduncles and phyllaries glandular. Fl. May–Jun, ff. Jun–Jul. $2n = 48^*, 72^*$.

• Streamsides, roadsides, forest margins; ca. 2100 m. Chongqing (Nanchuan), Guizhou (Zheng'an).

Morphologically, *Sinosenecio globiger* var. *adenophyllus* can be readily distinguished from the typical variety and may be recognized as an independent species of its own.

25. Sinosenecio leiboensis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 242. 1984.

雷波蒲儿根 lei bo pu er gen

Herbs, shortly stoloniferous, with leafy stems. Rhizome elongated, ca. 4 mm in diam. Stems solitary, erect, ca. 60 cm tall, ascending and 5–6 mm in diam. at base, villous, with brownish hairs. Radical and lower stem leaves withered by anthesis; median stem leaves 3 or 4; petiole 7–9 cm, basally somewhat expanded, villous, with fulvous multicellular hairs; blade broadly ovate or reniform, 4–5 × 5.5–7.5 cm, papery, abaxially sparsely pilose mainly on veins, adaxially sparsely pilose, palmately 5-veined, base deeply cordate, palmately 5–7-lobed, apex obtuse, mucronulate; lobes broadly triangular, teeth callose-mucronulate, laterally callose-unidenticulate. Upper stem leaves shorter petiolate, smaller. Uppermost leaves shortly petiolate, lanceolate. Capitula 5–9 in terminal corymbs; peduncles 0.5–1 cm, puberulent, basally bracteate. Involucres obconic-campanulate, hemispheric when flattened, 5–6 × 5–6 mm, not calyculate; phyllaries 13–15, green, oblong-elliptic, 5–

6 × 2–2.5 mm, herbaceous, abaxially purplish red puberulent, white fimbriate on upper margins and apex, margin scarious, apically acute. Ray florets 13; corolla tube ca. 2 mm, glabrous; lamina yellow, oblong, 9–10 × 2.5–3 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 3 mm, with ca. 1.8 mm tube and campanulate limb; lobes lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, basally obtuse, ca. 1.5 mm, appendages lanceolate. Ovary cylindric, ca. 1 mm, smooth, glabrous; style branches recurved. Pappus absent. Fl. May–Jun, fr. Jun–Jul. $2n = 48$*.

• Valley thickets, wet places; ca. 2000 m. SW Sichuan (Leibo).

Sinosenecio leiboensis is very similar to *S. globiger* in posture, leaf shape, and the epappose achenes. From the latter, it differs only in the phyllaries purplish puberulent abaxially and in the presence of short stolons.

26. Sinosenecio palmatisectus C. Jeffrey & Y. L. Chen, Kew Bull. 39: 242. 1984.

鄂西蒲儿根 e xi pu er gen

Herbs, with leafy stems. Rhizomes ca. 8 mm in diam. Stems solitary, erect, to 55 cm, 5–6 mm in diam. at base, simple, sparsely pubescent when young, glabrescent. Radical leaves few, long petiolate; petiole 6–16.5 cm, ± glabrous, rather dilated at base; blade abaxially pale green, adaxially green, reniform, 5–15 × 5.5–18 cm, submembranous, both surfaces at first sparsely pubescent or glabrous, palmately yellowish green 5–7-veined, base broadly cordate or subtruncate, palmately 7–9-lobed to middle; lobes oblong-lanceolate, laterally 2- or 3-dentate or lobulate with callose-mucronulate teeth or lobules, apically acute or acuminate, mucronulate. Stem leaves usually 2–4, lower leaves similar to radical ones, upward smaller, shortly petiolate; uppermost leaves ovate-lanceolate, base cuneate, margin 5–7-dentate or lobulate, apex acute or acuminate. Capitula 2.5–3 cm in diam., 3 or 4(–7), arranged in terminal or axillary subumbelliform corymbs; peduncles 3–5.5 cm, stout, expanded at apex, sparsely fulvous villous, not bracteate. Involucres obconic-campanulate, 7–8 × 6–8 mm; phyllaries 13, oblong-lanceolate, ca. 2 mm wide, 3–5-veined, sparsely fulvous villous, apex rather acute or obtuse, white ciliate. Ray florets ca. 11; corolla tube 2–2.5 mm, glabrous; lamina yellow, oblong-elliptic, ca. 11 × 3–4 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 3 mm, with ca. 1.5 mm tube and campanulate limb; lobes ovate-lanceolate, apically acute. Anthers oblong, ca. 1.5 mm, basally obtuse, appendages ovate-oblong. Ovary cylindric, 1.3–1.5 mm, smooth, glabrous; style branches recurved. Pappus absent. Fl. Apr, fr. May–Jun. $2n = 48$*.

• Wet places on slopes, woods; ca. 1400 m. W Hubei (Hefeng).

Sinosenecio palmatisectus is very similar to *S. albonervius* in the leaves palmately divided but differs by the leaf blade at first sparsely pubescent adaxially, later glabrescent, 7–9-palmatilobed to the middle, the lobes oblong-lanceolate, and the veins yellowish green adaxially.

27. Sinosenecio phalacrocarpus (Hance) B. Nordenstam, Opera Bot. 44: 50. 1978.

秃果蒲儿根 tu guo pu er gen

Senecio phalacrocarpus Hance, J. Bot. 19: 151. 1881.

Herbs, rhizomatous, with leafy stems; upper parts arachnoid-tomentose. Stems solitary, erect, ca. 30 cm or taller, robust, hollow, 5–6 mm in diam. at base, not branched below synflorescence. Radical leaves long petiolate, withered by anthesis; median stem leaf petiole 5–7 cm, basally slightly expanded, thinly arachnoid; blade adaxially green, reniform, ca. 6 × 8–9 cm, abaxially thinly arachnoid-tomentose, adaxially sparsely pubescent, palmately 5-veined, margin irregularly sublobed or coarsely dentate, with apically mucronulate deltoid teeth. Upper leaves smaller, shallowly cordate, shortly petiolate. Capitula 5 to many, arranged in terminal and axillary subumbelliform corymbs, ca. 2.5 cm in diam.; peduncles 0.5–2.5 cm, distally slightly dilated, basally not bracteate, sparsely arachnoid-tomentose, glabrescent, not bracteolate. Involucres hemispheric when flattened, ciliate; phyllaries ca. 10, green, lanceolate, herbaceous, sparsely arachnoid or glabrescent, 3-veined, margin scarious, apically ciliate, acute or acuminate. Ray florets ca. 13; corolla tube 2–2.5 mm, glabrous; lamina yellow, oblong, ca. 13 × 3 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4.5 mm, with 1.5–1.7 mm tube and campanulate limb; lobes lanceolate, apically acute. Anthers ca. 1.5 mm, basally obtuse, appendages lanceolate. Style branches ca. 0.8 mm. Achenes cylindric, ca. 1.5 mm, sparsely minutely glandular puberulent. Pappus absent. Fl. Jun.

• Sides of rocks, forest margins. Guangdong (Bei Jiang).

Sinosenecio phalacrocarpus is very likely related to *S. globiger* but differs by the leaf blade abaxially arachnoid-tomentose and the achenes glandular puberulent.

28. Sinosenecio phalacrocarpoides (C. C. Chang) B. Nordenstam, Opera Bot. 44: 50. 1978.

假光果蒲儿根 jia guang guo pu er gen

Senecio phalacrocarpoides C. C. Chang, Acta Phytotax. Sin. 1: 313. 1951.

Herbs, dwarf, with leafy stems. Rhizomes 3–4 mm in diam., clad in persistent brown petiole bases. Stems solitary, to 10 cm tall, branching from near base, sparsely arachnoid, glabrescent. Radical leaves several, long petiolate; petiole 5–8 cm, rather stout, basally slightly expanded, glabrous; blade abaxially pale green, adaxially dark green, subreniform or suborbicular, 3–4 × 3.5–4 cm, glabrous, basally 3-veined, base shallowly cordate or subtruncate, margin palmately shortly duplicate-lobed or coarsely duplicate-dentate, with apically mucronulate deltoid teeth or lobes. Stem leaves 4 or 5, shorter petiolate, smaller. Uppermost leaves ovate-deltoid, lobed or denticulate. Capitula small, rather numerous, arranged in contracted terminal compound corymbs; peduncles campanulate, very short, 2–3 mm, sparsely arachnoid or glabrous, not bracteate. Involucres campanulate, 2–3 mm in diam., not calyculate; phyllaries 8 or 9, subbiseriate, linear, ca. 0.5 mm, herbaceous, glabrous, margin broadly scarious, denticulate in upper part, apex acuminate. Ray florets ca. 6; corolla tube ca. 1.5 mm; lamina yellow, ovate-oblong, ca. 1.5 × 0.5–0.6 mm, inconspicuously 4-veined, margin repand, apically rounded. Disk florets ca. 9; corolla yellow, ca. 2.5 mm, with ca. 1.3 mm tube and campanulate limb; lobes

ovate-oblong, apically acute. Anthers ca. 1 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 0.5 mm. Achenes cylindric, 1–1.3 mm, smooth, glabrous. Pappus absent. Fl. Mar.

• Mixed forests; ca. 2700 m. W Yunnan (Yongde).

Sinosenecio phalacrocarpoides is distinct in its very small capitula, many arranged in contracted corymbs, very short peduncles, and duplicate-dentate leaves. From the absence of the pappus, this species may be somewhat related to *S. globiger* and its allies.

29. Sinosenecio jishouensis D. G. Zhang, Y. Liu & Q. E. Yang, Bot. Stud. 49: 287. 2008.

吉首蒲儿根 ji shou pu er gen

Herbs, rhizomatous, with leafy stems, without stolons. Stems solitary or several, erect, to 40 cm tall, simple, pubescent. Basal leaves long petiolate; petiole 4–16 cm, sparsely pubescent, basally expanded; blade elliptic-lanceolate, 4–14 × 2–5 cm, papery or thinly so, both surfaces sparsely pubescent, pinnately veined, lateral veins 6–10, base broadly cuneate, margin irregularly sinuate-dentate, apex acute or acuminate. Stem leaves similar but smaller, with shorter petioles. Capitula 5 to many in terminal corymbs; peduncles 1–2 cm, pubescent, apically dilated. Involucres campanulate, 5–7 × 6–8 mm; phyllaries ca. 13, oblong-lanceolate, 6–7 × 1.5–2 mm, herbaceous, pubescent, apically acute to subacute. Ray florets ca. 13; corolla tube ca. 2 mm, glabrous; lamina yellow, oblong-elliptic, 8–10 × 3–4 mm, 4-veined, apically 3-denticulate. Disk florets numerous; corolla ca. 4 mm, with ca. 2 mm tube and campanulate limb; lobes ovate-lanceolate. Anthers ca. 1.5 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 1 mm. Achenes cylindric, ca. 1.5 mm, smooth, glabrous. Pappus absent. Fl. Mar–Apr, fr. May. $2n = 48^*, 96^*$.

• Wet soil on limestone, along streams, below waterfalls; ca. 300 m. NW Hunan (Jishou).

Sinosenecio jishouensis is readily distinguishable by the pinnately veined leaves and epappose achenes. This species is related to *S. globiger* and its allies in habit and floral structure.

30. Sinosenecio albonervius Y. Liu & Q. E. Yang, Bot. Stud. 52: 359. 2011.

白脉蒲儿根 bai mai pu er gen

Herbs, rhizomatous, with leafy stems; stolons absent. Rhizomes ca. 6 mm in diam. Stems solitary or several, erect, 24–45 cm tall, simple, pubescent or glabrous. Radical leaves long petiolate; petiole 8–20 cm, pubescent or sometimes glabrescent, base expanded, not auriculate; blade abaxially pale green, adaxially matte green, reniform to orbicular-reniform in outline, 3–13 × 4–13 cm, submembranous, abaxially pubescent with spreading hairs or sometimes glabrescent, adaxially pubescent, palmately white veined, base shallowly to deeply cordate, shallowly palmately 7–9-lobed to 1/4–1/3, apex acute to obtuse; lobes deltoid, margin remotely denticulate. Upper stem leaves smaller, with shorter petioles. Capitula many in apical compound corymbs; peduncles 1–3 cm, distally expanded, sparsely fulvous villous. Involucres campanulate, 7–8 × 8–9 mm, ecalyculate; phyllaries 12 or 13, green, oblong-lanceolate, ca. 7 × 2 mm, herbaceous, sparsely fulvous villous or sometimes glabrescent, apex fimbriate-ciliate and acuminate or acute. Ray florets 9–13; corolla tube 2–3 mm, glabrous; lamina yellow, oblong-elliptic, ca. 10 × 3 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla ca. 4 mm, tube ca. 3 mm, limb campanulate; lobes ovate-lanceolate. Anthers ca. 1.7 mm, base obtuse, appendages ovate-oblong. Style branches ca. 0.6 mm, apex truncate. Achenes cylindric, ca. 2 mm, smooth, glabrous. Pappus absent. Fl. Apr, fr. May–Jun. $2n = 48^*$.

• Shaded places along streamsides; 800–1200 m. Hubei (Wufeng), Hunan (Shimen).

Sinosenecio albonervius resembles *S. palmatisectus* but differs in the leaf blade adaxially spreading pubescent, 7–9-palmatilobed to 1/4–1/3, the lobes deltoid in outline, and the veins white adaxially.

31. Sinosenecio baojingensis Y. Liu & Q. E. Yang, Bot. Stud. 50: 107. 2009.

保靖蒲儿根 bao jing pu er gen

Herbs, rhizomatous, with leafy stems, without stolons. Stems solitary, erect, 75–150 cm tall, simple, villous or lanate. Basal leaves petiolate; petiole 14–28 cm, sparsely lanate, basally expanded, not auriculate; blade adaxially green, ovate-cordate, 12–20 × 10–18 cm, abaxially pale green or whitish lanate, adaxially sparsely villous, palmately veined, base cordate, margin denticulate, apically acute. Upper stem leaves similar but smaller, with shorter petioles. Capitula numerous in terminal compound corymbs; peduncles 1.5–4 cm, sparsely villous. Involucres campanulate, 6–7 × 6–9 mm; phyllaries ca. 13, oblong-lanceolate, 6–7 × 1.5–2 mm, herbaceous, puberulent, apically acute. Ray florets ca. 13; corolla tube ca. 3 mm, glabrous; lamina yellow, oblong-elliptic, ca. 8 × 3–4 mm, 4–7-veined, apically 3-denticulate. Disk florets numerous; corolla ca. 5 mm, with ca. 3 mm tube and campanulate limb; lobes ovate-lanceolate. Anthers ca. 1.5 mm, basally obtuse, appendages ovate-oblong. Style branches ca. 1 mm. Achenes cylindric, ca. 1.5 mm, smooth, glabrous. Pappus white, ca. 3 mm. Fl. Mar–Apr, fr. May. $2n = 48^*$.

• Open hillsides, in grass beside rice fields; ca. 300 m. NW Hunan (Baojing).

Sinosenecio baojingensis is similar to *S. denticulatus* in the leafy stem, tall stature, and smooth, pappose achenes, but it differs by its leaf blade ovate-cordate with margin denticulate and petioles not auriculate. It is the tallest species known in the genus, up to 150 cm.

32. Sinosenecio hupingshanensis Y. Liu & Q. E. Yang, Bot. Stud. 51: 387. 2010.

壶瓶山蒲儿根 hu ping shan pu er gen

Herbs, rhizomatous, with leafy stems; stolons absent. Rhizomes ca. 10 mm in diam. Stems solitary, erect, 16–60 cm tall, simple, pubescent. Radical leaves long petiolate; petiole 5–20 cm, pubescent, base expanded, not auriculate; blade abaxially pale green, adaxially green, reniform to orbicular-reniform, 4.5–12 × 5–13 cm, abaxially sparsely villous or sometimes glabrescent, adaxially pubescent, palmately veined, base shallowly to deeply cordate, margin very indistinctly repand-dentate, apex obtuse to acute. Upper stem leaves smaller, with shorter petioles. Capitula many in apical compound corymbs; peduncles 1–4 cm, pubescent or sometimes sparsely to densely villous. In-

volucres campanulate, 7–10 × 6–7 mm, ecalyculate; phyllaries 10–14, green, oblong-lanceolate to oblong-oblanceolate, ca. 7 × 1.5 mm, herbaceous, pubescent, apex fimbriate-ciliate and acuminate or acute. Ray florets ca. 13; corolla tube ca. 3 mm, glabrous; lamina yellow, oblong-elliptic, 10–14 × 2.5–4 mm, 6- or 7-veined, apically 3-denticulate. Disk florets many; corolla ca. 5 mm, tube ca. 4 mm, limb campanulate; lobes ovate-lanceolate. Anthers ca. 1.5 mm, base obtuse, appendages ovate-oblong. Style branches ca. 0.8 mm, apex truncate. Achenes cylindric, 1–1.5 mm, smooth, glabrous. Pappus white, ca. 3 mm. Fl. Apr–May, fr. May–Jun. $2n = 48$*.

• Broad-leaved forest margins; 1000–1600 m. Hubei (Wufeng), Hunan (Shimen).

Sinosenecio hupingshanensis is similar to *S. baojingensis* and *S. denticulatus* in posture, the ray floret lamina 6- or 7-veined, and the achenes glabrous and pappose. From the former, it differs in the leaf blade reniform or orbicular-reniform, margin repand-dentate, smaller size, and much shorter stature; from the latter, it differs in the petioles expanded basally but never auriculate and the shorter stature.

33. Sinosenecio denticulatus J. Q. Liu, Acta Phytotax. Sin. 38: 192. 2000.

齿裂蒲儿根 chi lie pu er gen

Herbs, rhizomatous, with leafy stems. Stems solitary, erect, 35–140 cm tall, simple, sparsely puberulent below, glabrous in upper part. Radical leaves withered by anthesis, long petiolate; blade reniform, 4–14 × 6–17 cm, abaxially sparsely white pilose on veins, palmately 5–7-veined, base deeply cordate, margin subentire or 5–7-denticulate. Median and upper leaves similar to lower ones, but smaller, petioles basally auriculate; uppermost small and bractiform, lanceolate. Capitula 1–1.5 cm in diam., 8 to many, arranged in terminal subumbelliform corymbs; peduncles 2–3 cm, slender, sparsely puberulent or subglabrous, 1-bracteate. Involucres campanulate, 5–7 × 5–7 mm; phyllaries ca. 12, lanceolate or broadly lanceolate, 5–7 × 1–2 mm, glabrous, 1- or 2-veined, apically acuminate and ciliate. Ray florets 8–12; corolla tube ca. 2 mm; lamina yellow, oblong or linear-oblong, 7–9 × 1.5–2.5 mm, 4–7-veined, apically denticulate. Disk florets numerous; corolla yellow, 4–6 mm, with 2.5–3.5 mm tube and campanulate limb; lobes ovate-lanceolate, glabrous, apically acute. Anthers oblong, ca. 1.3 mm, basally obtuse. Style branches recurved. Achenes cylindric, ca. 2 mm, smooth, glabrous. Pappus white, 3.5–4 mm. Fl. May–Jun, fr. Jun–Jul. $2n = 48$*.

• Ravines, wet places; ca. 1500 m. Sichuan (Xuyong).

In the protologue of *Sinosenecio denticulatus*, the petioles were described as being exauriculate and the ray floret laminae as being 7-veined. However, the petioles are actually auriculate at the base, and the ray floret laminae are 4–7-veined.

34. Sinosenecio fanjingshanicus C. Jeffrey & Y. L. Chen, Kew Bull. 39: 248. 1984.

梵净蒲儿根 fan jing pu er gen

Herbs, subscapigerous. Rhizomes ca. 3 mm in diam., clad in persistent petiole bases. Stems solitary, erect, 5–30 cm tall, simple, densely white arachnoid-tomentose, ± glabrescent. Radical leaves several, rosulate, long petiolate; petiole 1.5–7 cm, densely to sparsely tomentose, basally slightly expanded; blade adaxially whitish or pale green, suborbicular or pentagonal, 1–6 × 1–6 cm, abaxially densely white tomentose, adaxially sparsely white arachnoid and shortly pilose, obscurely palmately veined, base cordate, margin shallowly 5-lobed or angled or shallowly lobed with mucronulate teeth, apex rounded-obtuse. Stem leaves 1 or 2, small, shallowly lobed, shortly petiolate. Capitula 1.5–2 cm in diam., 2–10 or more, arranged in at first contracted terminal umbelliform corymbs; peduncles short, with a small basal leaflike bract and few small linear bracteoles. Involucres campanulate, 4–6 × ca. 6 mm, not calyculate; phyllaries 17, broadly lanceolate or lanceolate, 1.5–2 mm wide, herbaceous, inconspicuously 3-veined, apically acuminate or acute, marginally and apically reddish purple and ciliate. Ray florets ca. 13, uniseriate; corolla tube 0.5–1 mm, glabrous; lamina yellow, oblong, 3–4 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets: corolla yellow, ca. 2.5 mm, with ca. 1 mm tube and campanulate limb; lobes lanceolate, 0.5–1 mm, acute. Anthers 1–1.5 mm, basally obtuse to rounded, appendages ovate-lanceolate. Ovary cylindric, ca. 0.8 mm, smooth, glabrous; style branches 0.7–0.8 mm. Pappus white, shorter than corolla. Fl. May–Jun, fr. Jul. $2n = 48$*.

• On rocks, roadsides, shaded places; 1400–2500 m. Chongqing (Wulong), Guizhou (Jiangkou, Songtao).

Sinosenecio fanjingshanicus is similar to *S. septilobus* in the leaf blade abaxially white tomentose but differs in the leaf blade adaxially whitish or pale green, hardly divided, repand, or irregularly shallowly lobed.

35. Sinosenecio septilobus (C. C. Chang) B. Nordenstam, Opera Bot. 44: 51. 1978.

七裂蒲儿根 qi lie pu er gen

Senecio septilobus C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 59. 1935.

Herbs, subscapigerous, with leafy stem. Rhizomes 3–5 mm in diam., clad in persistent petiole bases. Stems usually solitary, erect, 30–35 cm tall, 2.5–3 mm in diam. at base, simple, sparsely white arachnoid or subglabrous. Radical leaves several, rosulate, long petiolate; petiole 9–12 cm, sparsely villous, glabrescent, basally slightly expanded; blade adaxially green, orbicular, 3.5–5 × 4–8 cm, abaxially densely white tomentose, adaxially thinly adpressed arachnoid to rarely subglabrous, base deeply cordate, margin usually deeply palmately 7–9-lobed to middle, lobes deltoid, margin entire or inconspicuously dentate, apex obtuse to rounded, mucronulate. Stem leaves 1 or 2, smaller, palmately lobed, shortly petiolate. Capitula 1.5–2 cm in diam., 7–13 arranged in terminal ± subumbelliform corymbs; peduncles 1–3(–7) cm, slender, with a basal oblanceolate or leaflike or 3–7-lobed bract, with 1 or 2 linear bracts in upper part, sparsely pubescent. Involucres campanulate, subhemispheric when flattened, 5–6 × 4–5.5 mm, not calyculate; phyllaries ca. 13, ovate-oblong or lanceolate-oblong, rarely linear, 1.5–2.5 mm wide, herbaceous, sparsely arachnoid, margin broadly scarious, apically obtuse to subacute and ciliate. Ray florets ca. 13; corolla tube 2–2.5 mm; lamina yellow, oblong, 6–7 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4 mm, with ca. 2 mm tube and campanulate limb; lobes lanceolate, 1–1.5 mm, apically acute. An-

thers oblong, ca. 1.4 mm, appendages ovate-lanceolate. Style branches recurved, ca. 0.7 mm. Achenes cylindric, ca. 1.5 mm, smooth, glabrous. Pappus white, ca. 3 mm. Fl. May–Jul, fr. Jun–Jul. $2n = 48$*.

• Thickets, on rocks, in bushes, roadsides; 400–2300 m. Chongqing (Nanchuan), Guizhou (Daozhen).

Sinosenecio septilobus is easily distinguished by its leaves 7–9-palmatilobed to the middle, green adaxially owing to the absence of white tomentum, and densely white tomentose abaxially.

36. Sinosenecio changii (B. Nordenstam) B. Nordenstam, Compositae Newslett. 49: 4. 2011.

莲座狗舌草 lian zuo gou she cao

Tephroseris changii B. Nordenstam, Opera Bot. 44: 44. 1978; *Senecio rosulifer* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 58. 1935 [*"rosuliferus"*], not H. Léveillé & Vaniot (1910).

Herbs, subscapigerous. Rhizomes ca. 10 mm in diam., clad in persistent brown petiole bases. Stems solitary, rarely 2 or 3, erect, scapiform, to 40 cm tall, simple, floccose-tomentose, fulvous pubescent especially in lower part. Radical leaves several, rosulate, present at anthesis; petiole 2.5–4 cm, rather broad, floccose-tomentose and fulvous hirtellous, basally expanded; blade ovate-oblong, 2.5–9 × 2–6 cm, papery, abaxially densely floccose-tomentose, adaxially thinly floccose-tomentose and densely adpressed hirtellous, pinnately veined, lateral veins 10–14, veins prominent, base cordate, margin irregularly shallowly repand-dentate, teeth mucronulate, apex rounded, apiculate. Stem leaves usually 1, on lower part of stem, similar to basal ones but smaller. Capitula 1.8–2 cm in diam., 6–15, arranged in simple to compound subumbelliform terminal corymbs; peduncles 1–4.5 cm, densely arachnoid, usually bracteate at base, not bracteolate or with 1 or more linear bracteoles in upper part; bracts 5–10 mm, densely tomentose. Involucres broadly campanulate to hemispheric, ca. 5 × 5 mm, not calyculate; phyllaries ca. 13, linear-lanceolate, 4–5 × 1–1.5 mm, sparsely arachnoid, margin broadly scarious, apically acute or acuminate, purplish and puberulent. Ray florets ca. 18; corolla tube ca. 2.5 mm, glabrous; lamina yellow, oblong, ca. 9 × 2–2.9 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets numerous; corolla yellow, ca. 4 mm, with 1.5–2 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.3 mm, basally obtuse, appendages lanceolate. Style branches recurved, 0.6–0.7 mm. Achenes cylindric, ca. 1.5 mm, smooth, glabrous. Pappus white, ca. 3 mm. Fl. May–Jul, fr. Jun–Aug. $2n = 48$*.

• Roadsides, forest margins; 1800–2700 m. Chongqing (Nanchuan).

Sinosenecio changii was recently provisionally transferred from *Tephroseris* to *Sinosenecio* on the basis of molecular and morphological evidence. The pinnately veined leaves and numerous ray florets are somewhat unusual in the genus, and the systematic position of this taxon will be further investigated.

37. Sinosenecio bodinieri (Vaniot) B. Nordenstam, Opera Bot. 44: 49. 1978.

黔西蒲儿根 qian xi pu er gen

Senecio bodinieri Vaniot, Bull. Acad. Int. Géogr. Bot. 11: 348. 1902; *S. bodinieri* var. *brevior* Vaniot; *S. bodinieri* var. *parcepilosus* Vaniot; *S. palmatilobus* Kitamura; *Sinosenecio brevior* B. Nordenstam; *S. palmatilobus* (Kitamura) C. Jeffrey & Y. L. Chen.

Herbs, scapigerous. Rhizomes 5–10 mm in diam., clad in persistent brown petiole bases. Stems solitary, rarely 2, erect, scapiform, 10–40 cm tall, villous with brown hairs, especially in lower part, usually with 1 ovate or spatulate bractlike leaf in upper part. Leaves several, radical, rosulate; petiole 3.5–10 cm, densely villous with long reddish brown hairs; blade abaxially pale green, adaxially lustrous, green or deep green, broadly ovate or broadly elliptic, 3–7 × 2.5–5 cm, subleathery, abaxially sparsely adpressed pilose on veins or glabrous, adaxially sparsely or densely villous, long ciliate with purplish brown hairs on margins, palmately 5–7-veined, base truncate or rounded, margin lobed with ovate-deltoid or deltoid mucronulate teeth. Capitula 1.5–2 cm in diam., 1–7, rarely 9, arranged in terminal corymbs, at first rather dense, becoming lax; peduncles 1–6 cm, slender, pubescent or subglabrous, with basal bract and several bracteoles; bracts and bracteoles linear or linear-spatulate, 5–10 mm. Involucres campanulate, 5–7 × 5–7 mm, not calyculate; phyllaries ca. 13, lanceolate or broadly lanceolate, 6–7 × 1–1.5 mm, herbaceous, inconspicuously 3-veined, puberulent, margin broadly scarious, apically acuminate or obtuse, ciliate at apex and on upper margin. Ray florets ca. 13, 9–13 mm; corolla tube 2.5–3 mm, glabrous; lamina yellow, oblong, 8–9 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4.5 mm with ca. 2 mm tube and campanulate limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, ca. 1.5 mm, base obtuse to rounded, appendages lanceolate. Style branches recurved, ca. 0.8 mm. Achenes cylindric, ca. 1.8 mm, smooth, glabrous. Pappus white, 4–4.5 mm. Fl. Mar–Apr, fr. May. $2n = 48$*.

• Riverbanks, waterfalls, rocky cliffs; 900–1000 m. Guizhou (Huangguoshu, Xingyi).

Sinosenecio bodinieri is very similar to *S. confervifer*, so much so that they may be treated as being conspecific. The former differs mainly by the leaf blade broadly ovate or broadly elliptic, base truncate or rounded, and margin long ciliate.

38. Sinosenecio confervifer (H. Léveillé) Y. Liu & Q. E. Yang, **comb. nov.**

西南蒲儿根 xi nan pu er gen

Basionym: *Senecio confervifer* H. Léveillé, Fl. Kouy-Tchéou, 105. 1914–1915 [*"confervifer"*; p. 104: *"confervi-verus"*]; *S. bodinieri* Vaniot var. *elatior* Vaniot; *S. bodinieri* var. *elatissimus* Handel-Mazzetti; *Sinosenecio elatior* (Vaniot) B. Nordenstam; *S. elatissimus* (Handel-Mazzetti) B. Nordenstam.

Herbs, scapigerous. Rhizomes 5–10 mm in diam., clad in persistent brown petiole bases. Stems solitary, sometimes 2–5, erect, scapiform, 10–65 cm tall, villous with brown hairs, especially in lower part, fulvous tomentose near apex, with 1 or 2 shortly petiolate bractlike leaves in upper part. Leaves several, radical, rosulate; petiole 2–20 cm, densely villous with long reddish brown hairs; blade abaxially pale green or purplish,

adaxially lustrous, green or deep green, orbicular or suborbicular, 1.5–6 × 2–6 cm, subleathery, abaxially sparsely villous or pubescent on veins, somewhat shortly ciliate with purplish brown hairs on margins, adaxially densely or sparsely villous or glabrous, palmately 5–7-veined, base cordate or subtruncate, margin repand or lobed, with rounded or broadly deltoid mucronulate or obscurely mucronulate shallow teeth or lobes. Capitula 1.5–2 cm in diam., 1–7(–10 or more), arranged in terminal corymbs, at first rather dense, becoming lax; peduncles 1–6 cm, slender, pubescent or subglabrous, with basal bract and 2 or 3 bracteoles; bracts and bracteoles linear or linear-spatulate, 5–10 mm. Involucres campanulate, 5–7 × 5–7 mm, not calyculate; phyllaries ca. 13, lanceolate or broadly lanceolate, 6–7 × 1–1.5 mm, herbaceous, inconspicuously 3-veined, puberulent, margin broadly scarious, apically acuminate or obtuse, ciliate at apex and on upper margin. Ray florets ca. 13, 9–13 mm; corolla tube 2.5–3 mm, glabrous; lamina yellow, oblong, 8–9 × 1.5–2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 4.5 mm with ca. 2 mm tube and campanulate; lobes ovate-lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, ca. 1.5 mm, base obtuse to rounded, appendages lanceolate. Style branches recurved, ca. 0.8 mm. Achenes cylindric, ca. 1.8 mm, smooth, glabrous. Pappus white, 4–4.5 mm. Fl. Apr–Jun, fr. May–Jul. $2n = 48$*.

• Hillsides, streamsides, woods, shaded places; 500–2200 m. Chongqing, Guizhou, W Hunan, SE Sichuan, NE Yunnan.

Sinosenecio confervifer is very similar to *S. bodinieri*, distinguishable only by its leaf blade orbicular or suborbicular, base cordate or subtruncate, and margin shortly ciliate.

39. Sinosenecio trinervius (C. C. Chang) B. Nordenstam, Opera Bot. 44: 51. 1978.

三脉蒲儿根 san mai pu er gen

Senecio trinervius C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 60. 1935.

Herbs, scapigerous. Rhizomes 3–5 mm in diam., clad in persistent petiole bases. Stems solitary, erect, purplish, scapiform, 18–26 cm tall, slender, glabrous or sparsely puberulent. Leaves several, radical, rosulate, long petiolate; petiole 7–12 cm, slender, sparsely puberulent or subglabrous, basally slightly expanded; blade abaxially pale green, adaxially green, ovate-oblong or elliptic, 2.9–7.5 × 1.3–3 cm, membranous, both surfaces sparsely puberulent, brown ciliate on margin, basally 3-veined, base cuneate, margin coarsely mucronulate-dentate with 4–6 large deltoid teeth on each side, apex obtuse-acuminate, mucronulate. Capitula ca. 1.7 cm in diam., 4–8 in terminal corymbs or compound-corymbs; peduncles to 3 cm, slender, linear-bracteolate at base. Phyllaries 12 or 13, ovate-lanceolate or lanceolate, 4–4.5 × 0.3–1.3 mm, herbaceous, margin broadly scarious, apically acute, puberulent. Ray florets ca. 13, 10–11 mm; corolla tube ca. 3 mm, glabrous; lamina yellow, oblong, 6–8 × 2–2.5 mm, 4-veined, apically 3-denticulate and obtuse. Disk florets: corolla yellow, ca. 4.5 mm, with 2–2.5 mm tube and campanulate limb; lobes ovate, 1–1.5 mm, basally obtuse to rounded, appendages ovate-oblong. Ovary cylindric, ca. 1 mm, glabrous; style branches recurved, ca. 0.8 mm. Pappus white, 3.5–4 mm. Fl. May, fr. Jun.

• W Guizhou (Xingyi).

Sinosenecio trinervius is somewhat similar to *S. bodinieri* and *S. confervifer*, particularly in the scapigerous habit, but it is readily distinguishable by the leaves basally 3-veined. It is currently only known from the type locality. The record of its occurrence in S and NW Yunnan most likely resulted from misidentifications.

40. Sinosenecio nanchuanicus Z. Y. Liu, Y. Liu & Q. E. Yang, Bot. Stud. 52: 105. 2011.

南川蒲儿根 nan chuan pu er gen

Herbs, scapigerous; stolons absent. Rhizomes 3–4 mm in diam. Stems solitary, erect, purple, scapiform, 10–12 cm tall, simple, glabrescent, with several small spatulate, leaflike bracts in upper part. Leaves several, radical, long petiolate; petiole 1–4 cm, pubescent, base expanded, not auriculate; blade abaxially purple, adaxially dark green, orbicular or suborbicular in outline, 0.8–1.7 × 0.8–2 cm, subleathery, nitid, abaxially sparsely pubescent or glabrescent on midvein, adaxially pubescent, palmately veined, veins impressed adaxially, base shallowly cordate, shallowly regularly 5–7-lobed with broadly deltoid or rounded, entire, apiculate lobules, margin ciliate, apex acute. Capitula solitary, terminal; peduncles sparsely pubescent or glabrescent in upper part. Involucres campanulate, ca. 7 × 9 mm, ecalyculate; phyllaries 13, green at base, purple in upper part, oblong-lanceolate, ca. 6 × 1.5 mm, herbaceous, sparsely pubescent, apex fimbriate-ciliate and acuminate or acute. Ray florets 14 or 15; corolla tube ca. 1.5 mm, glabrous; lamina yellow, oblong-elliptic, ca. 9 × 1.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla ca. 4 mm, tube ca. 3 mm, limb campanulate; lobes ovate-lanceolate. Anthers ca. 1.5 mm, base obtuse, appendages ovate-oblong. Style branches ca. 0.5 mm, apex truncate. Achenes cylindric, ca. 1 mm, smooth, glabrous. Pappus white, ca. 2.5 mm. Fl. May–Jun, fr. Jun. $2n = 144$*.

• Streamsides, rocky cliffs under waterfalls; 1200–1700 m. Chongqing (Nanchuan).

Sinosenecio nanchuanicus resembles *S. confervifer* in posture and leaf shape but is distinguished by the leaf blade smaller, adaxially dark green, the veins impressed adaxially, and the capitula strictly solitary.

41. Sinosenecio qii S. W. Liu & T. N. Ho in Y. R. Lin et al., Int. Symp. *Artemisia* Allies, 185. 2005.

承经蒲儿根 cheng jing pu er gen

Herbs, scapigerous. Rhizomes short. Stems solitary, scapiform, erect, slender, ca. 32 cm tall, densely white tomentose at base, glabrous in middle and upper parts. Leaves 3, radical, long petiolate; petiole ca. 3 cm, densely arachnoid-pubescent; blade orbicular, 5–7 × 5–7 cm, thinly papery, abaxially sparsely pale arachnoid-pubescent, adaxially sparsely pubescent, palmately 7–9-veined, base cordate, margin subentire, ciliate. Capitula many in corymbs; peduncles 2–3 cm, 1-bracteate at middle. Involucres campanulate, 3–5 × 3–4 mm, ecalyculate; phyllaries 10–13, lanceolate, ca. 4 × 1.5 mm, apex acute, glabrous. Ray florets yellow; corolla tube ca. 2 mm; lamina lanceolate, 5–6 × ca. 2 mm, apex acute. Disk florets many; corolla ca. 3 mm, limb campanulate or cupular. Achenes cylindric, ca. 2.5 mm, ribbed, glabrous. Pappus absent. Fl. Jun, fr. Jul.

• Woods. S Hunan (Jianghua).

Sinosenecio qii is imperfectly known. It was described from a single locality in S Hunan. The type material includes only one fruiting plant without any florets. The species may be somewhat related to *S. globiger*, but it differs by the absence of stem leaves. More material is needed to confirm this character and to increase the list of differences between the species and its putative relatives.

104. TEPHROSERIS (Reichenbach) Reichenbach, Deut. Bot. Herb.-Buch (Nom.), 87. 1841.

狗舌草属 gou she cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

Cineraria sect. *Tephroseris* Reichenbach, Fl. Germ. Excurs. 241. 1831.

Herbs, erect, perennial, rarely stoloniferous, rhizomatous, or rarely biennial or annual, with fibrous roots. Stems leafy, sometimes subscapiform, often arachnoid-tomentose at least when young. Leaves simple, petiolate or sessile, both radical and on stem. Radical leaves rosulate, persistent at or withered by anthesis; petiole winged or not winged, basally not auriculate; blade broadly ovate or deltoid to linear-spatulate, pinnately veined, base cordate to attenuate, margin coarsely sinuate-serrate or dentate to subentire. Capitula usually few to rather numerous, arranged in terminal, subumbelliform, simple or compound, corymbose cymes, rarely solitary, heterogamous and radiate, sometimes also homogamous and discoid, pedunculate. Involucres hemispheric, campanulate, or cylindric-campanulate, not calyculate, receptacle flat; phyllaries 18–25, rarely 13, uniseriate, linear-lanceolate or lanceolate, herbaceous, margin usually narrowly scarious or membranous. Ray florets 7–15, commonly 13, rarely 18 or 20–25; lamina yellow, orange, or purplish red, oblong, rarely linear or elliptic-oblong, 4-veined, apically usually 3-denticulate. Disk florets many, corolla yellow, orange, or orange-red, sometimes purple tinged; limb funnelform or rarely campanulate; lobes 5. Anthers linear-oblong, rarely oblong, base usually obtuse to rounded; antheropodium narrowly cylindric to cylindric, somewhat broader than filament, cells uniform, endothecial cell wall thickenings numerous, polar and radial. Style branches convex or less often truncate, with short, often few, obtuse marginal papillae. Achenes cylindric, ribbed, glabrous or sparsely to strongly pubescent. Pappus capillary-like, uniform, white or rarely rubescent, persistent, present in all florets.

About 50 species: temperate and arctic regions of Asia and Europe, and extending into North America; 14 species (four endemic) in China.

Tephroseris first appeared in the literature as the epithet of the name of a taxon of *Cineraria* Linnaeus of infrageneric, supraspecific rank (conventionally treated as sectional), validly published by Reichenbach in 1831: *C.* sect. *Tephroseris* Reichenbach (Fl. Germ. Excurs. 241. 1831). This taxon was later raised to generic rank by Reichenbach in 1841 as *Tephroseris* (Reichenbach) Reichenbach (Deut. Bot. Herb.-Buch (Nom.), 87. 1841). There, Reichenbach accepted three infrageneric, supraspecific taxa (conventionally treated as sections) within his genus, one of which was "3. *Pericallis* DeC." [sic]. This refers to Candolle (Prodr. 6: 340. 1838), who treated "*Pericallis* D. Don" in synonymy under *Senecio* but treated the species of that affinity (loc. cit.: 409) under *S.* "Ser. IX. *Canarienses*" [a nomen nudum] "§ [i.e., unranked]. 1. *Pericallides*" and nowhere there cited Don. However, within that taxon (loc. cit.: 410), Candolle included *S. tussilaginis* (L'Héritier) Lindley, the type (by monotypy, as *P. tussilaginis* (L'Héritier) D. Don) of the generic name *Pericallis* D. Don (in Swartz, Brit. Fl. Gard. 6: 228. 1838). Reichenbach, in citing "3. *Pericallis* DeC." under *Tephroseris*, effectively transferred *S.* [unranked] *Pericallides* Candolle to *Tephroseris*, as *T.* sect. *Pericallides* (Candolle) Reichenbach, and thereby implicitly included the type of *Pericallis* D. Don (1838) within *Tephroseris* (Reichenbach) Reichenbach (1841). The latter was therefore nomenclaturally superfluous when published (*Vienna Code*, Art. 52.1), but not illegitimate because it has a basionym (Art. 52.3). The following year, Reichenbach accepted *Tephroseris* (Reichenbach) Reichenbach in his Deutsche Bot. Fl. Sax. (146. 1842), and there (as in the present treatment) the generic name was correct because *Pericallis* was not included.

1a. Plants biennial or annual; pappus hairs conspicuously elongating at fruiting; ray lamina pale yellow ..... 14. *T. palustris*
1b. Plants perennial; pappus hairs not conspicuously elongating at fruiting; ray lamina yellow, orange, or purplish red.
2a. Plants with long flagelliform stolons arising from base ..... 1. *T. stolonifera*
2b. Plants without stolons.
3a. Achenes pubescent at least in part.
4a. Ray lamina yellow, 6–11 mm.
5a. Stem leaves and peduncles densely arachnoid and fulvous pubescent; radical leaves ovate or ovate-oblong, basally cordate or truncate; petioles not winged; achenes sparsely pubescent ..... 11. *T. phaeantha*
5b. Stem leaves and peduncles usually densely arachnoid-tomentose; radical leaves oblong or obovate-oblong, basally cuneate to attenuate; petioles winged; achenes densely hirsute ..... 12. *T. kirilowii*
4b. Ray lamina orange to purplish red, 15–20 mm.
6a. Radical leaves present at anthesis; phyllaries 20–22; ray lamina oblong ..... 10. *T. rufa*
6b. Radical leaves withered by anthesis; phyllaries ca. 25; ray lamina linear ..... 13. *T. flammea*
3b. Achenes glabrous.
7a. Ray lamina orange or dark purplish red; involucres dark purple or fuscous-purple.
8a. Stem 10–20 cm tall, densely glandular villous and multicellular hairy; ray lamina orange with purple streaks, ca. 15 mm; pappus white, ca. 5.5 mm ..... 9. *T. turczaninovii*

8b. Stem to 60 cm tall, floccose-tomentose; ray lamina orange to dark purplish red, ca. 20 mm; pappus rubescent, 3.5–4 mm ..... 10. *T. rufa*

7b. Ray lamina yellow; involucres green.

9a. Involucres 7–9 mm; stem floccose-tomentose or arachnoid-tomentose, or rarely glabrescent.

10a. Phyllaries densely fulvous glandular pubescent; ray lamina ca. 17 mm ..... 8. *T. adenolepis*

10b. Phyllaries 20–22, sparsely arachnoid or puberulent.

11a. Stem and leaves arachnoid; involucres 10–14 mm in diam.; ray florets 20–25, lamina 7–8 mm ..... 6. *T. pierotii*

11b. Stem and leaves puberulent or subglabrous; involucres 6–8 mm in diam.; ray florets 13–15, lamina ca. 12 mm ..... 7. *T. taitoensis*

9b. Involucres 4–6 mm; stem sparsely arachnoid or ± glabrous.

12a. Phyllaries 20–25, lanceolate, sparsely puberulent; ray lamina ca. 10 mm; stem leaves basally auriculate and subamplexicaul ..... 4. *T. pseudosonchus*

12b. Phyllaries 13–20, glabrous or hairy; ray lamina less than 8 mm; leaves basally not auriculate.

13a. Leaf blades cordate-hastate; phyllaries 13; ray florets 7 ..... 5. *T. koreana*

13b. Leaf blades spatulate to ovate, not cordate; phyllaries 15–20; ray florets 13–20.

14a. Phyllaries 18–20, glabrous; ray lamina 6–7 mm; leaves spatulate, linear-spatulate, or oblanceolate, margin entire or subentire ..... 2. *T. subdentata*

14b. Phyllaries 15 or 16, arachnoid; ray lamina 5–6 mm; leaves ovate, apically obtuse to rounded, margin sparsely denticulate ..... 3. *T. praticola*

1. Tephroseris stolonifera (Cufodontis) Holub, Folia Geobot. Phytotax. 8: 174. 1973.

蒲枝狗舌草 pu zhi gou she cao

Senecio stolonifer Cufodontis, Repert. Spec. Nov. Regni Veg. Beih. 70: 100. 1933.

Herbs, stoloniferous, rhizomatous. Stolons slender, flagelliform, with elongated internodes and very small leaves. Stem solitary, erect, leafy, 30–60(–80) cm tall, floccose-tomentose, ± glabrescent. Radical leaves several, rosulate, petiolate, usually present at anthesis; petiole 1.5–12 cm, rather broad, floccose-tomentose, fulvous hirtellous; blade adaxially green, broadly ovate or ovate-spatulate, 5–8 × 3–5 cm, papery, abaxially arachnoid or floccose-tomentose, adaxially thinly arachnoid-tomentose and glabrescent, lateral veins 6, base broadly cuneate or subcordate and narrowly decurrent into petiole, margin subentire or remotely shallowly repand-dentate, apex obtuse to rounded, apiculate. Lower and median stem leaves similar but smaller, more shortly petiolate to subsessile, ovate to lanceolate, 3–6 × 0.5–1.5 cm. Upper leaves lanceolate to linear, sessile, bractlike. Capitula 2.5–3 cm in diam., 5–15 in terminal subumbelliform corymbs or compound corymbs; peduncles 1.5–3.5 cm, white arachnoid, fulvous puberulent, with a basal subulate bract, not bracteolate. Involucres broadly campanulate, 7–8 × 5–7 mm, not calyculate; phyllaries ca. 20, linear-lanceolate, 1–1.5 mm wide, herbaceous, with submembranous margin, ± glabrous, apex acuminate and sparsely puberulent. Ray florets 11–13, corolla tube ca. 5 mm; lamina oblong, ca. 9 × 2–2.5 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets numerous; corolla yellow, ca. 7 mm, with 4–5 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.7 mm, basally obtuse to rounded, appendages ovate-lanceolate. Style branches ca. 0.5 mm. Achenes cylindric, 2.5–3 mm, glabrous. Pappus white, ca. 7 mm. Fl. Apr–Jun.

• Wet places, streamsides; 1400–2800 m. SW Sichuan, NW Yunnan.

2. Tephroseris subdentata (Bunge) Holub, Folia Geobot. Phytotax. 8: 174. 1973.

尖齿狗舌草 jian chi gou she cao

Cineraria subdentata Bunge, Enum. Pl. China Bor. 39. 1833; *C. pratensis* Hoppe ex Reichenbach var. *borealis* Herder; *Crepis chanetii* H. Léveillé; *Senecio campestris* (Retzius) Candolle var. *subdentatus* (Bunge) Maximowicz; *S. imaii* Nakai; *S. linaresensis* Soldano; *S. pratensis* (Hoppe ex Reichenbach) Candolle var. *polycephalus* Regel; *S. pseudosonchus* Vaniot var. *borealis* (Herder) S. Y. Hu; *S. pseudosonchus* var. *polycephalus* (Regel) Kitamura; *S. subdentatus* (Bunge) Turczaninow (1837), not Ledebour (1833); *S. subdentatus* var. *borealis* (Herder) Cufodontis; *S. subdentatus* var. *polycephalus* (Regel) Cufodontis; *Tephroseris polycephala* (Regel) Barkalov.

Herbs, rhizomatous. Stem solitary, erect, leafy, 20–60 cm tall, at first sparsely arachnoid, ± glabrescent. Radical leaves several, rosulate, usually present at anthesis, long petiolate; petiole 2–13 cm, narrowly winged, sparsely arachnoid, glabrescent, basally expanded; leaf blade spatulate, linear-spatulate, or oblanceolate, 6–15(–22) × 1–2 cm, papery, both surfaces sparsely arachnoid and glabrescent, pinnately veined, base gradually narrowed into petiole, margin entire, subentire, or irregularly mucronulate-dentate, apex obtuse to subacute. Lower stem leaves similar to radical leaves. Median leaves sessile, lanceolate to linear, 4–9 × 0.5–1 cm, smaller upward, margin entire or few toothed, apex acute or acute-acuminate. Upper leaves linear or linear-subulate, bractlike. Capitula 1.5–2 cm in diam., 7–30, arranged in terminal subumbelliform corymbs or compound corymbs; peduncles 1.5–3 cm, sparsely arachnoid and fulvous puberulent, basally bracteate; bracts linear-subulate, 7–8 mm, apically acuminate. Involucres campanulate, 4.5–5 × 4–5 mm, not calyculate; phyllaries 18–20, lanceolate or linear-lanceolate,

0.5–1 mm wide, herbaceous, with narrow membranous margin, glabrous, apex acuminate or long acuminate and green or somewhat purplish. Ray florets 13–15, corolla tube ca. 4 mm, glabrous; lamina yellow, oblong, 6–7 × 1.5–2 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, 6–7 mm with ca. 3.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 0.7 mm. Achenes cylindric, ca. 2 mm, glabrous. Pappus white, 6–9 mm. Fl. Jun–Jul.

Wet meadows, damp places. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai [Korea, Russia (Far East, E Siberia)].

Probatova and Barkalov (in Kozhevnikov & Probatova, Fl. Ross. Dal'nego Vostoka, 253. 2006) elevated *Senecio pratensis* var. *polycephalus* to the rank of species, i.e., *Tephroseris polycephala*, which is doubtfully specifically distinct.

3. Tephroseris praticola (Schischkin & Sergievskaya) Holub, Folia Geobot. Phytotax. 8: 174. 1973.

草原狗舌草 cao yuan gou she cao

Senecio praticola Schischkin & Sergievskaya, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1949(1–2): 28. 1949; *S. asiaticus* Schischkin & Sergievskaya; *S. campestris* (Retzius) Candolle var. *glabratus* Candolle; *S. glabellus* Candolle (1838), not Poiret (1806); *S. integrifolius* (Linnaeus) Clairville var. *glabratus* (Candolle) Cufodontis; *S. subdentatus* Ledebour var. *glabellus* Cufodontis.

Herbs, rhizomatous. Stem solitary, erect, 20–40 cm tall, simple, green or purplish at base, glabrous or sparsely arachnoid. Radical leaves present at anthesis; petiole 3.5–4 cm, not winged or inconspicuously narrowly winged; blade ovate, 2–4.5 × 1–2 cm, both surfaces inconspicuously arachnoid or subglabrous, base narrowed into petiole, margin sparsely denticulate or subentire, apex obtuse to rounded. Lower stem leaves similar to basal leaves. Median stem leaves sessile, usually lanceolate, 3–4 × 0.3–0.5 cm, base subamplexicaul, margin entire or denticulate, apex rather acute or obtuse. Upper leaves smaller, linear, apex acuminate or acute. Capitula 2–12, arranged in terminal corymb; peduncles 1.5–2 cm, not bracteate, white arachnoid. Involucres hemispheric-campanulate, 5–8 × 5–7(–10) mm; phyllaries 15 or 16, herbaceous, linear-lanceolate, sparsely arachnoid or rarely subglabrous, apically acuminate. Ray florets 12–20, corolla yellow, tube 3–4 mm; lamina 5–6 × 1.5–2 mm, apically 3-denticulate. Disk florets numerous; corolla yellow, ca. 7 mm, with ca. 4 mm tube and funnelform limb; lobes lanceolate, ca. 1 mm. Anthers linear-oblong, basally obtuse. Style branches ca. 1 mm. Achenes cylindric, 2–2.5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Jun–Jul.

Meadows; 3000–3200 m. N Xinjiang (Altay) [Russia (Siberia)].

4. Tephroseris pseudosonchus (Vaniot) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 272. 1984.

黔狗舌草 qian gou she cao

Senecio pseudosonchus Vaniot, Bull. Acad. Int. Géogr. Bot. 11: 349. 1902.

Herbs, rhizomatous. Stem solitary, erect, 50–70 cm tall, rather stout, simple, sparsely arachnoid when young, glabrescent. Radical leaves usually present at anthesis, several, rosulate, long petiolate; petiole 3–17 cm, winged, glabrescent, basally expanded; blade ovate-elliptic to oblanceolate, 6–15 × 2.5–4 cm, papery, both surfaces at first sparsely arachnoid, glabrescent, pinnately veined, lateral veins 10–12, base cuneately narrowed into petiole, margin repand with mucronulate teeth, apex obtuse to rarely acute. Lower stem leaves similar to radical leaves. Median leaves sessile, oblong or oblong-lanceolate, 6–15 × 1–3 cm, smaller upward, base auriculate and amplexicaul, apex obtuse to acute. Upper leaves linear-lanceolate, bractlike. Capitula 2.5–3 cm in diam., 6–12 arranged in simple or compound subumbelliform terminal corymbs; peduncles 1.5–4.5 cm, sparsely pubescent, basally bracteate, not bracteolate, or with a linear-subulate bract in upper part, slightly dilated at apex. Involucres broadly campanulate or hemispheric, 5–6 × 6–7 mm, not calyculate; phyllaries 20–25, lanceolate, ca. 1.5 mm wide, herbaceous, with membranous margin, sparsely pubescent or glabrous, apically acuminate. Ray florets 13–15, corolla tube ca. 4 mm, glabrous; lamina yellow, oblong, ca. 10 × 2.5–3 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 7–7.5 mm, with 3.8–4 mm tube and campanulate limb; lobes ovate-triangular, ca. 1.2 mm, apically papillose. Anthers linear-oblong, ca. 2 mm, basally obtuse, appendages ovate-lanceolate; style branches ca. 0.5 mm. Achenes cylindric, 2–2.5 mm, glabrous. Pappus white, 7–7.5 mm. Fl. Apr–May.

• Streamsides, wet meadows; 300–400 m. Guizhou, Hubei, Hunan, Shaanxi, Shanxi.

5. Tephroseris koreana (Komarov) B. Nordenstam & Pelser, Compositae Newslett. 49: 5. 2011.

朝鲜蒲儿根 chao xian pu er gen

Senecio koreanus Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 421. 1901; *Sinosenecio koreanus* (Komarov) B. Nordenstam.

Herbs, with leafy stems. Rhizomes 10–15 mm in diam., clad in persistent brown petiole bases. Stem solitary, erect, green or purplish, 30–60 cm tall, 3–4 mm in diam. at base, simple, sparsely arachnoid or pubescent, glabrescent. Radical leaves mostly withered by anthesis, long petiolate; petiole 5–17 cm, slender, sparsely arachnoid or subglabrous, not winged, basally slightly expanded; blade abaxially pale green, adaxially green, deltoid or deltoid-cordate, 4–7 × 2.5–4 cm, abaxially sparsely arachnoid-tomentose, adaxially sparsely pubescent, base broadly cordate, margin coarsely dentate with deltoid mucronulate teeth, apex acute-acuminate. Lower and median stem leaf petioles 8–13 cm, slightly winged, basally subamplexicaul; blades similar in shape and size to basal leaves, 3–8 × 3–6 cm, base cordate or hastate. Upper stem leaves shortly petiolate; blades gradually smaller upward, deltoid-lanceolate to lanceolate, base cuneate. Capitula rather numerous, in terminal corymbs; peduncles 2–3.4 cm, slender, with or without a basal linear bract, usually not bracteolate, glandular puberulent or subglabrous. Involucres campanulate, ca. 5 × 4–6 mm, not calyculate; phyllaries ca. 13, uniseriate, oblong or oblong-linear,

herbaceous, sparsely puberulent, margin scarious, apically acute to obtuse or shortly acuminate, and white ciliate. Ray florets ca. 7; corolla tube ca. 2.5 cm, glabrous; lamina oblong, ca. 8 × 2.5–3 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, 5.5–6 mm, with ca. 2.5 mm tube and campanulate limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers oblong, ca. 1.7 mm, basally obtuse; appendages ovate-oblong. Style branches recurved. Achenes cylindric, 2–2.5 mm, glabrous, ribbed. Pappus white, ca. 5 mm. Fl. Jun, fr. Aug.

Wet forests. Jilin (Changbai Shan), Liaoning [Korea].

Until recently, *Tephroseris koreana* was treated in *Sinosenecio*, but it was transferred to *Tephroseris* on the basis of molecular and other evidence (Nordenstam & Pelser, Compositae Newslett. 49: 5. 2011).

However, one of us (Jeffrey) does not accept the transfer of *Sinosenecio koreanus* to *Tephroseris*; i.e., phenetically, *S. koreanus* is *Sinosenecio*, not *Tephroseris*, as shown by the combination of leaf shape and venation, low phyllary and ray floret numbers, short ray floret and disk floret corolla tubes, and campanulate disk floret corolla limbs.

6. Tephroseris pierotii (Miquel) Holub, Folia Geobot. Phytotax. 8: 174. 1973.

浙江狗舌草 zhe jiang gou she cao

Senecio pierotii Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 182. 1866; *S. subdentatus* Ledebour var. *pierotii* (Miquel) Cufodontis.

Herbs, rhizomatous. Stem solitary, erect, 50–60 cm tall, rather stout, simple, arachnoid or ± glabrescent. Radical leaves usually present at anthesis, several, rosulate, long petiolate; petiole 4–10 cm, ± winged, at first arachnoid-tomentose, glabrescent, basally expanded; leaf blade oblong, narrowly oblong, or oblanceolate, 12–20 × 1.5–3 cm, papery, both surfaces at first arachnoid-tomentose, later ± glabrescent, pinnately veined, base cuneate or gradually narrowed into petiole, margin mucronulate-dentate or sometimes subentire, apex obtuse to subacute. Stem leaves rather numerous, sessile; lower leaves oblong to oblanceolate, base subamplexicaul; upper leaves gradually smaller upward, lanceolate to linear, base broadly subamplexicaul, apex acuminate; uppermost leaves bractlike, linear or linear-subulate, white arachnoid-tomentose, apex acute. Capitula 2.5–3 cm in diam., usually 6–30 arranged in subumbelliform or umbelliform corymbs; peduncles to 5 cm, sparsely arachnoid or pubescent, basally bracteate, not bracteolate; bracts linear-subulate. Involucres hemispheric, 7–8.5 × 10–14 mm, not calyculate; phyllaries 20–22, broadly lanceolate, ca. 1 mm wide, herbaceous, with membranous margin, sparsely arachnoid or glabrescent, apex acute-acuminate. Ray florets 20–25; corolla tube 4–6 mm; lamina yellow, 7–8 mm, oblong, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 7–9 mm, with 5–6 mm tube and funnelform limb; lobes ovate-oblong, 1–1.2 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse. Style branches ca. 1 mm. Achenes cylindric, 2.5–3 mm, glabrous. Pappus white, 7–9 mm. Fl. Apr–May.

Marshes, wet places; 300–500 m. Fujian, Heilongjiang, Jiangsu, Liaoning, Zhejiang [Japan, Korea].

7. Tephroseris taitoensis (Hayata) Holub, Folia Geobot. Phytotax. 8: 174. 1973 [*"taitonensis"*].

台东狗舌草 tai dong gou she cao

Senecio taitoensis Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 156. 1911; *S. pierotii* Miquel var. *taitoensis* (Hayata) Kitamura; *S. subdentatus* Ledebour var. *taitoensis* (Hayata) Cufodontis.

Herbs, rhizomatous. Stem solitary, erect, 30–60 cm tall, simple, sparsely arachnoid to subglabrous. Radical leaves few, usually present at anthesis, rosulate; petiole 3–6 cm, winged, basally expanded; blade ovate-oblong or broadly oblong, 9–15 × 4.5–6.5 cm, thinly papery, glabrous, base cuneate-attenuate into petiole, margin irregularly repand-dentate to subentire, apex obtuse to rounded, apiculate. Stem leaves few, progressively smaller upward; lower leaves shortly petiolate, oblong or oblanceolate-oblong, basally subamplexicaul; upper leaves sessile, ovate-lanceolate or lanceolate, margin few dentate or entire, apically obtuse to subacute; uppermost leaves small, bractlike. Capitula 2.5–3 cm in diam., 8–12 arranged in terminal subumbelliform simple or compound corymbs; peduncles 1.5–4 cm, slender, pubescent, basally bracteate, not bracteolate; bracts linear-subulate. Involucres campanulate, 6–7 × 6–8 mm, not calyculate; phyllaries 20–22, lanceolate or linear-lanceolate, 0.8–1 mm wide, herbaceous, with narrow membranous margin, glabrous, apex acuminate. Ray florets 13–15; corolla tube ca. 7 mm; lamina yellow, ca. 12 × 2.5 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets: corolla yellow, 11–12 mm, with 8–8.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 0.5 mm. Achenes cylindric, 2–2.5 mm, glabrous. Pappus white, 10–11 mm. Fl. Mar–Apr.

● Marshes. Taiwan.

8. Tephroseris adenolepis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 275. 1984.

腺苞狗舌草 xian bao gou she cao

Herbs, rhizomatous. Stem solitary, erect, 40–50 cm tall, simple, rather densely white arachnoid-tomentose, glandular pubescent. Radical leaves several, usually present at anthesis, rosulate, long petiolate; petiole 2–7 cm, narrowly winged, arachnoid-tomentose, basally expanded; blade obovate-lanceolate or elliptic-lanceolate, 6–12 × 1.5–3 cm, papery, both surfaces white arachnoid-tomentose, base cuneate or attenuate into petiole, margin subentire or obscurely mucronulate-dentate, apex obtuse to rounded, mucronulate. Stem leaves few, progressively smaller upward. Lower leaves petiolate, oblanceolate-oblong or spatulate, 12–15 × 1.5–2.5 cm, attenuate into a broadly winged, basally subamplexicaul petiole; upper leaves small, linear-lanceolate or linear. Capitula 3–3.5 cm in diam., 3–8 arranged in terminal umbelliform corymbs; peduncles 3–9 cm, rather stout, sparsely arachnoid, also brownish glandular hairy, with or without a small linear basal bract, not bracteolate. Involucres broadly campanulate, 8–9 × ca. 10 mm, not calyculate; phyllaries ca. 18, lanceolate, ca. 1.5 mm wide, herbaceous, with narrow membranous margin, densely glandular pu-

bescent with brownish hairs, apically acute-acuminate. Ray florets 13–15; corolla tube ca. 7 mm; lamina yellow, oblong, ca. 17 × 2.5 mm, 4-veined, apically 2- or 3-denticulate. Disk florets many; corolla yellow, ca. 8.5 mm, with ca. 5.5 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.7 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 0.8 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus white, 7–7.5 mm. Fl. Jul–Aug.

Stony mountain slopes. Not recorded from China but expected in Heilongjiang, Jilin, and adjacent mountains [Russia (Far East)].

Probatova and Barkalov (in Kozhevnikov & Probatova, Fl. Ross. Dal'nego Vostoka, 254. 2006) considered that this may be a synonym of *Tephroseris subscaposa* (Komarov) Czerepanov (Vasc. Pl. Russia, 108. 1995).

9. Tephroseris turczaninovii (Candolle) Holub, Folia Geobot. Phytotax. 8: 174. 1973.

天山狗舌草 tian shan gou she cao

Senecio turczaninovii Candolle, Prodr. 6: 360. 1838; *Cineraria frigida* Richardson var. *robusta* Herder; *S. integrifolius* (Linnaeus) Clairville var. *robustus* (Herder) Cufodontis; *S. nemorensis* Linnaeus var. *turczaninovii* (Candolle) Komarov; *S. sarracenicus* Linnaeus var. *turczaninovii* (Candolle) Nakai.

Herbs, rhizomatous. Stems solitary, rarely 2 or 3, erect, 10–20 cm tall, simple, at first arachnoid-tomentose, glabrescent, glandular villous with purplish hairs in upper part. Radical leaves several, present at or withered by anthesis, rosulate, long petiolate; petiole 2–8 cm, narrowly winged in upper part, sparsely arachnoid, glabrescent, basally expanded; blade oblong-ovate, 3–10 × 1–2 cm, papery, sparsely white arachnoid, base cuneate or attenuate into petiole, margin entire or sinuate-dentate, apex obtuse to rounded, apiculate. Median stem leaves sessile, oblong-lanceolate or lanceolate, 4–10 × 0.8–2 cm, base expanded and subamplexicaul, margin few dentate or subentire, apex obtuse. Upper leaves lanceolate or linear-lanceolate, base cordate and subamplexicaul. Capitula ca. 3 cm in diam., sometimes discoid, 2 or 3(–6) arranged in terminal corymbs; peduncles 0.5–2 cm, densely arachnoid-lanate, bracteate at base, not bracteolate. Involucres broadly campanulate, 8–12 × ca. 10 mm, not calyculate; phyllaries 18–20, dark purple, lanceolate or linear-lanceolate, 1–1.5 mm wide, herbaceous, densely glandular villous with dark purple hairs, apex acuminate. Ray florets ca. 15; corolla tube ca. 3.5 mm; lamina orange-yellow, oblong, ca. 15 × 3–3.5 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla deep yellow, ca. 6.5 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers obtuse at base, appendages ovate-lanceolate. Style branches ca. 1 mm. Achenes cylindric, 2.5–3 mm, glabrous. Pappus white, ca. 5.5 mm. Fl. Jul–Aug. $2n = 90, 104$.

Montane meadows; below 3000 m. N Xinjiang (Altay) [Mongolia, Russia (Siberia)].

10. Tephroseris rufa (Handel-Mazzetti) B. Nordenstam, Opera Bot. 44: 45. 1978.

橙舌狗舌草 cheng she gou she cao

Herbs, rhizomatous. Stem solitary, erect, green or purplish in lower part, 9–60 cm tall, white floccose-tomentose, often ± glabrescent. Radical leaves several, present at anthesis, rosulate, shortly petiolate; petiole 0.5–3 cm, broadly to narrowly winged, basally expanded; blade ovate, elliptic, or oblanceolate, 2–10 × 1.5–3 cm, papery, both surfaces at first sparsely arachnoid-tomentose, glabrescent, pinnately veined, base cuneate-attenuate into petiole, margin entire or remotely mucronulate-dentate, apex obtuse to rounded. Lower stem leaves oblong or oblong-spatulate; median leaves sessile, oblong or oblong-lanceolate, 3–6 × 0.5–1 cm, progressively smaller upward, base expanded and subamplexicaul, apex obtuse; upper leaves linear-lanceolate to linear, both surfaces sparsely arachnoid and glabrescent to subglabrous, and sparsely to densely pilose, apex acute. Capitula radiate, less often discoid, 2–20 arranged in dense to lax terminal subumbelliform corymbs; peduncles 1–4.5 cm, densely to sparsely white arachnoid-tomentose, and pilose, linear-bracteate at base, bracteolate or not. Involucres campanulate, 6–7 × 7–10 mm, not calyculate; phyllaries 20–22, wholly fulvous-purple or purple only at apex, lanceolate to linear-lanceolate, 1–1.5 mm, herbaceous, densely to sparsely arachnoid and fulvous pilose to glabrescent, apically acute-acuminate. Ray florets ca. 15, corolla tube ca. 5 mm; lamina yellow, 4-veined, 3-denticulate. Disk florets many; corolla orange to orange-red or yellow with orange lobes, 7–8 mm, with 3.5–4 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally obtuse, appendages ovate-lanceolate. Achenes cylindric, ca. 3 mm, glabrous or pubescent. Pappus somewhat rubescent, 3.5–4 mm. Fl. Jun–Aug.

• Montane meadows, slopes, roadsides; 2600–4000 m. Gansu, Hebei, Qinghai, Shaanxi, Shanxi, NW Sichuan, NE Xizang.

1a. Achenes glabrous ..... 10a. var. *rufa*
1b. Achenes pubescent ..... 10b. var. *chaetocarpa*

10a. Tephroseris rufa var. **rufa**

橙舌狗舌草(原变种) cheng she gou she cao (yuan bian zhong)

Senecio rufus Handel-Mazzetti, Acta Horti Gothob. 12: 291. 1938; *S. flammeus* Turczaninow ex Candolle var. *rufus* (Handel-Mazzetti) Z. Ying Zhang & Y. H. Guo.

Achenes glabrous.

• Montane meadows; 2600–4000 m. SW Gansu, Hebei, SE Qinghai, Shaanxi, NW Sichuan, NE Xizang.

10b. Tephroseris rufa var. **chaetocarpa** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 279. 1984.

毛果橙舌狗舌草 mao guo cheng she gou she cao

Tephroseris flammea (Turczaninow ex Candolle) Holub var. *chaetocarpa* (C. Jeffrey & Y. L. Chen) Y. M. Yuan.

Achenes pubescent.

• Slopes, meadows, roadsides; 2800–3200 m. Gansu, Hebei, Qinghai, Shanxi.

11. Tephroseris phaeantha (Nakai) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 279. 1984.

长白狗舌草 chang bai gou she cao

Senecio phaeanthus Nakai, Bot. Mag. (Tokyo) 31: 110. 1917; *S. birubonensis* Kitamura; *S. fauriei* H. Léveillé (1910), not *S. fauriae* Franchet (1888); *S. integrifolius* (Linnaeus) Clairville subsp. *fauriei* Kitamura; *Tephroseris birubonensis* (Kitamura) B. Nordenstam.

Herbs, rhizomatous. Stem solitary, erect, subscapiform, 13–45 cm tall, simple, sparsely arachnoid and pubescent, ± glabrescent after anthesis. Radical leaves few to several, present at anthesis, rosulate; petiole 2–6(–8) cm, densely arachnoid and pubescent, not winged, basally slightly expanded; blade ovate-oblong or elliptic, 6–13 × 2–4 cm, papery, both surfaces arachnoid and fulvous pubescent, somewhat glabrescent, pinnately veined, lateral veins 10–14, obscure, margin irregularly sinuate-serrate or dentate with mucronulate teeth, apex rounded. Stem leaves few, progressively smaller upward; lower and median oblong, with winged petioles or sessile, lanceolate, sparsely arachnoid, glandular pubescent, margin subentire or mucronulate-serrate, apex obtuse to acute or acuminate. Capitula 1.8–2.5 cm in diam., 2–6(–8) arranged in terminal umbelliform corymbs; peduncles 1.5–4(–6) cm, sparsely arachnoid, densely glandular with fulvous hairs, basally bracteate, not bracteolate. Involucres campanulate, 7–8 × 7–9 mm, not calyculate; phyllaries 18–20, lanceolate, ca. 1 mm wide, herbaceous, purple and glandular ciliate at margin in upper part, sparsely arachnoid and fulvous puberulent to glabrescent, margin narrowly scarious, apically acute-acuminate. Ray florets ca. 13; corolla tube 2.5–3 mm; lamina yellow, oblong, ca. 11 × 2–2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, with fuscous-purplish lobes, ca. 6.5 mm, with 2.5–3 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 1 mm. Achenes cylindric, 3–3.5 mm, sparsely pubescent to subglabrous. Pappus white, ca. 6 mm. Fl. Jul–Aug.

Rocky montane slopes; 2000–2500 m. Jilin (Changbai Shan) [Korea].

12. Tephroseris kirilowii (Turczaninow ex Candolle) Holub, Folia Geobot. Phytotax. 12: 429. 1977.

狗舌草 gou she cao

Senecio kirilowii Turczaninow ex Candolle, Prodr. 6: 361. 1838; *S. amurensis* Schischkin; *S. aurantiacus* (Hoppe ex Willdenow) Lessing var. *spathulatus* Miquel; *S. campestris* (Retzius) Candolle var. *tomentosus* Franchet; *S. integrifolius* (Linnaeus) Clairville subsp. *kirilowii* (Turczaninow ex Candolle) Kitagawa; *S. integrifolius* var. *spathulatus* (Miquel) H. Hara; ?*S. spathulifolius* Turczaninow; *S. tashiroi* Hayata; *Tephroseris integrifolia* (Linnaeus) Holub subsp. *kirilowii* (Turczaninow ex Candolle) B. Nordenstam.

Herbs, rhizomatous. Stems solitary or rarely 2 or 3, erect, subscapiform, 20–60 cm tall, densely white arachnoid, sometimes ± glabrescent. Radical leaves several, present at anthesis, rosulate, shortly petiolate; blade oblong or ovate-oblong, 5–10 × 1.5–2.5 cm, both surfaces densely to sparsely white arachnoid-tomentose, base cuneate to gradually attenuate into narrowly to broadly winged petiole, margin irregularly mucronulate-dentate or subentire, apex obtuse. Stem leaves few, progressively smaller upward; lower leaves sessile, oblanceolate or oblanceolate-oblong, 4–8 × 0.5–1.5 cm, base subamplexicaul, apex obtuse to acute; upper leaves small, bractlike, lanceolate, apically acute. Capitula 1.5–2 cm in diam., 3–11 arranged in ± umbelliform terminal corymbs; peduncles 1.5–5 cm, densely arachnoid-tomentose, ± glandular with fulvous hairs, basally bracteate, not bracteolate. Involucres subcylindric-campanulate, 6–8 × 6–9 mm, not calyculate; phyllaries 18–20, lanceolate or linear-lanceolate, 1–1.5 mm wide, herbaceous, with narrow membranous margin, densely to sometimes sparsely arachnoid, sometimes ± glabrescent, apically acuminate or acute, and green or purplish. Ray florets 13–15; corolla tube 3–3.5 mm; lamina yellow, oblong, 6.5–7 × 2.5–3 mm, 4-veined, apically 3-denticulate, obtuse. Disk florets many; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2.2 mm, basally obtuse, appendages ovate-lanceolate. Style branches ca. 1 mm. Achenes cylindric, ca. 2.5 mm, densely hirsute. Pappus white, ca. 6 mm. Fl. Feb–Aug.

Grassy and stony slopes and meadows; 200–2000 m. Anhui, Fujian, Gansu, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang [Japan, Korea, Mongolia, Russia (Far East)].

Vibe (in Krasnoborov, Fl. Sibir. 13: 155–156. 1997) recorded *Tephroseris integrifolia* (Linnaeus) Holub for China; however, we have seen no specimens. *Tephroseris kirilowii* might prove not to be specifically distinct from *T. integrifolia*.

13. Tephroseris flammea (Turczaninow ex Candolle) Holub, Folia Geobot. Phytotax. 8: 173. 1973.

红轮狗舌草 hong lun gou she cao

Senecio flammeus Turczaninow ex Candolle, Prodr. 6: 362. 1838; *S. flammeus* var. *glabrifolius* Cufodontis; *S. flammeus* f. *limprichtii* Cufodontis; *S. flammeus* f. *simplex* Y. Ling; *S. longeligulatus* H. Léveillé & Vaniot; *Tephroseris flammea* subsp. *glabrifolia* (Cufodontis) B. Nordenstam.

Herbs, rhizomatous, with leafy stems. Stem solitary, erect, to 60 cm tall, white arachnoid-tomentose and pubescent, ± glabrescent. Radical leaves withered by anthesis, long petiolate; leaf blade elliptic-oblong, base cuneately narrowed, apex obtuse to acute. Lower stem leaves oblanceolate-oblong, 8–15 × 1.5–3 cm, thickly papery, both surfaces sparsely arachnoid-tomentose and pubescent or adaxially ± glabrescent and sometimes abaxially also, base cuneately narrowed into winged, subamplexicaul, slightly decurrent petiole, margin irregularly mucronate-dentate, apex obtuse to subacute, mucronulate. Median stem leaves sessile, elliptic, oblong, or oblong-lanceolate, apically acute to obtuse, mucronulate; upper leaves linear-lanceolate to linear, smaller. Capitula ca. 3 cm in diam., 2–9 arranged in ± umbelliform terminal corymbs; peduncles fulvous pubescent and usually white arachnoid-tomentose, basally bracteate, 2- or 3-bracteolate. Involucres campanulate, 5–6 × 6–10 mm, not calyculate; phyllaries ca. 25, lanceolate or linear-lanceolate, ca. 1 mm wide, herbaceous, dark purple, sparsely arachnoid or subglabrous, apex acute. Ray florets 13–15; corolla tube 3–3.5 mm; lamina dark orange, linear, 12–16 × ca. 1.6 mm, 4-veined, 3-denticulate. Disk florets many; corolla yellow or purplish

yellow, 6–6.5 mm, with ca. 3 mm tube and funnelform limb; lobes tinged purplish, ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse, appendages ovate-lanceolate. Achenes cylindric, 2.5–3 mm, pubescent. Pappus whitish, ca. 5.5 mm. Fl. Jul–Aug.

Montane meadows, forests; 1200–2100 m. Hebei, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shanxi [Russia (Far East, E Siberia)].

14. Tephroseris palustris (Linnaeus) Reichenbach, Fl. Saxon. 146. 1842.

湿生狗舌草 shi sheng gou she cao

Othonna palustris Linnaeus, Sp. Pl. 2: 924. 1753; *Cineraria congesta* R. Brown; *C. palustris* (Linnaeus) Linnaeus; *Senecio arcticus* Ruprecht; *S. congestus* (R. Brown) Candolle; *S. gracillimus* C. Winkler; *S. palustris* (Linnaeus) Hooker (1834), not Vellozo (1831); *S. palustris* var. *congestus* (R. Brown) Hooker; *Tephroseris palustris* subsp. *congesta* (R. Brown) Holub.

Herbs, biennial or annual, with numerous fibrous roots. Stem solitary, erect, 20–60 cm tall, hollow, glandular pubescent at upper part, leafy. Radical leaves petiolate, withered by anthesis; lower stem leaves petiolate; median stem leaves sessile, oblong or oblong-lanceolate or lanceolate-linear, 5–15 × 0.7–1.8 cm, papery, both surfaces glandular pubescent, rarely glabrous, base subamplexicaul, margin coarsely sinuate-serrate to repand-dentate or rarely entire, apex obtuse. Capitula radiate, few to many arranged in dense to lax terminal corymbs; peduncles densely glandular pubescent. Involucres campanulate, 5–7 × 5–7 mm, not calyculate; phyllaries 18–20, green, lanceolate, herbaceous, with membranous margin, sparsely glandular, apically acuminate. Ray florets 20–25; corolla tube 3–3.5 mm; lamina pale yellow, elliptic-oblong, ca. 5.5 × 2.5 mm, apically obtuse, 2- or 3-denticulate or entire. Disk florets many; corolla yellow, ca. 5 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-lanceolate, apically acute, papillose. Anthers ca. 1.2 mm, basally obtuse, appendages ovate-lanceolate. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus copious, white, 3–3.5 mm at anthesis, 12–13 mm in fruit. Fl. Jun–Aug.

Wet places; 600–1000 m. Hebei, Heilongjiang, Nei Mongol [circumboreal (except Greenland and most of NW Europe)].

105. NEMOSENECIO (Kitamura) B. Nordenstam, Opera Bot. 44: 45. 1978.

羽叶菊属 yu ye ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

Senecio sect. *Nemosenecio* Kitamura, Acta Phytotax. Geobot. 6: 266. 1937.

Herbs, perennial or biennial, erect, rhizomatous, with fibrous roots. Leaves alternate, herbaceous, green; basal and lower stem leaves usually fallen by anthesis; petiole unwinged; blade broadly ovate to ovate-oblong, pinnately veined, deeply pinnatipartite into usually lobulate or coarsely shortly dentate lobes. Capitula few to moderately numerous in terminal, lax, subumbelliform cymes, heterogamous, radiate; peduncles slender. Involucres ecalyculate, broadly campanulate, cupuliform, or subhemispheric; phyllaries 6–8 or 11–13, oblong to ovate-lanceolate, with minutely puberulent tips and scarious margins. Receptacle convex-hemispheric, alveolate, glabrous. Ray florets 5–13; lamina yellow, linear-lanceolate, oblong-lanceolate, or oblong, 4(–6)-veined, apically shortly bifid or 3-dentate. Disk florets many; corolla yellow, tube narrow; limb campanulate; lobes 5. Anthers rounded to obtuse at base; antheropodia narrowly cylindric to cylindric, not or somewhat broader than filaments, with uniform cells, endothecial cell wall thickenings scattered or radial, never strictly polarized. Style branches short, apically truncate, with rather short, obtuse marginal papillae, dorsally glabrous or minutely papillate. Achenes cylindric, ribbed, shortly pubescent or glabrous; carpopodium distinct. Pappus of barbellate bristles, persistent, or absent from all florets, white.

Six species: China, Japan; five species (all endemic) in China.

1a. Pappus absent from all florets ..... 5. *N. concinnus*
1b. Pappus present in all florets, at least when young.
2a. Phyllaries usually 6–8; achenes and ovary glabrous ..... 4. *N. solenoides*
2b. Phyllaries more than 10; achenes and ovary pubescent or apically sparsely setose.
3a. Capitula small; involucres 2–3 × 2–3 mm; ray lamina short, ca. 2 mm ..... 1. *N. formosanus*
3b. Capitula larger; involucres 4.5–7 × 3–8 mm; ray lamina 5–13 mm.
4a. Involucres 3–4 mm in diam.; leaves usually with 3 or 4(or 5) lateral lobes on each side; ray lamina 5–7 mm ..... 2. *N. incisifolius*
4b. Involucres 6–8 mm in diam.; leaves usually with 6 or 7 lateral lobes on each side; ray lamina 11–13 mm ..... 3. *N. yunnanensis*

1. Nemosenecio formosanus (Kitamura) B. Nordenstam, Opera Bot. 44: 46. 1978.

台湾刘寄奴 tai wan liu ji nu

Senecio formosanus Kitamura, Acta Phytotax. Geobot. 3: 140. 1934 [*"formosnus"*]; *S. nikoensis* Miquel var. *formosanus* Sasaki.

Plants biennial, stoloniferous; stems solitary, erect, green or purple, 9–60 cm tall, simple or branched above, ± pubescent with white crisped hairs. Basal leaves usually shed by anthesis; lower and median stem leaves petiolate; blade abaxially pale green, adaxially green, ovate-oblong, 2.5–15 × 1.5–6 cm, pinnatipartite or subbipinnatipartite with 3–6 lateral lobes on each side, both surfaces puberulent; lateral lobes spreading,

ovate-oblong or oblong, usually 3–6-denticulate, apex acute to obtuse; upper stem leaves progressively smaller, shortly petiolate. Capitula few to many, pseudoumbellate, pedunculate, 8–10 mm across ray florets; peduncles 0.5–2.2 cm, slender, minutely puberulent, ebracteolate. Involucres cupuliform, 2–3 × 2–3 mm; phyllaries 13, uniseriate, narrowly oblong, 3–4 × ca. 1 mm, herbaceous, externally glabrous, margin hyaline, ciliate, apex acuminate. Ray florets ca. 13; corolla tube ca. 2.5 mm; lamina oblong, ca. 2 × 1 mm, 4-veined, apically 3-dentate. Disk florets many; corolla yellow, ca. 3.5 mm, with tube ca. 2.5 mm and campanulate limb; lobes 5, ovate-triangular, ca. 0.5 mm, apex acute. Anthers oblong, ca. 0.5 mm, obtuse to rounded at base. Style branches ca. 0.5 mm. Achenes (immature) 1–1.2 mm, puberulent. Pappus persistent, white, 4.5–5 mm. Fl. Aug.

• Mountain slopes; 2300–2900 m. Taiwan (Gaoxiong).

2. Nemosenecio incisifolius (Jeffrey) B. Nordenstam, Opera Bot. 44: 46. 1978.

刻裂羽叶菊 ke lie yu ye ju

Senecio incisifolius Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 127. 1916; *S. incisifolius* var. *gracilior* Y. Ling.

Stems solitary, erect or ± flexuous, 30–75 cm tall, sparsely puberulent or glabrous. Basal and lower stem leaves shed by anthesis; median stem leaves petiolate; blade ovate-oblong, 5–10 × 3–6 cm, rather thickly herbaceous, glabrous or abaxially sparsely white pilose on veins, pinnatipartite with 3–5 lateral lobes on each side; lateral lobes subopposite or alternate, oblong, margin acutely coarsely (1–)3–5-dentate, apex acute or acuminate. Capitula (4–)15–30 in terminal subumbelliform corymbs, 1.5–2 cm across ray florets; peduncles 1.5–3(–4) cm, slender, sparsely fulvous puberulent. Involucres broadly campanulate or subhemispheric, 3–4 mm in diam.; phyllaries 10–13, subuniseriate to subbiseriate, oblong, ca. 5 × 1–1.5 mm, glabrous, with puberulent tips and scarious margins, obscurely 3–5-veined, apex acute or acuminate. Ray florets 7 or 8; corolla tube ca. 3 mm; lamina linear-oblong, 5–7 × 1–1.5 mm, 4-veined, apically 3-dentate. Disk florets many; corolla yellow, 4–4.5 mm, with tube ca. 2 mm and distinctly campanulate limb; lobes 5, equal, ovate-triangular. Anthers 1–1.2 mm, obtuse to rounded at base. Style branches ca. 0.7 mm. Achenes narrowly cylindric, 1.3–1.5 mm, minutely puberulent. Pappus persistent, 4–5 mm. Fl. Aug.

• Mixed woods; 2200–2800 m. Yunnan.

3. Nemosenecio yunnanensis B. Nordenstam, Opera Bot. 44: 46. 1978.

滇羽叶菊 dian yu ye ju

Stems solitary, erect, 50–70 cm tall, sparsely adpressed pubescent in upper parts. Lower leaves usually shed by anthesis; median stem leaves petiolate; petiole 0.5–1.5 cm, sparsely puberulent, somewhat expanded at base; blade abaxially dull, adaxially green, ovate-oblong, 5–16 × 2.5–7 cm, rather thinly herbaceous, abaxially sparsely setulose-puberulent, adaxially ± glabrescent, pinnatipartite with 6 or 7 lateral lobes on each side; lateral lobes subopposite or alternate, ovate-oblong, apex acute or shortly acuminate, usually 1–3(or 4)-lobulate; lobules oblong-ovate, apex acuminate. Capitula 6–14 in terminal or upper axillary subumbelliform corymbs; peduncles somewhat flexuous, 2–3 cm, slender, sparsely puberulent. Involucres broadly campanulate, 6–8 mm in diam.; phyllaries 10–13, subuniseriate or subbiseriate, ovate-lanceolate, 6–7 × 1.3–3 mm, herbaceous, externally puberulent, with thin margins and puberulent tips, faintly many veined, apex acute. Ray florets ca. 13; corolla tube 2–3 mm; lamina linear-oblanceolate, 11–13 mm, 4(–6)-veined, apically shortly 3-dentate. Disk florets many; corolla yellow, 4–4.5 mm, with tube 2–2.5 mm and campanulate limb; lobes 5, equal, ovate-triangular, ca. 1 mm, apex acute. Anthers ca. 1.3 mm, obtuse to rounded at base. Style branches 0.6–0.7 mm, dorsally minutely papillate. Achenes narrowly cylindric, 1.5–1.8 mm, shortly pubescent especially in upper half, or subglabrous. Pappus persistent, 4–4.5 mm. Fl. Jul–Aug.

• Grasslands, scrub; 1700–2800 m. W Guizhou, E Yunnan.

4. Nemosenecio solenoides (Dunn) B. Nordenstam, Opera Bot. 44: 46. 1978.

茄状羽叶菊 qie zhuang yu ye ju

Senecio solenoides Dunn, J. Linn. Soc., Bot. 35: 508. 1903.

Stems erect, 50–90 cm tall, simple, glabrous. Lower leaves shed by anthesis; median stem leaves petiolate; petiole 3–4 cm, shorter in upper leaves, sparsely puberulent to subglabrous; blade broadly ovate, 6–12 × 3–12 cm, membranous, abaxially sparsely puberulent, adaxially minutely pubescent, deeply pinnatisect with 3 or 4 lateral lobes on each side; lateral lobes subopposite, oblong-lanceolate or lanceolate, apex acute or acuminate, coarsely and irregularly 3–5-dentate, teeth mucronate; terminal lobe subequaling lateral ones. Capitula 5–9 in terminal subumbelliform corymbs, 1.5–2 cm across ray florets; peduncles 0.8–1.8 cm, slender, sparsely glandular. Involucres campanulate, 5–6 × ca. 3 mm; phyllaries 6–8, subuniseriate, ovate-oblong, ca. 5 × 1.2–2 mm, herbaceous, externally minutely puberulent, with puberulent tips and pale brown scarious margins, apex obtuse or acuminate. Ray florets 5–9; corolla tube ca. 2.7 mm; lamina linear or oblong-linear, ca. 8 × 1–1.5 mm, 5-veined, apically shortly 2-dentate. Disk florets many; corolla yellow, 4–4.5 mm, with tube 2–2.5 mm and campanulate limb; lobes 5, equal, ovate-triangular, ca. 1.5 mm. Anthers 1–1.5 mm, obtuse to rounded at base. Style branches 0.7–0.8 mm. Achenes narrowly cylindric, ca. 2 mm, glabrous. Pappus persistent, ca. 4 mm. Fl. Aug–Nov.

• Mountains; ca. 1800 m. S Yunnan.

5. Nemosenecio concinnus (Franchet) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 266. 1984.

裸果羽叶菊 luo guo yu ye ju

Senecio concinnus Franchet, J. Bot. (Morot) 10: 418. 1896.

Stems solitary, erect, 35–70 cm tall, slender, subglabrous. Basal leaves shed by anthesis; stem leaves petiolate; petiole 1–2 cm, slender, glabrous; blade ovate or ovate-oblong, 4–12 × 1.5–4.5 cm, membranous, abaxially sparsely puberulent, adaxially glabrous, deeply pinnatipartite with 4–6 lobes on each side; lateral lobes obovate-oblong and 2- or 3-lobulate, or linear and

entire, basally cuneate, apex mucronate; terminal lobe subequaling lateral ones. Capitula 1–3(–6), terminal, lax; peduncles 1–2 cm, slender, sparsely puberulent. Involucres depressed-campanulate, ca. 5 × 5–7 mm; phyllaries ca. 13, subuniseriate, oblong-lanceolate. 4–5 × ca. 1 mm, herbaceous, externally glabrous, with scarious margins and minutely puberulent or ciliate tips, 3–5-veined, apex acute or acuminate. Ray florets ca. 13; corolla tube ca. 1.5 mm; lamina pale yellow, linear-oblong or linear, 7–8.5 × 1.3–1.8 mm, 4-veined, apically shortly 3-dentate. Disk florets many; corolla yellow, 2.5–3 mm, with tube ca. 1 mm and campanulate limb; lobes 5, equal, ovate-triangular, ca. 0.8 mm. Anthers ca. 1 mm, obtuse to rounded at base. Style branches ca. 0.5 mm. Achenes (immature) narrowly cylindric, 1.5–1.7 mm, sparsely hispidulous. Pappus absent. Fl. Jul.

• Woods; ca. 1900 m. Chongqing (Chengkou).

3. Subtribe SENECIONINAE

千里光亚族 qian li guang ya zu

Chen Yilin (陈艺林 Chen Yi-ling), Liu Ying (刘莹), Yang Qiner (杨亲二);
Bertil Nordenstam, Charles Jeffrey, Leszek Vincent

Antheropodia balusterform, with enlarged marginal basal cells; endothecial tissue with usually radial cell wall thickenings, rarely scattered; stigmatic areas usually discrete, rarely contiguous or confluent; gametic chromosome number usually 20 or 10, less often 52, 50, 30, 23, 22, 19, or 5.

About 100 genera and 2,500 species: worldwide (except Antarctica); nine genera (one endemic, three introduced) and 135 species (74 endemic, six introduced) in China.

1a. Anther bases with sterile caudate auricles.
2a. Plants erect or subscandent, without prehensile petioles ..... 106. *Synotis*
2b. Plants scandent, with basally thickened, prehensile petioles ..... 107. *Cissampelopsis*
1b. Anther bases without sterile caudate auricles, obtuse to sagittate.
3a. Involucre not calyculate.
4a. Capitula homogamous, discoid ..... 112. *Emilia*
4b. Capitula radiate.
5a. Leaves cauline, palmately veined; ray lamina variously colored (never yellow) ..... 113. *Pericallis*
5b. Leaves rosulate, pinnately veined; ray lamina white ..... 114. *Hainanecio*
3b. Involucre calyculate.
6a. Style branches erect, with long, subulate, papillose appendages ..... 111. *Gynura*
6b. Style branches recurved, without papillose appendages.
7a. Marginal female florets filiform ..... 110. *Erechtites*
7b. Marginal female florets radiate or absent.
8a. Apex of style branches without a central appendage of fused papillae ..... 108. *Senecio*
8b. Apex of style branches with a central appendage of fused papillae ..... 109. *Crassocephalum*

106. SYNOTIS (C. B. Clarke) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 285. 1984.

合耳菊属 he er ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

Senecio subg. *Synotis* C. B. Clarke, Compos. Ind. 177. 1876.

Subshrubs or perennial herbs, rhizomatous, erect or sometimes scrambling or ± scandent. Rhizomes woody. Stems usually leafless in lower part at anthesis, leafy above or with leaves subrosulate at base of synflorescence. Leaves simple, petiolate or sessile, broadly ovate-cordate to narrowly oblong-lanceolate, pinnately veined, rarely 3-veined from near base, base sometimes auriculate, margin usually not lobed, rarely deeply pinnately divided, usually mucronulate-serrate or dentate. Capitula few to very numerous, arranged in terminal or axillary and narrow to broad and abundant thyrses, heterogamous and radiate or disciform, or homogamous and discoid, erect or ascending, pedunculate or sometimes subsessile. Involucres calyculate, campanulate or cylindric; receptacle flat; phyllaries (2–)4 or 5 or 7 or 8 or 11–15, free, herbaceous to leathery, margin scarious. Ray florets or filiform female florets absent or 1–10(–20); lamina yellow, conspicuous or inconspicuous, sometimes minute, (1–)4(–6)-veined, apically not or (1–)3(–5)-denticulate. Disk florets 1 to many; corolla yellow, sometimes pale yellow or cream; limb funnelform, lobes 5. Anthers linear-oblong or linear, usually distinctly caudate, tail 0.3–2 × as long as antheropodium, rarely subcaudate with tail only ca. 0.25 × as long as antheropodium; antheropodium balusterform to subcylindric, stout, basally hardly to rather distinctly dilated, with somewhat enlarged basal lateral cells; endothecial cell wall thickenings few to numerous, radial, cells usually short. Style branches truncate or convex, with short to long marginal papillae and often with a central tuft of sometimes longer papillae. Achenes cylindric, ribbed, glabrous or less often pubescent. Pappus capillary-like, uniform, white, straw-colored, or rubescent.

About 54 species: endemic to the Sino-Himalayan region, except for *Synotis atractylidifolia*, which occurs in N China; 43 species (30 endemic) in China.

The genus is divisible into two well-marked sections and five series, which are not described here.

1a. Plants with leaves subrosulate at base of synflorescence, herbaceous; lower part of stem when developed leafless; synflorescence terminal; leaves abaxially never white tomentose.
2a. Leaves basally cordate to rounded, abruptly narrowed into winged or not winged petiole.
3a. Ray florets 2–5, conspicuous; phyllaries 7 or 8.
4a. Ray florets 2, lamina ca. 2.5 mm; petioles broadly to narrowly winged ..... 14. *S. ainsliaeifolia*
4b. Ray florets 4 or 5, lamina ca. 4 mm; petioles not winged ..... 11. *S. pseudoalata*
3b. Ray florets absent to 2, minute; phyllaries 4 or 5.
5a. Petiole not winged; phyllaries ± glabrous ..... 12. *S. wallichii*
5b. Petiole winged, rarely not; phyllaries setose ..... 13. *S. alata*
2b. Leaves basally cuneate, gradually attenuate into winged or not winged petioles.
6a. Capitula discoid.
7a. Involucres 3–4 mm; phyllaries 10–12; pappus scant, 2–3 mm ..... 8. *S. brevipappa*
7b. Involucres 6–7 mm; phyllaries 5; pappus abundant, 6–8 mm.
8a. Petioles narrowly winged to base; pappus pure white; calycular bracts to 6 mm ..... 9. *S. sciatrephes*
8b. Petioles not winged to base; pappus off-white, sordid; calycular bracts not more than 3 mm ..... 10. *S. nayongensis*
6b. Capitula radiate.
9a. Involucres 5–7 × 2–4 mm.
10a. Phyllaries 10–12; involucres 5–7 × 3–6 mm; ray lamina 9–10 mm ..... 1. *S. cavaleriei*
10b. Phyllaries 8; involucres ca. 5 × 2–3 mm; ray lamina ca. 5 mm ..... 2. *S. duclouxii*
9b. Involucres 10–11 × 5–6 mm.
11a. Ray lamina 6–11 mm; calycular bracts 4–6 mm.
12a. Phyllaries 13–15; leaves abaxially finely sparsely arachnoid-tomentose and glabrescent ..... 4. *S. fulvipes*
12b. Phyllaries ca. 10; leaves abaxially very sparsely setulose or glabrous ..... 6. *S. austroyunnanensis*
11b. Ray lamina 3.5–5 mm; calycular bracts to 3 mm.
13a. Stems sparsely arachnoid-tomentose; leaves narrowly elliptic, apically caudate-acuminate, abaxially adpressed pilose; calycular bracts 10; phyllaries 12, basally sparsely arachnoid ..... 7. *S. damiaoshanica*
13b. Stems densely fulvous tomentose; leaves obovate-spatulate or obovate-elliptic, apically obtuse or shortly acute, abaxially gray-white tomentose; calycular bracts 7 or 8; phyllaries 9–11, glabrous ..... 5. *S. changiana*
1b. Plants with leaves ± equally distributed on stems, herbaceous, scandent or suffrutescent; synflorescences terminal and axillary; leaves abaxially sometimes white tomentose.
14a. Stems weak, flexuous; plants scandent or subscandent; capitula heterogamous.
15a. Involucres 4–5.5 × 1–1.5 mm; leaves ovate, basally cordate or cuneate ..... 15. *S. tetrantha*
15b. Involucres 8–12 × 2–3 mm; leaves rounded at base ..... 16. *S. yui*
14b. Stems ± erect; plants not scandent, ± erect; capitula heterogamous or homogamous.
16a. Capitula few, in terminal or axillary groups of 1–5; involucres 8–11 × 2.2–7 mm; leaves abaxially sparsely setose or thinly arachnoid, never densely white tomentose.
17a. Calycular bracts conspicuous, to 6 mm; leaves membranous ..... 20. *S. chingiana*
17b. Calycular bracts inconspicuous, to 3 mm; leaves papery.
18a. Capitula discoid ..... 19. *S. sinica*
18b. Capitula radiate.
19a. Ray florets 7, lamina 9–10 mm; leaves elliptic or oblanceolate-elliptic ..... 17. *S. hieraciifolia*
19b. Ray florets 5, lamina ca. 3 mm; leaves oblanceolate-oblong ..... 18. *S. guizhouensis*
16b. Capitula numerous, in flat-topped terminal corymbs, rounded axillary terminal corymbs, or large terminal thyrses; involucres to 7 mm, if larger then leaves abaxially densely white tomentose.
20a. Synflorescences ± flat-topped terminal corymbs.
21a. Leaves shortly petiolate, abaxially glabrous; pappus straw-colored.
22a. Phyllaries 3 or 4, ca. 7 mm; ray floret 1, minutely radiate ..... 37. *S. acuminata*
22b. Phyllaries 5, ca. 5 mm; ray florets 2 or 3, conspicuously radiate ..... 38. *S. calocephala*
21b. Leaves sessile, abaxially tomentose, or if glabrous then pappus white.
23a. Capitula radiate.
24a. Leaves abaxially thinly arachnoid-tomentose; pappus straw-colored; achenes glabrous; ray lamina 5–7 mm ..... 41. *S. birmanica*

24b. Leaves abaxially glabrous; pappus white; achenes hairy; ray lamina 8–10 mm ..... 43. *S. atractylidifolia*

23b. Capitula discoid.

25a. Stem leaves 2 or 3, long petiolate, blade reniform or cordate-reniform, margin undulate-dentate; capitula solitary, racemose; phyllaries and florets 5 ..... 39. *S. reniformis*

25b. Stem leaves numerous, sessile or subsessile, blade narrowly oblong-elliptic to lanceolate; capitula numerous, arranged in dense corymbs; phyllaries 8; florets 8–11.

26a. Leaves abaxially thinly arachnoid-tomentose ..... 40. *S. lucorum*

26b. Leaves abaxially densely white tomentose ..... 42. *S. setchuenensis*

20b. Synflorescences ± rounded axillary and terminal corymbs, or terminal pyramidal thyrses.

27a. Capitula arranged in terminal thyrses; florets 1–4(or 5), all bisexual.

28a. Leaves divided.

29a. Leaves deeply pinnatipartite; lateral lobes (2 or)3 or 4 pairs, narrowly lanceolate or oblong-lanceolate ..... 32. *S. vaniotii*

29b. Leaves 3–5-lobed or deeply palmatipartite, lobes ovate-triangular or oblong-lanceolate.

30a. Leaves shallowly 3–5-lobed; involucres 6–7 mm; phyllaries and florets 5; achenes hairy ..... 30. *S. muliensis*

30b. Leaves deeply 5-palmatipartite; phyllaries and florets 3; achenes glabrous ..... 31. *S. palmatisecta*

28b. Leaves undivided.

31a. Petiole expanded into an amplexicaul auricle, leaf blade triangular-ovate or triangular-hastate, both surfaces brown pubescent; phyllaries and florets 5; pappus purplish brown ..... 26. *S. otophylla*

31b. Petiole not expanded, without an auricle, leaf blade ovate-lanceolate or oblong-lanceolate, rarely cordate, abaxially pubescent to subglabrous; phyllaries and florets 2 or 3(or 4).

32a. Leaves cordate or ovate-cordate, subleathery, palmately veined, abaxially veins fulvous setulose; phyllaries and florets 3; pappus reddish ..... 28. *S. cordifolia*

32b. Leaves not cordate, papery or thinly papery, pinnately veined, abaxially veins shortly pubescent or subglabrous; phyllaries and florets 2–4; pappus pale reddish brown or sordid.

33a. Synflorescences broad, lax pyramidal thyrses; phyllaries and florets 2 or 3; achenes glabrous or hairy; pappus pale reddish brown or straw-colored ..... 29. *S. erythropappa*

33b. Synflorescences narrow, dense pyramidal thyrses; phyllaries 4 or 5, florets 3; achenes hairy; pappus white ..... 27. *S. solidaginea*

27b. Capitula arranged in axillary and terminal corymbs; florets 5–35, with at least 1 marginal filiform or radiate female floret present.

34a. Leaves abaxially white tomentose.

35a. Involucres 1.5–2 mm wide; florets 11–15.

36a. Lateral main veins of leaves with pale yellow-brown hairs ..... 21. *S. xantholeuca*

36b. Lateral main veins of leaves with conspicuous dark brown hairs ..... 22. *S. yakoensis*

35b. Involucres 2–4 mm wide; florets 19–35.

37a. Capitula disciform or minutely radiate ..... 25. *S. nagensium*

37b. Capitula conspicuously radiate.

38a. Synflorescences and phyllaries white arachnoid-tomentose, at most with some brown hairs intermixed; ray florets ca. 8 ..... 23. *S. cappa*

38b. Synflorescences and phyllaries conspicuously ferruginous tomentose; ray florets 14–20 ..... 24. *S. ionodasys*

34b. Leaves abaxially not white tomentose.

39a. Capitula conspicuously radiate, ray florets 8.

40a. Leaves pubescent or thinly tomentose; ray lamina ca. 3.5 mm ..... 23. *S. cappa*

40b. Leaves glabrous; ray lamina ca. 6 mm ..... 3. *S. longipes*

39b. Capitula minutely radiate, ray florets 2–5.

41a. Corymbs dense, glomeruliform, 2–4 cm ..... 33. *S. glomerata*

41b. Corymbs more lax, spreading, 4.5–10 cm.
42a. Capitula ca. 4 × 2.7 mm; phyllaries 8 ..... 36. *S. saluenensis*
42b. Capitula 3.5–4 × ca. 1.5 mm; phyllaries 4 or 5.
43a. Leaves ovate or elliptic, basally not auriculate; ray florets 3 or 4 ..... 34. *S. triligulata*
43b. Leaves narrowly elliptic or narrowly oblong-elliptic, basally auriculate; ray florets 2 ..... 35. *S. auriculata*

1. Synotis cavaleriei (H. Léveillé) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 291. 1984.

昆明合耳菊 kun ming he er ju

Senecio cavaleriei H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 537. 1913.

Herbs, erect, rhizomatous, vegetatively subacaulescent. Rhizome short, swollen, irregularly tuberous, woody. Vegetative stem short, to 5 cm, densely fulvous lanate, especially around leaf bases. Flowering stems solitary or few, scapiform, leafless, branching from base or in upper part, 5–42 cm tall, finely fulvous tomentose, ± glabrescent. Leaves basal, subrosulate, subsessile or shortly petiolate; petiole 0.5–1 cm, sparsely to densely pubescent; blade obovate to oblanceolate or sometimes subpandurate, 4–20 × 2–8 cm, papery, abaxially sparsely finely arachnoid-pubescent, glabrescent and sometimes purple, adaxially sparsely setulose, pinnately veined, lateral veins 10–18, midvein prominent abaxially, base cuneate-attenuate, margin subentire to shallowly repand-dentate, apex sometimes shortly acuminate, obtuse. Capitula radiate, 1.5–2.5 cm in diam., few to numerous, arranged in often rather narrow and elongated compound corymbs; peduncles 1.5–5 cm, slender, basally bracteate, shortly ± tomentose, with 3–6 linear or linear-lanceolate, 5–12 mm, thinly pubescent bracteoles. Involucres narrowly campanulate, 5–7 × 3–6 mm, calyculate; bracts of calyculus 6–8, linear or linear-subulate; phyllaries 10–12, oblong, 1–2 mm wide, herbaceous, sometimes purplish, sparsely arachnoid-tomentose to subglabrous, margin scarious, apically acuminate and puberulent. Ray florets 8; corolla tube ca. 3 mm; lamina yellow, oblong or oblong-lanceolate, 9–10 × 2.5–3 mm, 4- or 5-veined, apically obtuse, 3-denticulate. Disk florets ca. 20; corolla yellow, 7–7.5 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.2 mm, apically acute. Anthers ca. 2.5 mm, anther tails ca. 0.75 × as long as to subequaling antheropodium; appendages ovate-oblong; antheropodium slightly dilated at base. Style branches ca. 1.2 mm, fringed with spreading papillae and with a prominent central tuft of long papillae. Achenes ca. 2.5 mm, glabrous. Pappus white, 7–7.5 mm. Fl. Oct–Nov.

• Rocky places, slopes, by streams and waterfalls; 1700–3000 m. Guizhou, Sichuan, Yunnan.

2. Synotis duclouxii (Dunn) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 293. 1984.

滇东合耳菊 dian dong he er ju

Senecio duclouxii Dunn, J. Linn. Soc., Bot. 35: 504. 1903; *S. cichoriifolius* H. Léveillé.

Herbs, erect, rhizomatous, woody at base. Vegetative stem solitary, 20–40 cm tall, somewhat tomentose especially in lower part, ± glabrescent, leafless except at apex. Flowering stems several, scapiform, short, branching from base, 7–9 cm tall, fine arachnoid-pubescent, glabrescent. Leaves crowded in a rosette at base of synflorescence, shortly petiolate; petiole 0.5–2 cm, sparsely pubescent or glabrous; blade obovate-lanceolate or elliptic, 8–22 × 3–9 cm, papery, abaxially very thinly arachnoid at first and soon glabrous, adaxially glabrous, pinnately veined, lateral veins 18–20, arcuate-ascending, abaxially like midvein prominent, base cuneate, margin remotely shallowly to coarsely sinuate-denticulate especially in upper half, apex acuminate or acute. Capitula radiate, ca. 1 cm in diam., numerous, arranged in much branched corymbose clusters; peduncles 5–15 mm, basally bracteate, usually with 1 or 2 linear bracteoles, arachnoid-pubescent. Involucres narrowly campanulate, ca. 5 × 2–3 mm, calyculate; bracts of calyculus 3 or 4; phyllaries 8, oblong, ca. 1 mm wide, herbaceous, arachnoid-tomentose, ± glabrescent, margin broadly scarious, apically acute and puberulent. Ray florets 6–10; corolla tube ca. 4 mm, slender, glabrous; lamina yellow, oblong-lanceolate, 6–7 × 1.5–2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets ca. 8; corolla 8–9 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 2.7 mm, apically acute. Anthers ca. 4 mm; anther tails ca. 1.3 × as long as antheropodia; appendages ovate-oblong; antheropodia slightly dilated at base. Style branches ca. 1.5 mm, fringed with fine papillae and with a distinct central tuft of long papillae. Achenes 1.8–2 mm, glabrous. Pappus white, ca. 7 mm. Fl. Nov.

• Mixed forests; 700–2500 m. Yunnan.

3. Synotis longipes C. Jeffrey & Y. L. Chen, Kew Bull. 39: 294. 1984.

长柄合耳菊 chang bing he er ju

Herbs, basal parts unknown. Stems erect, ca. 60 cm tall, glabrous. Leaves on stem shortly petiolate; petiole 2–2.5 cm, narrowly winged, glabrous, somewhat expanded at base; blade oblanceolate, 12–28 × 3.5–5.5 cm, thickly papery, glabrous, pinnately veined, lateral veins 18–22, arcuate-ascending, base attenuate into petiole, margin coarsely sinuate-dentate, apex acute-acuminate. Uppermost leaves elliptic, smaller, margin mucronulate-serrulate, apex acute-acuminate. Capitula radiate, 1–1.5 cm in diam., numerous, arranged in abundant, long-stalked terminal and upper axillary compound corymbs; peduncles 6–10 mm, slender, sparsely arachnoid, bracteate at base, with a few minute subulate bracteoles. Involucres narrowly campanulate, 4–5 × 2–3 mm, calyculate; bracts of calyculus 2 or 3, subulate; phyllaries 8, oblong-lanceolate, 1–1.5 mm wide, herbaceous, sparsely arachnoid, margin broadly scarious, apex subacute and shortly barbellate. Ray florets 8; corolla tube ca. 3 mm; lamina yellow, oblong, ca. 6 × 1.5 mm, 4-veined, apically obtuse, ob-

scurely 3-denticulate. Disk florets ca. 10; corolla ca. 7 mm, with ca. 3.2 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 3 mm, apically acute, papillose. Anthers ca. 3 mm; anther tails ca. 0.8 × as long as antheropodia; appendages ovate-lanceolate; antheropodia distinctly dilated at base. Style branches ca. 1.5 mm, fringed with obtuse papillae and with a longer central tuft. Achenes 1.5–2 mm, glabrous. Pappus dirty white, ca. 6 mm. Fl. Feb.

• Roadsides. Yunnan (Zhaotong).

4. Synotis fulvipes (Y. Ling) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 294. 1984.

褐柄合耳菊 he bing he er ju

Senecio fulvipes Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 27. 1937; *S. handelianus* B. Nordenstam, nom. illeg. superfl.; *S. hunanensis* Handel-Mazzetti (Nov 1937), not Y. Ling (Jan 1937), nom. illeg. superfl.

Herbs, erect, rhizomatous, vegetatively subacaulescent; rhizome short, woody, somewhat swollen. Vegetative stem short, to 10 cm, fulvous tomentose, densely so around leaf base. Flowering stem solitary, ascending-erect, scapiform, few branched, densely fulvous tomentose, 17–22 cm tall. Leaves subbasal, subrosulate, subsessile, obovate-lanceolate, 6–13 × 2–5.5 cm, papery or subleathery, abaxially scattered setulose, adaxially finely sparsely arachnoid-tomentose and glabrescent, pinnately veined, lateral veins 8–10, arcuate-ascending, base cuneate-attenuate, margin rather remotely and coarsely mucronately sinuate-serrate or repand-dentate, apex obtusely acuminate-mucronate. Flowering stem leaves few, small, oblanceolate-spatulate, or reduced to narrow bracts. Capitula radiate, 1.5–2 cm in diam., terminal in 2- or 3-headed clusters, shortly pedunculate. Involucres campanulate, 8–10 × 5–8 mm, tomentose at base, calyculate; bracts of calyculus 10–12, linear or linear-lanceolate, subequal, ca. 1/2 as long as phyllaries; phyllaries 13–15, oblong-linear, 1–2 mm wide, herbaceous, sparely pubescent to glabrous, margin scarious, apically acute to acute-acuminate and puberulent. Ray florets 6–10; corolla tube 5–6 mm; lamina yellow, elliptic-oblong, 6–11 × 2.5–2.7 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many (ca. 30); corolla yellow, 9–11 mm, with ca. 3.5 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 1.5 mm. Anthers ca. 4 mm; anther tails slightly exceeding antheropodia; appendages ovate-oblong; antheropodia gradually expanded toward base. Style branches ca. 1.5 mm, obtuse, fringed with numerous long fine papillae and with slender terminal tuft of somewhat longer papillae. Achenes (immature) ca. 2.5 mm, glabrous. Pappus white, 8–9 mm. Fl. Aug–Oct.

• Dense valley forests; ca. 1100 m. Hunan, Jiangxi.

5. Synotis changiana Y. L. Chen, Acta Phytotax. Sin. 33: 78. 1995.

肇骞合耳菊 zhao qian he er ju

Herbs, erect, rhizomatous. Rhizome stout, ca. 2 cm in diam. Vegetative stem solitary, 40–50 cm tall, simple, 3–4 mm in diam. at base, lower part long naked, at first arachnoid, ± glabrescent, upper part fulvous tomentose. Leaves usually densely crowded at middle part, rosulate or subrosulate, shortly petiolate; petiole 1.5–2.5 cm, stout, densely tomentose; blade adaxially dark green, obovate-spatulate or elliptic-obovate, 8–14 × 4–7 cm, papery, abaxially gray-white arachnoid-tomentose, adaxially arachnoid, glabrescent, pinnately veined, lateral veins 14–18 pairs, arcuate-ascending, base broadly cuneate, margin irregularly mucronately sinuate-serrate, apex obtuse to subacute. Upper leaves sessile, bractlike, linear, small. Capitula radiate, usually 2–5 in terminal corymbs; synflorescence to 4 cm, densely fulvous tomentose, subsessile or shortly pedunculate, bracteate at base; bracts linear, 5–7 mm, apically acute. Involucres campanulate, 8–10 × 10–12 mm, base fulvous tomentose, with 7 or 8 linear-subulate equal bracteoles; phyllaries 9–11, oblong-lanceolate, 8–10 × 2.5–3 mm, herbaceous, glabrous, with broadly scarious margin, inconspicuously 3-veined, apically slightly acute or obtuse. Ray florets 5 or 6; corolla tube 3–3.5 mm, slender; lamina yellow, oblong, ca. 5 × 1–1.5 mm, 4- or 5-veined, apically 3-denticulate. Disk florets many; corolla yellow, 7–8 mm, with 2–3 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, apically acute. Anthers linear, 3–4 mm, basally caudate, antheropodia slightly expanded. Style branches excurved, apically obtuse, papillose. Achenes ca. 2 mm, glabrous. Pappus white, 7–8 mm. Fl. Oct–Nov.

• Lax forests; 400–1000 m. Guangxi (Lingchuan, Yangshuo).

6. Synotis austroyunnanensis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 296. 1984.

滇南合耳菊 dian nan he er ju

Herbs, erect, rhizomatous. Rhizome woody, branching. Vegetative stem solitary, 17–45 cm, sparsely fulvous villous, glabrescent, leafless except at apex. Flowering stem solitary, erect, scapiform, 10–25 cm tall, few branched, fulvous tomentose, glabrescent. Leaves crowded in a rosette at base of flowering stems, shortly petiolate; petiole 1.5–2 cm, stout, sparsely ferruginous pubescent; blade oblanceolate-elliptic or obovate, 7–17 × 2–5 cm, papery or subleathery, abaxially sparsely pilose to subglabrous and sometimes purple, adaxially very sparsely setulose or glabrous, pinnately veined, lateral veins 10–14, arcuately ascending, inconspicuous, base cuneate-attenuate into petiole, margin remotely and often coarsely mucronately sinuate-serrate or repand-dentate, apex acute-acuminate and mucronate. Flowering stem leaves few, much smaller, elliptic or lanceolate; uppermost leaves narrow, bractlike. Capitula radiate, 2–7 in terminal corymbose clusters; peduncles 0.5–2.5 mm, densely fulvous villous, bracteate, with 2 or 3 linear or linear-lanceolate, 8–15 mm, apically acute, sparsely villous bracteoles. Involucres narrowly campanulate, 8–11 × 5–7 mm, calyculate; bracts of calyculus 8–11, linear, 1/3–1/2 as long as phyllaries, glabrous or sparsely villous, apically acute; phyllaries ca. 10, pale green, oblong-linear, 1.5–3 mm wide, herbaceous, glabrous, 3–5-veined, margin broadly scarious, apically acute, puberulent. Ray florets 6–9; corolla tube ca. 6 mm; lamina yellow, elliptic-oblong, 8–10 × 2–2.5 mm, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 9–9.5 mm, with 3–5 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 4 mm, anther tails ca. 1.25 × as long as antheropodium; appendages ovate-lanceo-

late, antheropodia stout, basally broadly dilated. Style branches ca. 2 mm, apically obtuse, fringed with long, rather fine papillae, central tuft only slightly longer than others. Achenes ca. 2 mm, glabrous. Pappus white, 8–9 mm. Fl. Oct–Nov.

• Mixed forests, thickets; 1000–1700 m. Guizhou, S Yunnan.

7. Synotis damiaoshanica C. Jeffrey & Y. L. Chen, Kew Bull. 39: 298. 1984.

大苗山合耳菊 da miao shan he er ju

Herbs, erect, rhizomatous. Vegetative stem solitary, ca. 30 cm, thinly arachnoid-tomentose, glabrescent, leafless except in upper part. Flowering stem solitary, erect, scapiform, ca. 13 cm tall, arachnoid-tomentose. Leaves rather crowded at base of flowering stems, shortly petiolate; petiole 3–5 cm, stout, densely pubescent; blade narrowly elliptic, 7–11 × 1–3 cm, papery, abaxially shortly scattered pilose, thinly pubescent on veins and purple, adaxially scattered setulose, pinnately veined, lateral veins 10–14, arcuate-ascending, base cuneate, margin rather distantly apiculate-serrate, apex caudate-acuminate. Flowering stem leaves few, small; upper leaves bractlike. Capitula radiate, 3 or 4 in terminal corymbose clusters; peduncles ca. 10 mm, densely arachnoid-tomentose, bracteate, with 1–3 linear-lanceolate bracteoles. Involucres narrowly campanulate, 10–11 × ca. 7 mm, calyculate; bracts of calyculus 10, linear-lanceolate, to 1/4 as long as phyllaries; phyllaries ca. 12, oblong-lanceolate, 1.5–2 mm wide, herbaceous, margin broadly scarious, subglabrous or sparsely arachnoid at base, inconspicuously 3-veined, apically acute or acuminate and puberulent. Ray florets ca. 6; corolla tube 5–5.5 mm; lamina yellow, oblong, 3.5–4 × ca. 1 mm, 3- or 4-veined, 3-denticulate. Disk florets many; corolla yellow, ca. 8.5 mm, with ca. 2 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 2.5 mm, anther tails 1.7–2 × as long as antheropodia; appendages ovate-lanceolate; antheropodia rather elongated, basally gradually dilated. Style branches ca. 1.5 mm, apically obtuse. Achenes 3.5–4 mm, glabrous. Pappus white, ca. 7.5 mm. Fl. Oct.

• Open forests; 1200–1500 m. Guangxi (Damiao Shan, Yuanbao Shan).

8. Synotis brevipappa C. Jeffrey & Y. L. Chen, Kew Bull. 39: 300. 1984.

短缨合耳菊 duan ying he er ju

Herbs, erect, rhizomatous. Rhizome short, woody, branching. Vegetative stems 1 or 2, erect or ascending, ca. 50 cm or more, thinly floccose-tomentose, and shortly fuscous pubescent, glabrescent, leafless except at apex. Flowering stem solitary, scapiform, few branched, thinly arachnoid, 10–40 cm tall, erect. Leaves crowded, subrosulate at base of flowering stems, shortly petiolate; petiole 3–15 mm, arachnoid-tomentose; blade obovate-lanceolate or oblanceolate-elliptic, 12–25(–29) × 3–8 cm, papery, abaxially thinly arachnoid especially on veins and glabrescent, adaxially shortly scattered setulose, pinnately veined, lateral veins 18–22, arcuate-ascending, rather prominently reticulate abaxially, base cuneate or cuneate-attenuate, margin sharply antrorsely mucronate-serrate, apex acute-acuminate and attenuate. Stem leaves few, sessile, smaller. Capitula discoid, moderately numerous, arranged in orbicular terminal corymbs; peduncles 2–10 mm, fulvous tomentose, bracteate; bracteoles 1 or 2, linear. Involucres subcylindric, 3–4 × 2–3 mm, calyculate; bracts of calyculus 4–6, linear, to 1/2 as long as phyllaries; phyllaries 10–12, oblong-lanceolate, ca. 1 mm wide, subleathery, margin narrowly scarious, subglabrescent, apically subacute or obtuse, puberulent and slightly spreading. Ray florets absent. Disk florets ca. 20; corolla pale yellow, ca. 7 mm, with ca. 2.7 mm tube and narrowly funnelform or tubular limb, much exserted from involucre, contracted at mouth; lobes erect, ovate-oblong, ca. 0.7 mm, apically acute, puberulent. Anthers ca. 3 mm, anther tails ca. 1.3 × as long as antheropodia; appendages ovate-oblong; antheropodia slightly dilated toward base. Style branches ca. 0.7 mm, fringed with long fine papillae; central tuft not markedly differentiated. Achenes ca. 1.5 mm, glabrous. Pappus 2–3 mm, shorter than corolla tube, setae few, easily deciduous. Fl. Aug.

• Open forests, dry slopes; 2400–2700 m. Xizang (Delei valley).

9. Synotis sciatrephes (W. W. Smith) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 300. 1984.

林荫合耳菊 lin yin he er ju

Senecio sciatrephes W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 118. 1913.

Herbs, erect, rhizomatous. Rhizome thick, woody, creeping, branching. Vegetative stem solitary, erect or ascending, 7–20 cm, glabrous, leafless except at apex. Flowering stem solitary, erect, scapiform, 20–50 cm tall, branching from near base or in upper part, arachnoid-tomentose, glabrescent. Leaves crowded, subrosulate at base of flowering stems, sessile; blade oblanceolate-oblong or elliptic, 12–22 × 4–6 cm, papery, both surfaces sparsely floccose-tomentose and glabrescent, pinnately veined, lateral veins 10–12, arcuate-ascending, base cuneate or attenuate into a 4–10 cm, gradually attenuate, winged petiole, slightly amplexicaul, margin remotely shortly mucronately sinuate-serrate, apex acute-acuminate. Capitula discoid, numerous, arranged in rather dense orbicular 3–12-headed corymbs, terminal on usually rather short or strictly ascending synflorescence branches, whole forming a rather narrow paniculoid thyrse; peduncles short, ca. 2 mm, arachnoid-tomentose, bracteate, 1-bracteolate; bracts and bracteoles linear, to 10 mm, sparsely tomentose or subglabrous. Involucres cylindric, ca. 6 × 1.5–2 mm, calyculate; bracts of calyculus 3–5, linear, ca. 1/2 as long as phyllaries; phyllaries 5, oblong-linear, triangular-acuminate, herbaceous, glabrous, margin scarious, apically subobtuse, shortly barbellate and purplish. Ray florets absent. Disk florets 5 or 6; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and narrowly funnelform limb, exserted from involucre; lobes ovate-oblong, 1–1.2 mm, apically acute. Anthers ca. 2.5 mm; anther tails ca. 0.75 × as long as antheropodia; appendages ovate-lanceolate; antheropodia rather long, robust, basally distinctly dilated. Style branches ca. 1 mm, fringed with abundant, moderately long papillae, those of central tuft somewhat exceeding laterals. Achenes (immature) 1.7–2 mm, glabrous. Pappus white, ca. 5.5 mm. Fl. Oct–Dec.

• Open and shaded thickets; 2400–3000 m. Yunnan.

10. Synotis nayongensis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 302. 1984.

纳拥合耳菊 na yong he er ju

Herbs, erect, rhizomatous. Rhizome thick, woody, creeping. Vegetative stem solitary, erect, ca. 35 cm, sparsely pubescent, glabrescent to glabrous, leafless except at apex. Flowering stem solitary, erect, scapiform, 35–60 cm tall, shortly branching, thinly arachnoid-tomentose, glabrescent. Leaves crowded, subrosulate at base of flowering stems; petiole 1–2.5 cm, not winged, slightly expanded at base; blade oblanceolate-obovate, 10–20 × 3–6 cm, membranous, abaxially sparsely arachnoid, glabrescent to subglabrous, adaxially scattered setulose, pinnately veined, lateral veins 10–14, arcuate-ascending, base cuneate-attenuate into petiole, margin shallowly sinuate-apiculate or repand-apiculate, apex subacute-acuminate. Flowering stem leaves few, remote, much smaller. Capitula discoid, numerous, arranged in rather dense 3–7-headed corymbs, terminal on short synflorescence branches, whole forming a somewhat attenuate narrowly paniculoid thyrse; peduncles 3–5 mm, densely fulvous tomentose, 1- or 2-bracteolate; bracts linear. Involucres cylindric, ca. 6 × 2–2.5 mm, calyculate; bracts of calyculus 3–5, ovate or ovate-oblong, 1/4–1/3 as long as phyllaries; phyllaries 5, narrowly oblong, 1–1.5 mm wide, herbaceous, margin narrowly scarious, glabrous, conspicuously 3–5-veined, apically triangular, obtuse, puberulent and dark colored. Ray florets absent. Disk florets 4 or 5; corolla yellow, ca. 9 mm, with ca. 2.5 mm tube and narrowly funnelform limb, exserted from involucre; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 3.5 mm, anther tails ca. equaling antheropodia; appendages ovate-lanceolate; antheropodia stout, basally dilated. Style branches ca. 1.5 mm, fringed with long papillae, terminal tuft not conspicuously longer. Achenes ca. 4 mm, glabrous. Pappus ca. 8.5 mm, fulvous. Fl. Jul.

● Shaded places among shrubs; ca. 2000 m. Guizhou (Nayong).

11. Synotis pseudoalata (C. C. Chang) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 303. 1984.

紫背合耳菊 zi bei he er ju

Senecio pseudoalatus C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 57. 1935.

Herbs, subacaulescent, rhizomatous. Rhizome thick, subtuberous, woody. Vegetative stem erect, subterranean part rooting at nodes, densely tomentose, leafless except at apex. Flowering stem solitary, arising from basal rosette, erect, scapiform, ca. 50 cm tall, ferruginous tomentose, somewhat glabrescent. Leaves in basal rosette, long petiolate; petiole 5–7 cm, not winged, densely ferruginous lanate; blade abaxially purple, ovate-oblong, 10–20 × 4–10 cm, papery, abaxially finely scattered villous, adaxially finely setulose, pinnately veined, lateral veins 10–14, arcuate-ascending, base cordate, margin shallowly repand-apiculate, apex shortly acute-acuminate. Flowering stem leaves few, sessile, lanceolate, bractlike. Capitula radiate, numerous, arranged in a rather slender compound thyrse terminating flowering stem; peduncles 2–3 mm, densely ferruginous tomentose, bracteate, few bracteolate; bracts and bracteoles linear, small. Involucres cylindric, 7–8 × ca. 3 mm, calyculate; bracts of calyculus 3–5, purplish, subulate, small; phyllaries 7 or 8, oblong, 1–1.5 mm wide, densely villous with purplish hairs, margin broadly scarious, apically obtuse to acute and puberulent, purple. Ray florets 4 or 5; corolla tube ca. 4.5 mm; lamina deep yellow, oblong, ca. 4 × 1.5 mm, 3-denticulate. Disk florets 10 or 11; corolla orange, ca. 8 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 3 mm; anther tails ca. 0.75 × as long as antheropodia; appendages ovate-triangular; antheropodia stout, basally dilated. Style branches ca. 1 mm, fringed with moderately long papillae, central tuft longer, prominent. Achenes ca. 1.3 mm, glabrous. Pappus white, ca. 6.5 mm. Fl. Oct.

Cliff ledges, rocky slopes; ca. 2700 m. NW Yunnan [Myanmar].

12. Synotis wallichii (Candolle) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 305. 1984.

合耳菊 he er ju

Senecio wallichii Candolle, Prodr. 6: 364. 1838.

Herbs, subacaulescent, rhizomatous. Rhizome short, thick, woody. Vegetative stem erect or ascending, ± subterranean, 0.5–20 cm, leafless except at apex. Flowering stems 1–4, erect, scapiform, to 40 cm tall, slender, thinly arachnoid, glabrescent. Leaves subrosulate at base of flowering stems, long petiolate; petiole 3.5–8 cm, slender, not winged, densely to sparsely fulvous pubescent; blade broadly ovate or ovate, 3.5–13 × 2.5–11 cm, membranous, abaxially sparsely pubescent especially on veins to glabrous, adaxially sparsely scattered setulose, pinnately veined, lateral veins 8, arcuate-ascending, margin remotely, obscurely to coarsely sinuate-dentate with mucronulate teeth, apex shortly rather broadly acuminate. Capitula heterogamous, disciform or minutely radiate, few to numerous, arranged in rather dense compound thyrsoid corymbs; peduncles short, 2–5 mm, pubescent, 1- or 2-bracteolate; bracts 3–6, linear. Involucres cylindric, 6–8 × ca. 1.5 mm, calyculate; bracts of calyculus few, short; phyllaries 5, oblong, ca. 1 mm wide, herbaceous, glabrous, sparsely arachnoid, or rarely sparsely to densely setulose, margin narrowly scarious, apex obtuse to acute and puberulent. Female florets 2; corolla tube 7–7.5 mm, filiform and 5-denticulate or with minute inconspicuous apically 2-denticulate lamina. Bisexual florets 3; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute. Anthers ca. 3 mm; anther tails just exceeding antheropodia; appendages oblong-ovate; antheropodia rather short and broad, basally slightly dilated. Style branches ca. 1.5 mm, fringed with long papillae; terminal tuft not clearly differentiated. Achenes ca. 2.2 mm, glabrous. Pappus white, ca. 7 mm. Fl. Sep.

Mixed forests; ca. 2700 m. Xizang (Yadong) [Bhutan, India (Sikkim), Nepal].

13. Synotis alata (Wallich ex Candolle) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 306. 1984.

翅柄合耳菊 chi bing he er ju

Senecio alatus Wallich ex Candolle, Prodr. 6: 368. 1838; *S. alatus* var. *oligocephalus* Y. L. Chen & K. Y. Pan; *S. cymatocrepis* Diels.

Herbs, rhizomatous. Rhizome thick, woody, branching. Vegetative stem creeping, ascending, or erect, 30–50 cm, leafless in lower part, leafy in upper part or at apex only, fulvous tomentose or villous. Flowering stem solitary, erect, ± subscapiform, 20–60 cm tall, tomentose or villous. Leaves at base of flowering stems petiolate, subrosulate or somewhat distant; petiole 5–10 cm, broadly to narrowly winged, at least toward base, obscurely to distinctly auriculate; auricle subamplexicaul, sparsely dentate or entire; blade broadly ovate to lanceolate, 9–22 × 4.5–12 cm, membranous, abaxially pubescent or shortly villous especially on veins, adaxially sparsely to densely finely setulose, pinnately veined, lateral veins 10–12, arcuate-ascending, base cordate, truncate, or broadly cuneate, margin obscurely sinuate and minutely mucronulate-denticulate to distinctly mucronulate-serrate or coarsely and irregularly mucronulate-dentate, apically acute-acuminate. Flowering stem leaves usually few, smaller, sessile, ovate-oblong or elliptic to oblanceolate-oblong or lanceolate-oblong; upper leaves often apically attenuate, basally subamplexicaul. Capitula heterogamous, disciform, or minutely radiate, rather few to very numerous, arranged in narrowly to broadly pyramidal thyrsoid corymbs or branched thyrsoid panicles; peduncles 1–3 mm, densely setose or tomentose, minutely bracteate, 1- or 2-bracteolate. Involucres cylindric, 5–7 × ca. 1.5 mm, very shortly calyculate; bracts of calyculus few; phyllaries 4 or 5, oblong-linear, 0.5–1 mm wide, herbaceous, usually densely setulose, margin narrowly scarious, apically obtuse. Ray florets 2; corolla 2–3.5 mm, truncate or minutely radiate, shorter than style. Disk florets 2 or 3(or 4); corolla yellow, 7–7.5 mm, with 2.5–3 mm tube and funnelform limb; lobes ovate-oblong, 1–1.2 mm, apically acute. Anthers ca. 3 mm; anther tails 0.3–0.75 × as long as antheropodia; appendages ovate-oblong; antheropodia somewhat elongated, stout, basally dilated. Style branches ca. 1 mm, fringed with rather short papillae and with a rather short and scant terminal tuft. Achenes ca. 1.5 mm, puberulent or glabrous. Pappus white, 5–6 mm. Fl. Aug–Nov.

Forests, thickets; 1900–4000 m. Guizhou, Xizang, Yunnan [Bhutan, NE India, Myanmar, Nepal].

14. Synotis ainsliaeifolia C. Jeffrey & Y. L. Chen, Kew Bull. 39: 307. 1984.

宽翅合耳菊 kuan chi he er ju

Herbs, probably rhizomatous, 30–200 cm tall; basal part not seen. Vegetative stems densely brown villous. Flowering stems solitary, erect, subscapiform, densely ferruginous pubescent. Leaves mostly subrosulate at base of flowering stems; petiole 4–9 cm, broadly to narrowly winged, base expanded and subamplexicaul, adaxially densely brown villous on midvein; blade ovate or ovate-oblong, 15–26 × 8–14 cm, papery, abaxially pubescent or shortly brownish villous especially on veins, adaxially hirtellous, pinnately veined, lateral veins 8–10, arcuate-ascending, base subtruncate or cordate, margin irregularly dentate or dentate-lacerate with mucronulate teeth, apex acuminate. Flowering stem leaves few, rapidly diminishing in size upward, shortly petiolate or sessile, ovate to lanceolate. Capitula heterogamous, minutely radiate, numerous, arranged in narrow to spreading paniculoid thyrse; peduncles 1–2 mm, densely pubescent, 1- or 2-bracteolate; bracts and bracteoles small. Involucres cylindric, 5–6 × 2–2.5 mm, very shortly calyculate; bracts of calyculus few; phyllaries 8, linear-lanceolate, 1–1.5 mm, herbaceous, densely setulose, margin broadly scarious, densely setulose, apically obtuse or acute. Ray florets 2; corolla yellow, 5–5.5 mm; corolla tube ca. 3 mm; lamina oblong-elliptic, ca. 2.5 × 1 mm, 4-veined, obscurely 3-denticulate. Disk florets 8 or 9; corolla dull yellow, ca. 7 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-lanceolate, 1–1.2 mm, apically acute, papillose. Anthers ca. 2 mm, anther tails slightly exceeding antheropodia, appendages lanceolate; antheropodia somewhat elongated, rather stout, basally dilated. Style branches ca. 0.7 mm, fringed with moderately long papillae, terminal tuft lax, slightly longer than lateral ones. Achenes (immature) ca. 1.5 mm, glabrous. Pappus white, 5–6 mm. Fl. Sep.

• Open places in forests; ca. 2700 m. Xizang (Delei valley).

15. Synotis tetrantha (Candolle) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 308. 1984.

四花合耳菊 si hua he er ju

Senecio tetranthus Candolle, Prodr. 6: 370. 1838.

Herbs, scandent. Stems terete, sparsely pubescent or subglabrous, branching, leafy. Leaves rather distant, petiolate; blade ovate or ovate-lanceolate, 5.5–12 × 3.5–9 cm, membranous, abaxially sparsely pubescent especially on veins to glabrous, adaxially scattered setulose, pinnately veined, lateral veins 10, arcuate-ascending, base cordate, truncate, or rounded, margin mucronately irregularly sinuate-serrate or dentate, apex acutely long acuminate. Capitula heterogamous, minutely radiate, numerous, arranged in terminal and axillary paniculoid thyrse, shortly pedunculate or subsessile; peduncles densely pubescent, linear-bracteate. Involucres narrowly cylindric, 4–5.5 × 1–1.5 mm, shortly calyculate; bracts of calyculus few; phyllaries 4 or 5, oblong, herbaceous, sparsely pubescent, margin scarious, apically obtuse. Ray florets 2; corolla yellow, ca. 5 mm, with ca. 2.5 mm tube and oblong-linear, minutely 3-denticulate lamina, usually shorter than style. Disk florets 2(or 3); corolla yellow, long exserted, ca. 7.5 mm, with ca. 2.5 mm tube and funnelform limb; lobes erect, oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 2 mm, anther tails ca. equaling antheropodia; appendages ovate-lanceolate; antheropodia distinctly dilated at base. Style branches ca. 0.8 mm, fringed with rather short papillae. Achenes ca. 2.5 mm, sparsely puberulent. Pappus white or pale reddish, ca. 5 mm. Fl. Aug–Sep.

Mixed woods, forests; 2300–2700 m. Xizang (Cona, Nyalam) [Bhutan, NE India, Nepal].

16. Synotis yui C. Jeffrey & Y. L. Chen, Kew Bull. 39: 308. 1984.

蔓生合耳菊 man sheng he er ju

Herbs, rhizomatous. Rhizome woody, creeping. Stem solitary, subscandent, flexuous, 35–45 cm, slender, pubescent with brownish multicellular hairs, glabrescent, leafy. Leaves shortly petiolate; petiole 0.5–0.8 cm, ± pubescent; blade abaxially purple, adaxially deep green, ovate or ovate-lanceolate, 4–10 × 1.5–2.5 cm, papery, abaxially sparsely pubescent on veins to

glabrous, adaxially scattered setulose to glabrous, triplinerved from base, base rounded, ± falcate in upper part, margin remotely sinuate-denticulate to rather distantly coarsely serrate with mucronate teeth, apex acuminate or caudate-acuminate; uppermost leaves similar but smaller and narrower. Capitula heterogamous, disciform, in lax terminal and upper axillary 3–7-headed corymbs; peduncles 6–18 mm, slender, linear-bracteate at base, with 1 or 2 linear bracteoles in upper part, sparsely shortly fulvous pubescent. Involucres cylindric, 8–12 × 2–3 mm, obscurely calyculate; bracts of calyculus 1–3, unequal; phyllaries 5, oblong-linear, 1–1.5 mm wide, herbaceous, glabrous, 3-veined, margin narrowly scarious, apically obtuse and pubescent. Marginal female florets 2; corolla yellow, ca. 5 mm, filiform, not radiate, shorter than style. Disk florets 3 or 4; corolla yellow, ca. 13 mm, with ca. 4 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute, puberulent. Anthers long exserted, ca. 5 mm, anther tails 0.5–0.75 × as long as antheropodia; appendages ovate-oblong; antheropodia long, stout, basally distinctly dilated. Style branches ca. 2 mm, fringed with stout papillae, terminal tuft much longer than lateral ones. Achenes ca. 3.5 mm, glabrous. Pappus white, ca. 9 mm. Fl. and fr. Aug–Sep.

Moss forests; 2700–2900 m. Xizang (Mêdog), Yunnan [Myanmar].

17. Synotis hieraciifolia (H. Léveillé) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 310. 1984.

毛叶合耳菊 mao ye he er ju

Gynura hieraciifolia H. Léveillé, Bull. Géogr. Bot. 24: 284. 1914; *G. esquirolii* H. Léveillé; ?*Senecio hui* C. C. Chang; *S. lonchophyllus* Handel-Mazzetti.

Herbs, perennial; basal part not seen. Stems glabrous, leafy. Leaves shortly petiolate; petiole 1–2.5 cm, sparsely fulvous arachnoid, glabrescent to glabrous; blade elliptic or oblanceolate-elliptic, 8–12 × 1.5–4 cm, thickly papery, abaxially sparsely fulvous arachnoid, adaxially glabrous, pinnately veined, lateral veins 10–14, inconspicuous, base cuneate, margin remotely mucronulate-serrate, apex acuminate; uppermost leaves similar but smaller. Capitula radiate in lax few-headed terminal and upper axillary corymbs or thyrses; peduncles 1.5–3 cm, slender, sparsely to densely fulvous tomentose, glabrescent, basally linear-bracteate; bracteoles 3–5, linear-subulate, 3–5 mm, apically acute. Involucres campanulate, 8–10 × 4–7 mm, calyculate; bracts of calyculus 5 or 6, linear-subulate, 2–3 mm; phyllaries 13, oblong-lanceolate, 1–1.2 mm, herbaceous, glabrous except at base, margin broadly scarious, apically acute or acute-acuminate and puberulent. Ray florets 7; corolla tube 8–8.5 mm; lamina yellow, oblong, 9–10 × ca. 3 mm, 4-veined, 3-denticulate. Disk florets to 25; corolla 12–13 mm, with ca. 7.5 mm tube and funnelform limb; lobes lanceolate, ca. 2.5 mm, apically acute, papillose. Anthers ca. 4 mm, anther tails shorter than antheropodia; appendages ovate-lanceolate; antheropodia dilated at base. Style branches ca. 3 mm, fringed with long stout papillae, terminal tuft not markedly longer than laterals. Achenes 3–3.5 mm, glabrous. Pappus white, 9–10 mm. Fl. Feb–Mar.

• Riversides, forest margins, on rocks; 800–2200 m. Guizhou (Guanling), Yunnan (Wenshan).

18. Synotis guizhouensis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 313. 1984.

黔合耳菊 qian he er ju

Herbs, rhizomatous. Rhizome woody, to 5 mm in diam., erect or ascending. Stem solitary, erect, ca. 130 cm tall, leafless in lower part, rather densely leafy above, simple, white arachnoid, glabrescent. Leaves shortly petiolate; petiole ca. 1 cm, fulvous pubescent and thinly arachnoid; blade oblanceolate-oblong, 8–15 × 1.5–2.5 cm, papery, abaxially thinly arachnoid, adaxially white arachnoid on midvein, pinnately veined, lateral veins 14–18, base attenuate, margin remotely shallowly to coarsely sinuate-dentate, with mucronulate teeth, apex acute or acute-acuminate. Upper leaves smaller; uppermost leaves sessile, linear, bractlike, 12–20 × 1–3 mm. Capitula radiate, solitary in axils of bractlike uppermost leaves, forming a narrow terminal raceme; peduncles 8–10 mm, densely arachnoid-tomentose; bracteoles 4 or 5, 3–5 mm. Involucres tubular, 6–7 × 2–3 mm, calyculate; bracts of calyculus 3 or 4, subulate, short; phyllaries 8–10, oblong, 1–1.5 mm wide, triangular-spreading, apically obtuse, and densely puberulent, subleathery, thinly arachnoid, margin broadly scarious. Ray florets 5; corolla tube ca. 7 mm; lamina yellow, oblong, ca. 3 × 1–1.5 mm, 6-veined, 4-denticulate. Disk florets 18 or 19; corolla ca. 10 mm, with ca. 2.5 mm tube and funnelform limb; lobes oblong-lanceolate, apically acute, papillose. Anthers ca. 4.5 mm; antheropodia stout, basally somewhat dilated; appendages ovate-lanceolate; anther tails ca. 2 × as long as antheropodia. Style branches ca. 2 mm, fringed with papillae, terminal tuft not evidently longer than laterals. Achenes ca. 3 mm, glabrous. Pappus pale straw-colored, ca. 11 mm. Fl. Sep.

• Montane forests; ca. 1600 m. Guizhou.

19. Synotis sinica (Diels) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 313. 1984.

华合耳菊 hua he er ju

Gynura sinica Diels, Bot. Jahrb. Syst. 29: 618. 1901; *Senecio sinicus* (Diels) C. C. Chang.

Herbs, rhizomatous. Stem solitary, erect, 50–80 cm tall, leafless in lower part, rather densely leafy above, simple or branching in synflorescence only, fulvous arachnoid, glabrescent. Leaves shortly petiolate; petiole 0.5–1.5 cm, densely fulvous pubescent; upper leaves subsessile or sessile, gradually smaller; leaf blade narrowly oblanceolate-elliptic or oblanceolate, 10–16 × 2–3 cm, papery, abaxially sparsely shortly setulose and sometimes purplish, adaxially thinly fulvous arachnoid on midvein, pinnately veined, lateral veins 10–14, base attenuate, margin rather remotely shallowly sinuate-dentate with mucronulate teeth, apex acute-acuminate. Capitula discoid, not very numerous, arranged in narrow terminal thyrses, solitary in axils of upper leaves in lower part of synflorescence, in small axillary and terminal corymbs toward apex of synflorescence; peduncles 5–10 mm, bracteate, densely fulvous arachnoid, with 3 or 4 linear-subulate bracteoles. Involucres cylindric or nar-

rowly campanulate, 7–9 × 2–3 mm, calyculate; bracts of calyculus 3–5, short; phyllaries 8, linear-lanceolate, 1.5–2 mm wide, herbaceous, sparsely to densely arachnoid, margin narrowly scarious, apically obtusely triangular-acuminate and puberulent, somewhat spreading. Ray florets absent. Disk florets ca. 14 or 15; corolla yellow, ca. 10 mm, with ca. 3 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.7 mm, apically acute. Anthers 4 or 5; anther tails equaling antheropodia; appendages ovate-oblong; antheropodia rather short and broad, basally slightly dilated. Style branches ca. 1.8 mm, fringed with long papillae, terminal tuft not longer than laterals. Achenes 3–4 mm, glabrous. Pappus white, 7–9 mm. Fl. Jul–Sep.

• Montane forests; 1300–2200 m. Chongqing (Nanchuan), Guizhou.

20. Synotis chingiana C. Jeffrey & Y. L. Chen, Kew Bull. 39: 315. 1984.

子农合耳菊 zi nong he er ju

Herbs, rhizomatous. Rhizome thick, woody. Stem solitary, erect, to 80 cm tall, leafless in lower part, leafy above, branching in synflorescence, fulvous arachnoid-tomentose, glabrescent. Leaf petiole 1–3 cm, arachnoid-tomentose; leaf blade elliptic-oblong or oblong-lanceolate, to 22 × 6 cm, membranous, abaxially thinly floccose-arachnoid-tomentose and ± glabrescent, adaxially green and sparsely shortly setulose, pinnately veined, lateral veins 16–20, arcuate-ascending and intramarginally uniting, base cuneate, margin minutely mucronulate-dentate, apex acute-acuminate. Upper leaves and leaves of branches shortly petiolate, oblong-lanceolate, smaller. Capitula disciform, moderately numerous, arranged in lax 2–7-flowered terminal and upper axillary thyrsoid corymbs; peduncles 1.5–2.5 cm, fulvous tomentose, basally bracteate; bracteoles 3–5, linear, 5–7 mm, sparsely pubescent, apically acuminate. Involucres campanulate-cylindric, 10–12 × 4–5 mm, prominently calyculate; bracts of calyculus 10–12, linear, ca. 1/3 as long as phyllaries, phyllaries 8 or 9, oblong-lanceolate, 1–1.5 mm wide, herbaceous, sparsely pubescent or subglabrous, obscurely 3–5-veined, margin broadly scarious, apically acute, puberulent and purplish. Female florets 6; corollas filiform, ca. 9 mm, with ca. 3.5 mm tube and subcylindric, 5-denticulate limb. Disk florets 19 or 20; corolla ca. 10 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.5 mm, apically acute. Anthers ca. 3 mm; anther tails ca. equaling antheropodia; appendages ovate-lanceolate; antheropodia long, robust, basally distinctly dilated. Style branches ca. 1.5 mm, fringed with rather short papillae, terminal tuft distinct, ca. equaling laterals. Achenes ca. 3 mm, glabrous. Pappus white, ca. 10 mm. Fl. and fr. Oct.

• Broad-leaved and mixed forests; ca. 3000 m. NW Yunnan (Yangbi).

21. Synotis xantholeuca (Handel-Mazzetti) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 316. 1984.

黄白合耳菊 huang bai he er ju

Senecio xantholeucus Handel-Mazzetti, Symb. Sin. 7: 1127. 1936.

Herbs, rhizomatous. Rhizome thick, woody. Stem solitary, erect, 70–150 cm tall, leafless in lower part, leafy above, branching in synflorescence, densely white tomentose, subglabrescent. Leaf petiole 1–3.5 cm, stout, densely white tomentose and brownish setulose; blade ovate-lanceolate or lanceolate, to 23 × 7.5 cm, membranous, abaxially densely white tomentose, adaxially minutely fulvous pubescent especially on veins and sometimes at first also thinly floccose-tomentose, pinnately veined, lateral veins 16–24, arcuate-ascending and intramarginally uniting, base rounded to obtuse, margin rather closely to remotely apiculate-dentate, apex long acuminate, apiculate. Upper leaves and leaves of branches shortly petiolate, gradually smaller. Capitula minutely radiate, rather numerous, arranged in rounded 2–13-headed rather dense to lax axillary and terminal corymbs; peduncles 0.5–2 cm, densely tomentose, basally bracteate, with a few linear or linear-filiform 4–8 mm bracteoles. Involucres cylindric-campanulate, 6–8 × 2.5–3.5 mm, calyculate; bracts of calyculus 3 or 4, purplish, linear, to 1/2 as long as phyllaries; phyllaries 5 or 8, oblong-lanceolate, 1–1.5 mm wide, herbaceous, sparsely arachnoid-tomentose, margin broadly scarious, apically acute to subobtuse-acuminate, puberulent and usually purplish. Ray florets 5; corolla tube ca. 4 mm; lamina yellow, ovate-oblong, small, usually shorter than style, apically 3-denticulate. Disk florets 5–10; corolla yellow, 9–10 mm, with ca. 3 mm tube and narrowly funnelform limb; lobes lanceolate, ca. 1 mm, apically acute. Anthers ca. 2.5 mm; anther tails exceeding antheropodia; appendages lanceolate; antheropodia slightly dilated at base. Style branches ca. 0.7 mm, fringed with rather short papillae, apical tuft distinct, much longer than laterals. Achenes ca. 2.5 mm, glabrous. Pappus white, 9–10 mm. Fl. and fr. Sep–Dec.

• Mixed forests, wet places; 2200–2700 m. NW Yunnan.

22. Synotis yakoensis (Jeffrey) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 318. 1984.

丫口合耳菊 ya kou he er ju

Senecio yakoensis Jeffrey, Notes Roy. Bot. Gard. Edinburgh 5: 195. 1912.

Herbs, robust, somewhat shrubby. Stems erect, ca. 90 cm tall, branching in synflorescence, densely white tomentose, setulose with reddish brown multicellular hairs. Leaf petiole 1–1.5 cm, densely white tomentose and brown setulose; blade lanceolate or elliptic-lanceolate, 7–16 × 4–5.5 cm, papery, abaxially densely white tomentose and ferruginous setuliferous especially on veins, adaxially shortly fulvous pubescent especially on veins, pinnately veined, lateral veins 18–20, arcuate-ascending and intramarginally uniting, base rounded, margin apiculate-dentate, apically acuminate-attenuate or acuminate. Upper leaves and leaves of branches shortly petiolate, lanceolate or narrowly lanceolate, gradually smaller, apically attenuate. Capitula minutely radiate, numerous, arranged in globose, rather dense, axillary and terminal corymbs; peduncles 5–10 mm, densely tomentose and brownish setulose, basally bracteate, with a few linear, densely tomentose bracteoles. Involucres cylindric, 6–7 × 2–2.5 mm, calyculate; bracts of calyculus 4 or 5, to 1/2 as long as phyllaries; phyllaries 5, oblong-linear, ca. 1

mm wide, herbaceous, thinly arachnoid-tomentose, margin narrowly scarious, apically obtuse or obtuse-acuminate, puberulent and dark colored. Ray florets 4; corolla tube ca. 4 mm; lamina yellow, ca. 3.5 mm, usually shorter than style, 3-denticulate. Disk florets 7–9; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, puberulent. Anthers ca. 2.5 mm; anther tails ca. 0.3 × as long as antheropodia; appendages ovate-lanceolate; antheropodia slightly dilated at base. Style branches ca. 1 mm, fringed with short papillae, terminal tuft distinct but hardly longer than laterals. Achenes ca. 5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Oct–Nov.

• Open montane slopes and forests; ca. 2000 m. NW Yunnan.

23. Synotis cappa (Buchanan-Hamilton ex D. Don) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 319. 1984.

密花合耳菊 mi hua he er ju

Senecio cappa Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 179. 1825; *S. densiflorus* Wallich ex Candolle; *S. densiflorus* var. *lobbii* J. D. Hooker; *S. nagensium* C. B. Clarke var. *lobbii* (J. D. Hooker) Craib; *S. tsoongianus* Y. Ling.

Subshrubs or shrubby herbs, rhizomatous. Stems erect, to 150 cm tall, often flexuous, densely lanate or arachnoid-tomentose, ± glabrescent when old, simple or usually branching above in synflorescences, leafless in lower part at anthesis. Leaves petiolate or sometimes subsessile; petiole to 10 mm, stout, densely tomentose, base often auriculate; blade broadly to narrowly obovate-oblanceolate or oblong-elliptic, 10–28 × 4–8 cm, papery, abaxially densely to sparsely fulvous pubescent on veins and densely to sparsely whitish tomentose, sometimes ± glabrescent, adaxially shortly densely to sparsely pubescent and sometimes thinly white arachnoid to subglabrous, pinnately veined, lateral veins 12–28, arcuate-ascending, base attenuate, margin finely to coarsely mucronulate-serrate, apically acuminate. Upper leaves and leaves of branches lanceolate or linear-lanceolate, gradually smaller. Capitula radiate, usually numerous, arranged in terminal and axillary usually 10–20-headed dense compound corymbs or thyrses; peduncles 5–10 mm, densely tomentose, with a few linear or linear-subulate bracts. Involucres narrowly campanulate, 5–7 × 2–4 mm, calyculate; bracts of calyculus ca. 8, linear-lanceolate, 3–5 mm, apically acuminate; phyllaries 8–13, linear-lanceolate, ca. 1 mm wide, herbaceous, densely tomentose, margin narrowly scarious, apically obtuse to acute and puberulent. Ray florets ca. 8; corolla tube ca. 2.5 mm; lamina yellow, ca. 3.5 × 1 mm, 4-veined, 3-denticulate. Disk florets 11–17; corolla yellow, ca. 5 mm, with ca. 1.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.5 mm, apically acute. Anthers ca. 2.5 mm; anther tails slightly exceeding antheropodia; appendages ovate-oblong; antheropodia rather slender, basally slightly dilated. Style branches ca. 1 mm, fringed with short papillae, terminal tuft not evident. Achenes ca. 2 mm, glabrous. Pappus white, ca. 5 mm. Fl. Oct–Jan.

Forest margins, thickets, streamsides, meadows; 1500–2300 m. Guangxi, Sichuan, Xizang, Yunnan [Bhutan, NE India, Myanmar, Nepal, N Thailand].

24. Synotis ionodasys (Handel-Mazzetti) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 320. 1984.

紫毛合耳菊 zi mao he er ju

Senecio ionodasys Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 637. 1937.

Subshrubs or herbs, rhizomatous. Stem solitary, erect, flexuous, to 100 cm tall, when young with dense rusty brown tomentum, glabrescent, leafless in lower part at anthesis. Leaf petiole 3–3.5 cm, prominently purplish brown setulose, basally slightly expanded, not auriculate; blade adaxially green, oblanceolate, obovate-oblanceolate, or elliptic, 8–23 × 2.5–8 cm, papery, abaxially densely whitish tomentose and brownish setulose on veins, adaxially thinly arachnoid with fugacious tomentum and sparsely scattered setulose especially on veins, pinnately veined, lateral veins 14–22, arcuate-ascending, furcate distally and excurrent in teeth, prominent abaxially, base cuneate-attenuate, margin sharply apiculate-serrate, apex shortly acuminate. Upper leaves shortly petiolate, gradually smaller. Capitula radiate, numerous, arranged in axillary and terminal compound corymbs; peduncles 5–15 mm, fulvous tomentose and purplish setulose. Involucres campanulate, 7–8 × 4–6 mm, calyculate; bracts of calyculus several, unequal, longest equaling phyllaries; phyllaries ca. 13, linear-lanceolate, ca. 1 mm wide, herbaceous, densely fulvous tomentose and often also purplish setulose, margin narrowly scarious, apically acute. Ray florets 14–20; corolla tube ca. 3.5 mm; lamina yellow, oblong, ca. 6 × 1.5 mm, 4- or 5-veined, 3-denticulate. Disk florets ca. 12; corolla yellow, ca. 7 mm, with ca. 3 mm tube and narrowly funnelform limb; lobes ovate-oblong, ca. 1 mm, apically acute. Anthers ca. 3 mm; anther tails ca. 1.5 × as long as antheropodia, appendages lanceolate; antheropodia elongated, basally dilated. Style branches ca. 1 mm, fringed with short papillae, terminal tuft barely differentiated. Achenes ca. 1.5 mm, glabrous or sparsely pubescent. Pappus white, ca. 6.5 mm. Fl. Feb–Oct.

• Forests, streamsides; 1200–2500 m. S Yunnan.

25. Synotis nagensium (C. B. Clarke) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 321. 1984.

锯叶合耳菊 ju ye he er ju

Senecio nagensium C. B. Clarke, J. Linn. Soc., Bot. 25: 39. 1889; *Inula vernoniiformis* H. Léveillé; *Pulicaria kouyangensis* Vaniot; *S. densiflorus* Wallich ex Candolle var. *fargesii* (Franchet) Handel-Mazzetti; *S. densiflorus* var. *mishmiensis* J. D. Hooker; *S. hugonis* S. Moore; *S. prionophyllus* Franchet; *Vernonia fargesii* Franchet.

Subshrubs or herbs, rhizomatous. Stem erect, to 150 cm tall, densely whitish tomentose or fulvous tomentose, branching in synflorescence, leafless in lower part at anthesis. Leaves shortly petiolate; petiole 5–25 mm, densely tomentose and often also setulose with reddish brown hairs; blade adaxially green, obovate-elliptic, oblanceolate-elliptic, or elliptic, 7–23 × 2.5–8.5 cm, papery, abaxially densely whitish tomentose or fulvous tomentose and brownish setulose especially on veins, adaxially sparsely arachnoid-tomentose and shortly scattered pubescent, pinnately veined, lateral veins 20–26(–30), arcuate-ascending, prominent adaxially, base cuneate or cuneate-attenuate, margin

finely to coarsely mucronulate-serrate or biserrate, apex shortly acuminate; upper and branch leaves smaller, shortly petiolate, narrowly elliptic or lanceolate. Capitula heterogamous, disciform or minutely radiate, numerous, arranged in narrow, simple, to spreading, compound, terminal and upper axillary paniculoid thyrses; peduncles 5–12 mm, densely tomentose and sometimes also ferruginous setulose, linear-bracteate. Involucres obconic-campanulate, 7–8 × 4–6 mm, calyculate; bracts of calyculus ca. 8, usually linear, equaling phyllaries, sometimes leaflike and much exceeding phyllaries; phyllaries 13–15, linear, 1–1.5 mm wide, herbaceous, very densely tomentose, margin narrowly scarious, apically acute. Female florets 12 or 13; corolla yellow, filiform, or minutely radiate, ca. 6 mm, minutely 3-denticulate. Disk florets 12–20; corolla yellow, ca. 6 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 3 mm; anther tails ca. 0.75–2 × as long as antheropodia; appendages ovate-oblong; antheropodia rather long and narrow, basally hardly dilated. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft indistinct. Achenes ca. 1.7 mm, sparsely pubescent. Pappus white, ca. 5 mm. Fl. Aug–Mar.

Woods, thickets, meadows; 100–2000 m. Gansu, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Xizang, Yunnan [NE India, N Myanmar, N Thailand].

26. Synotis otophylla Y. L. Chen, Acta Phytotax. Sin. 33: 81. 1995.

耳柄合耳菊 er bing he er ju

Herbs, rhizomatous. Rhizome woody, ascending. Stems erect, striate, purplish, 60–65 cm tall, branching in upper part, 3–4 mm in diam. at base, minutely setulose. Leaves long petiolate, basal leaves withered at anthesis; blade papery, lower leaf petiole 4–5 cm, sparsely puberulent, basally leaflike-expanded, auriculate-amplexicaul, with mucronulate teeth margins; blade abaxially purplish, adaxially green, triangular-ovate or triangular-hastate, 8–10 × 8–9 cm, palmately 5-veined, both surfaces adpressed fulvous pubescent, base deeply cordate or subhastate, margin irregularly dentate, with mucronulate teeth, apex acute or acuminate. Upper leaf petiole 1.5–3.5 cm, fulvous puberulent, basally leaflike-expanded auriculate, amplexicaul; blade smaller, ovate or broadly ovate, 4–5 × 4–4.5 cm, both surfaces fulvous setulose, base subcordate or truncate, margin irregularly dentate with mucronulate teeth, apex acute or acute-acuminate. Uppermost leaves shortly petiolate or subsessile, lanceolate or linear, very small, 1–1.5 cm, margin entire or 2- or 3-denticulate. Capitula discoid, numerous, arranged in terminal corymbose thyrses; peduncles 1–2 mm, densely pubescent, with 1 or 2 scalelike bracts. Involucres cylindric, 1.5–2 × 1.5–2 mm, with 1–3 subulate bracteoles at base; phyllaries 5, oblong, 1–1.5 mm wide, subleathery, sparsely puberulent or subglabrous, obscurely 1–3-veined, margin narrowly scarious, apically obtuse, purplish. Disk florets 5, distinctly exserted beyond phyllaries; corolla yellow-purplish, ca. 5 mm, with 2–2.5 mm tube and narrowly campanulate limb; lobes ovate-lanceolate, apically acute, papillose. Anthers linear, ca. 3 mm; anther tails long; antheropodium stout, basally slightly dilated. Style branches obtuse, fringed with rather short fine papillae. Achenes ca. 2.5 mm, glabrous. Pappus purplish brown. Fl. Sep.

• *Picea* forests; ca. 3300 m. S Xizang (Gyirong).

27. Synotis solidaginea (Handel-Mazzetti) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 323. 1984.

川西合耳菊 chuan xi he er ju

Senecio solidagineus Handel-Mazzetti, Acta Horti Gothob. 12: 285. 1938; *S. paucinervis* Dunn var. *brachylepis* C. Marquand & Airy Shaw.

Herbs, rhizomatous, forming large clumps. Rhizome woody, creeping. Stems 1–3, erect, 30–70 cm tall, simple or few branched in upper part, densely to sparsely arachnoid and ± glabrescent, leafless in lower part at anthesis. Leaves rather crowded; petiole 0.5–2 cm, sparsely arachnoid; blade ovate-lanceolate, lanceolate, or elliptic-oblong, 6–12 × 2–4.5 cm, papery, both surfaces at first sparsely arachnoid, glabrescent, pinnately veined, lateral veins (6–)8–10, arcuate, strongly ascending, prominent abaxially, base cuneate to rounded and often unequal, margin regularly and closely acutely serrate or sometimes subduplicate-serrate, apex acutely shortly acuminate. Upper leaves shortly petiolate, gradually smaller upward. Capitula homogamous, discoid, very numerous, arranged in dense terminal and upper axillary usually narrowly pyramidal compound thyrses, shortly pedunculate or subsessile; peduncles 1–2 mm, densely white tomentose; bracts subulate, small. Involucres narrowly cylindric, ca. 3 × 1–1.5 mm, calyculate; bracts of calyculus few, scalelike, very short; phyllaries 4 or 5, green with darker apices, broadly oblong, ca. 1 mm wide, subleathery, arachnoid, glabrescent, margin scarious, apically obtuse or rounded and shortly ciliate. Ray florets absent. Disk florets 3; corolla pale yellow or cream, ca. 6 mm, with ca. 1.5 mm tube and long-exserted funnelform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 2.5 mm; anther tails ca. 0.5 × as long as antheropodia; appendages oblong-lanceolate; antheropodia elongated, narrow, basally slightly dilated. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft not distinctive. Achenes ca. 2.5 mm, pubescent. Pappus white or pale straw-colored, 4.5–5 mm. Fl. Jul–Oct.

• Open sunny places; 2900–3900 m. Sichuan, Xizang, Yunnan.

28. Synotis cordifolia Y. L. Chen, Acta Phytotax. Sin. 33: 79. 1995.

心叶合耳菊 xin ye he er ju

Herbs, rhizomatous. Rhizomes not seen. Stems erect, 40–70 cm, striate, flexuous, simple, gray-white pubescent or subglabrous. Leaves long petiolate; petiole 4–8.5 cm, sparsely puberulent, basally slightly expanded; blade adaxially green, ovate-cordate or cordate, 9–13 × 6–10 cm, subleathery, palmately 5-veined, abaxially fulvous setulose on veins, adaxially glabrous, margin irregularly coarsely dentate, with mucronate broadly triangular teeth or subrepand-dentate, apically acuminate or acute. Capitula discoid, numerous, arranged in terminal and axillary in upper part pyramidal thyrses or corymbose panicles; peduncles 3–6 mm, densely fulvous pubescent. Involucres cylindric, 1.5–2 mm wide; phyllaries 3, subleathery, oblong, 1.5–2 mm wide, glabrous, sometimes slightly 3–6-veined, apically obtuse. Ray florets absent. Disk florets 3; corolla yellow, 5–6 mm, with 2.5–3 mm tube and funnelform limb; lobes ob-

long-lanceolate, apically acute, fringed with papillae. Anthers linear, 2–3 mm, basally caudate; antheropodia stout, basally slightly expanded. Style branches excurved, apically obtuse, papillose. Achenes 3–4 mm, glabrous, ribbed. Pappus rubescent, 5–6 mm. Fl. and fr. Oct.

• Mixed forests; ca. 3000 m. Yunnan (Dongchuan).

29. Synotis erythropappa (Bureau & Franchet) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 324. 1984.

红缨合耳菊 hong ying he er ju

Senecio erythropappus Bureau & Franchet, J. Bot. (Morot) 5: 73. 1891; *Cacalia diantha* (Franchet) Handel-Mazzetti; *S. dianthus* Franchet; *S. glumaceus* Dunn; *S. paucinervis* Dunn; *S. talongensis* Franchet; *S. viridiflavus* Handel-Mazzetti; *Vernonia mairei* H. Léveillé.

Herbs, rhizomatous. Rhizome woody. Stems solitary or several, erect or rarely decumbent, to 100 cm tall, usually branching in synflorescence, leafless in lower part at anthesis, fulvous pubescent, arachnoid-pubescent, or subglabrous, glabrescent. Leaves long petiolate; petiole 2–6 cm, sparsely pubescent, subglabrescent; blade ovate, ovate-lanceolate, or oblong-lanceolate, 10–20 × 2.5–7 cm, papery or thinly so, abaxially pubescent especially on veins to subglabrous, adaxially sparsely pubescent to glabrous, pinnately veined, lateral veins 6–10, arcuate-ascending, prominent abaxially, base cordate, subtruncate, rounded, or cuneate, margin regularly and closely to coarsely and unequally shallowly to deeply serrate or dentate, apex acuminate or caudate-acuminate. Upper and branch leaves smaller, shortly petiolate, narrowly lanceolate. Capitula homogamous, discoid, very numerous, arranged in terminal and upper axillary, usually abundant, broadly pyramidal compound thyrses, shortly pedunculate or subsessile; peduncles very short, usually with 1 linear bract. Involucres narrowly cylindric, 4–5 × 1–1.5 mm, calyculate; bracts of calyculus 3 or 4, minute; phyllaries 2 or 3(or 4), linear-oblong, herbaceous, sometimes white tomentose or pubescent, especially at base, or glabrous, margin broadly scarious, apically obtuse and puberulent. Ray florets absent. Disk florets (1 or)2 or 3(or 4); corolla pale yellow, 7.5–8 mm, with 2–3 mm tube and long-exserted funnelform limb; lobes oblong-lanceolate, 1.5–2 mm, apically acute. Anthers ca. 3.5 mm; anther tails ca. 0.5 × as long as antheropodia; appendages ovate-lanceolate; antheropodia robust, basally dilated. Style branches 1.5–2 mm, fringed with rather long fine papillae, terminal tuft not distinctive. Achenes 3–3.5 mm, sparsely pubescent. Pappus dirty white to pale reddish brown, ca. 6 mm. Fl. Jul–Oct.

• Forests, thicket margins, open grassy places; 1500–3900 m. W Hubei, Sichuan, SE Xizang, Yunnan.

30. Synotis muliensis Y. L. Chen, Acta Phytotax. Sin. 26: 54. 1988.

木里合耳菊 mu li he er ju

Herbs, rhizomatous. Rhizomes not seen. Stems erect, ca. 20 cm tall, branching in upper part, adpressed shortly pubescent or subglabrous. Leaf petiole 3–4 cm, fulvous puberulent, basally expanded; blade adaxially green, triangular-ovate or ovate-lanceolate, 8–10 × 5–7.5 cm, papery, abaxially sparsely shortly pubescent, adaxially sparsely fulvous setulose, palmately 3–5-veined, base broadly cuneate or cordate, terminal lobe large, triangular to lanceolate, margin irregularly triangular-dentate, apex acuminate or long acuminate; lateral lobes ovate-triangular or ovate-oblong, margin entire or 2- or 3-denticulate, apex acute. Upper leaves smaller, shortly petiolate, triangular-lanceolate to lanceolate, 3-lobed; lobes denticulate or entire. Capitula discoid, numerous, in terminal and upper axillary pyramidal thyrses, pedunculate or subsessile; peduncles densely lanate, with 2 or 3 triangular bracteoles. Involucres cylindric, 6–7 × 2–3 mm, calyculate; bracts of calyculus 2 or 3, subulate; phyllaries 5, glabrous, margin scarious, apically puberulent. Ray florets absent. Disk florets 5, conspicuously exceeding phyllaries, corolla yellow, 6–7 mm, with 3–3.5 mm tube and funnelform limb; lobes oblong-lanceolate, apically puberulent. Anthers linear, 3–3.5 mm, anther tails long; antheropodia slightly dilated at base. Style branches obtuse, fringed with papillae. Achenes ca. 3 mm, sparsely puberulent. Pappus white, ca. 6 mm. Fl. and fr. Aug.

• Forest margins, rocky places; 2400–2700 m. Sichuan (Muli).

31. Synotis palmatisecta Y. L. Chen & J. D. Liu, Acta Phytotax. Sin. 26: 55. 1988.

掌裂合耳菊 zhang lie he er ju

Herbs, rhizomatous. Rhizomes robust, woody, 8–10 mm in diam. Stem solitary, erect, striate, 35–40 cm tall, flexuous, simple, glabrous. Leaves long petiolate, basal leaves withered at anthesis. Median leaf petiole 3.5–4 cm, basally not expanded; blade abaxially pale green, adaxially green, ovate-triangular, 4–8 × 2.5–6.5 cm, abaxially glabrous, adaxially shortly pubescent on veins, palmately veined, veins prominent abaxially, base cordate, margin deeply palmately 5-sect; terminal lobe broader, oblong-lanceolate, 2.5–3 cm wide, coarsely dentate or lobed, apex acuminate, lateral lobes narrow, 2- or 3-denticulate. Upper leaves similar to median leaves, smaller; uppermost leaves shortly petiolate or subsessile, lanceolate, 3-lobed or entire. Capitula discoid, numerous, arranged in terminal and upper leaf axils, corymbose-paniculate; peduncles 4–5 mm, sparsely puberulent, with 1 or 2 scalelike bracteoles. Involucres cylindric, 4–5 × 1.5–2 mm, calyculate; bracts of calyculus 1 or 2, scalelike; phyllaries 3, broadly oblong, ca. 2 mm wide, subleathery, glabrous, margin broadly scarious, apically obtuse and ciliate. Florets 3, distinctly exceeding phyllaries, corolla yellow, 6–7 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-lanceolate, apically acute, puberulent. Anthers linear, 2.5–3 mm, basally long caudate; antheropodia slightly dilated at base. Style branches excurved, apically obtuse, fringed with papillae. Achenes 3–3.5 mm, glabrous, ribbed. Pappus reddish, 6–7 mm. Fl. May.

• Guizhou (Guiyang).

32. Synotis vaniotii (H. Léveillé) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 326. 1984.

羽裂合耳菊 yu lie he er ju

Senecio vaniotii H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 345. 1914.

Herbs, basal parts not seen. Stems erect, to 110 cm tall, branching in upper part, white puberulent, glabrescent. Leaf petiole 1–1.5 cm, slender, sparsely puberulent; blade ovate-lanceolate, 3.5–5 × 3–4 cm, papery, both surfaces sparsely and shortly ± white tomentose on main veins, glabrescent, very deeply pinnatipartite, with lanceolate, attenuate, pinnately basally few dentate or lobulate terminal lobe and (4–)6–8 narrowly lanceolate or oblong-lanceolate, coarsely few dentate lateral lobes. Upper and branch leaves smaller, with shorter and fewer lateral lobes, shortly petiolate. Capitula homogamous, discoid, numerous and glomerulate in abundant, pyramidal leafy terminal thyrses, shortly pedunculate or subsessile; peduncles densely shortly tomentose, 1- or 2-bracteolate. Involucres cylindric, 3–4 × 1–2 mm, calyculate; bracts of calyculus 2 or 3, minute; phyllaries 3, oblong or obovate-oblong, 1.5–2 mm wide, subleathery, glabrescent to glabrous, margin broadly scarious, apically obtuse to rounded and puberulent. Ray florets absent. Disk florets 3; corolla pale yellow, 6–7 mm, with ca. 2.5 mm tube and long-exserted funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute, papillose. Anthers ca. 3.5 mm; anther tails ca. equaling antheropodia; appendages ovate-lanceolate; antheropodia stout, broad, basally slightly dilated. Style branches ca. 1.5 mm, fringed with fine papillae, terminal tuft indistinct, shorter. Achenes ca. 3 mm, glabrous. Pappus somewhat rubescent, 6–6.5 mm. Fl. Sep.

• Rocky places; 2800–3100 m. Yunnan.

33. Synotis glomerata C. Jeffrey & Y. L. Chen, Kew Bull. 39: 327. 1984.

聚花合耳菊 ju hua he er ju

Senecio glomeratus Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 126. 1916, not Desfontaines ex Poiret (1817).

Herbs, basal parts not seen. Stem solitary, erect, to 120 cm tall, flexuous, shortly branching in synflorescence, fulvous tomentose, glabrescent. Leaves shortly petiolate; petiole 1–2 cm, sparsely fulvous tomentose, glabrescent; blade elliptic or oblanceolate-elliptic, 6–22 × 1.5–6 cm, membranous, abaxially sparsely arachnoid and glabrescent, adaxially sparsely shortly scattered setulose, pinnately veined, lateral veins 16–18, arcuate-ascending, conspicuous abaxially, base cuneate or attenuate, margin mucronulate-serrulate, apex long acuminate. Capitula heterogamous, disciform, numerous, 20–25 in dense rounded axillary and terminal glomeruliform corymbs; peduncles short, ca. 5 mm, fulvous tomentose, basally bracteate, 1- or 2-bracteolate; bracts and bracteoles linear. Involucres cylindric, ca. 3 × 1.5 mm, calyculate; bracts of calyculus 5, linear-subulate, to 1/2 as long as phyllaries; phyllaries 5, oblong, ca. 1.5 mm wide, subleathery, sparsely puberulent, glabrescent, margin broadly scarious, apically obtuse or sometimes acute and puberulent. Marginal female florets 2; corolla filiform, 4.5–5 mm, apically minutely 5-denticulate. Disk florets 3 or 4; corolla yellow, ca. 7 mm, with 2–2.5 mm tube and long-exserted funnelform limb; lobes ovate-oblong, ca. 1.3 mm, apically acute. Anthers ca. 3 mm; anther tails slightly exceeding antheropodia; appendages oblong-lanceolate; antheropodia rather narrow, basally slightly dilated. Style branches ca. 0.8 mm, fringed with short papillae, central tuft prominent, much longer than laterals. Achenes ca. 1.5 mm, glabrous. Pappus white, ca. 5.5 mm. Fl. Aug–Sep.

Forest and thicket margins, rocky slopes; 2500–3300 m. W Yunnan (Fugong, Tengchong) [N Myanmar].

34. Synotis triligulata (Buchanan-Hamilton ex D. Don) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 329. 1984.

三舌合耳菊 san she he er ju

Senecio triligulatus Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 178. 1825; *S. acuminatus* Wallich ex Candolle f. *breviligulatus* Handel-Mazzetti; *S. pentanthus* Merrill.

Subshrubs or shrubby herbs, erect or sometimes scrambling, to 150 cm tall. Stems flexuous, slender, branching, sparsely pubescent, glabrescent. Leaves shortly petiolate; petiole 1–2 cm, glabrous, not auriculate; blade elliptic-lanceolate to broadly oblong-elliptic, 10–15 × 4–6.5 cm, membranous or thinly papery, adaxially nitid, glabrous, pinnately veined, lateral veins 10–14, arcuate-ascending and intramarginally uniting, prominent abaxially, base rounded or broadly cuneate and sometimes unequal, margin finely to coarsely and irregularly mucronate-serrate, apex long acuminate or acuminate-caudate; leaves of synflorescence branches smaller, otherwise similar. Capitula minutely radiate, very numerous, arranged in lax axillary and terminal rounded compound corymbs; peduncles 5–6 mm, slender, sparsely puberulent; bracts linear-subulate, minute. Involucres cylindric, 3–4 × ca. 1 mm, minutely calyculate; bracts of calyculus 1–3, subulate; phyllaries 5, linear-oblong, ca. 1 mm wide, glabrous, margin broadly scarious, apically obtuse or subacute and puberulent. Ray florets 3 or 4; corolla yellow, 4–5 mm, with ca. 2 mm tube and minute, to 2.5 mm lamina, usually shorter than style. Disk florets 3 or 4; corolla yellow, ca. 5 mm, with ca. 2 mm tube and exserted funnelform limb; lobes oblong-lanceolate, ca. 2.5 mm, apically acute. Anthers ca. 2.5 mm; anther tails ca. 1.5 × as long as antheropodia, basally slightly dilated. Style branches ca. 1.2 mm, fringed with short rounded papillae, terminal tuft small, short. Achenes ca. 1.5 mm, glabrous. Pappus white, ca. 5 mm. Fl. Oct–May.

Forests, among scrub vegetation; 1200–2100 m. Xizang, NW Yunnan [Bhutan, NE India, Myanmar, Nepal, N Thailand].

35. Synotis auriculata C. Jeffrey & Y. L. Chen, Kew Bull. 39: 330. 1984.

耳叶合耳菊 er ye he er ju

Subshrubs or shrubby herbs, to 180 cm tall. Stems slender, branching, glandular pubescent. Leaves shortly petiolate; petiole ca. 5 mm, sparsely pubescent, basally auriculate; auricle subcircular, small; blade narrowly elliptic or oblong-elliptic, ca. 17 × 2.5 cm, papery, abaxially sparsely shortly pubescent, adaxially sparsely shortly scattered setulose, pinnately veined, lateral veins 16–18, arcuate-ascending, somewhat prominent abaxially, base narrowly cuneate, margin prominently mucronate-serrate, apex acute-acuminate; uppermost and branch leaves smaller. Capitula minutely radiate, very numerous, arranged in lax axillary and terminal rounded compound corymbs; peduncles 1–3 mm, glandular pubescent, 1- or 2-bracteate and/or bracteolate. Involucres cylindric, 3–3.5 × ca. 1 mm, calyculate; bracts of calyculus 2 or 3, minute; phyllaries 5, oblong-linear, ca. 0.8 mm wide, subglabrous, margin scarious,

apically obtuse and pubescent. Ray florets 2; corolla ca. 4.5 mm, tube ca. 2 mm; lamina yellow, oblong, ca. 2.5 × 0.7 mm, 2- or 3-veined, 3-denticulate. Disk florets 3; corolla yellow, 5–5.5 mm, with ca. 1.5 mm tube and exserted narrowly funnelform limb; lobes ovate-oblong, ca. 1 mm. Anthers ca. 2 mm; anther tails 0.3–0.7 × as long as antheropodia; appendages ovate; antheropodia distinctly dilated at base. Style branches 1–1.2 mm, fringed with short papillae, terminal tuft not distinctive. Achenes ca. 1.5 mm, sparsely pubescent. Pappus white, ca. 4 mm. Fl. Nov.

• Mixed forests; 2100–2400 m. Xizang.

36. Synotis saluenensis (Diels) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 330. 1984.

腺毛合耳菊 xian mao he er ju

Senecio saluenensis Diels, Notes Roy. Bot. Gard. Edinburgh 5: 193. 1912.

Subshrubs or shrubby herbs, scrambling, to 3 m tall. Stems branching in synflorescence, densely glandular fulvous pubescent, glabrescent. Leaves shortly petiolate; petiole 6–10 mm, pubescent, basally not auriculate; blade elliptic or elliptic-lanceolate, 10–22 × 4.5–6.5 cm, papery, abaxially sparsely to densely glandular fulvous pubescent especially on veins, adaxially glabrous or nearly so, pinnately veined, lateral veins 10–14, arcuate-ascending, prominent abaxially, base broadly cuneate to subrounded, margin finely to rather coarsely and irregularly mucronate-serrate, apex acuminate; leaves of synflorescence branches smaller. Capitula heterogamous, disciform, very numerous, arranged in lax to rather dense axillary and terminal rounded compound corymbs; peduncles to 5 mm, glandular fulvous pubescent, bracteate, few bracteolate; bracts and bracteoles linear or linear-subulate, 2–3 mm. Involucres narrowly campanulate, ca. 4 × 2–2.5 mm, calyculate; bracts of calyculus 4 or 5, minute; phyllaries 8, linear-lanceolate, 1–1.2 mm wide, herbaceous, sparsely glandular puberulent or subglabrous, margin narrowly to broadly scarious, apically acute or subacute and puberulent. Female florets 5; corolla yellow, filiform, ca. 3 mm, shorter than style, apically minutely 2- or 3-fid. Disk florets 5 or 6; corolla yellow, with ca. 2 mm tube and funnelform limb; lobes ovate-oblong, apically acute. Anthers ca. 2 mm; anther tails slightly longer than antheropodia; appendages ovate-lanceolate; antheropodia rather short and broad, basally slightly expanded. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft not distinctive. Achenes ca. 2.5 mm, glabrous. Pappus white, ca. 4 mm. Fl. Oct–Feb.

Forests, forest and thicket margins; 1000–3000 m. Xizang, Yunnan [Myanmar, Vietnam].

Synotis saluenensis is distinguished from *S. triligulata* in having leaves glandular pubescent abaxially and large disciform capitula with 8 phyllaries and 10 or 11 florets.

37. Synotis acuminata (Wallich ex Candolle) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 332. 1984.

尾尖合耳菊 wei jian he er ju

Senecio acuminatus Wallich ex Candolle, Prodr. 6: 368. 1838.

Herbs, perennial. Stems erect, 40–120 cm tall, usually corymbosely branched in upper part, fulvous pubescent, glabrescent to glabrous. Leaves shortly petiolate; petiole 3–5 mm, glabrous or sparsely puberulent, not auriculate; blade narrowly elliptic or lanceolate, 8–18 × 1.5–3.5 cm, papery, nitid, abaxially glabrous or sparsely puberulent on veins, adaxially glabrous, pinnately veined, lateral veins 10–12, arcuate-ascending, prominent abaxially, base cuneate or attenuate and often unequal, margin rather remotely mucronate-serrulate or mucronate-serrate, apex acutely long acuminate or caudate-acuminate and sometimes falcate; upper leaves smaller. Capitula minutely radiate, numerous, arranged in terminal compound corymbs; peduncles 1–2 mm, fulvous puberulent, usually 1- or 2-bracteate and or bracteolate. Involucres narrowly cylindric, 5–6 × 1–1.5 mm, calyculate; bracts of calyculus 2 or 3, linear, ca. 2 mm, puberulent; phyllaries 3 or 4, linear-oblong, glabrous, margin scarious, apically obtuse and puberulent. Ray floret 1; corolla yellow, 5–7 mm, with 3–3.5 mm tube and linear ca. 3 mm lamina. Disk florets 2 or 3; corolla yellow, ca. 7 mm, with ca. 2.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute. Anthers ca. 3.2 mm, anther tails ca. 0.5 × as long as antheropodia; appendages ovate-oblong; antheropodia long, basally somewhat dilated. Style branches ca. 1 mm, fringed with short papillae, terminal tuft indistinct. Achenes ca. 3.5 mm, glabrous. Pappus straw-colored, 4–4.5 mm. Fl. Aug–Sep.

Forest margins, streamsides; 2600–3400 m. Xizang [Bhutan, India (Sikkim), Nepal].

38. Synotis calocephala C. Jeffrey & Y. L. Chen, Kew Bull. 39: 334. 1984.

美头合耳菊 mei tou he er ju

Senecio calocephalus C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 48. 1935, not Poeppig (1845), nor Hemsley (1881).

Subshrubs or shrubby herbs. Stems erect, to 150 cm tall, simple or corymbosely branched in upper part, fulvous pubescent, glabrescent. Leaves shortly petiolate; petiole 1–2 cm, sparsely pubescent; blade elliptic or lanceolate-elliptic, 14–17 × 4.5–7 cm, papery, abaxially dull and sparsely shortly pubescent especially on veins and glabrescent, adaxially nitid and sparsely fulvous pubescent especially on midvein, pinnately veined, lateral veins 12–14, arcuate-ascending, veins prominent abaxially, base cuneate, margin apiculate-denticulate or serrulate, apex acuminate; upper leaves smaller. Capitula radiate, numerous, arranged in terminal rather dense compound corymbs; peduncles 1–2 mm, fulvous pubescent, 1- or 2-bracteate and/or bracteolate; bract and bracteoles linear. Involucres cylindric, ca. 4 × 1.5–2 mm, calyculate; bracts of calyculus several, linear, 2.5–3.5 mm; phyllaries 5, linear, ca. 1.5 mm wide, sparsely puberulent, margin scarious, apically obtuse to acute, dark colored and puberulent. Ray florets 2 or 3; corolla tube ca. 2.5 mm; lamina yellow, linear, 8.5–10 × ca. 1.5 mm, 2- or 3-denticulate, 4-veined; style long exserted. Disk florets 3; corolla yellow, ca. 8 mm, with 2–2.5 mm tube and funnelform limb; lobes linear, 2.5–3 mm, apically acute. Anthers ca. 3.5 mm; anther tails 0.5–0.8 × as long as antheropodia; appendages ovate-lanceolate; an-

theropodia robust, basally slightly dilated. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft not differentiated. Achenes ca. 2 mm, glabrous. Pappus straw-colored, ca. 7 mm. Fl. Aug–Sep.

Thicket margins; 2100–2700 m. Yunnan (Longchuan Jiang–Nu Jiang divide) [Myanmar].

Synotis calocephala differs from *S. acuminata* by its thinner textured, relatively broader, and less deeply denticulate leaves and its conspicuously radiate capitula with 5 phyllaries, 2 or 3 ray florets, and 8–10 mm long ray floret laminae.

39. Synotis reniformis Y. L. Chen, Acta Phytotax. Sin. 34: 648. 1996.

肾叶合耳菊 shen ye he er ju

Herbs, rhizomatous. Rhizomes not seen. Stem solitary, erect or basally curved, striate, slender, sparsely shortly pubescent or ± glabrescent. Basal and lower leaves withered at anthesis, with 1 or 2 scalelike persistent petioles; median leaves 2 or 3, long petiolate; petiole 3.5–5 cm, not winged, sparsely arachnoid and shortly pubescent, basally slightly expanded and subamplexicaul; blade abaxially gray-green, adaxially green, reniform or cordate-reniform, 3–4 × 5–6.5 cm, papery, abaxially arachnoid, adaxially adpressed setulose, 3–5-veined from base, lateral veins divaricate, and uniting and netted, base rounded or cordate and attenuate into petiole, margin shallowly repand-dentate with mucronulate teeth. Upper leaves similar to median leaves but smaller, shortly petiolate. Uppermost leaves reduced and bractlike, linear or linear-lanceolate, 5–10 × 1–1.5 mm, apically acute. Capitula homogamous, discoid, solitary in bracts of uppermost part, racemose; peduncles 1–2 mm, densely tomentose. Involucres narrowly campanulate, 4–5 × 3–4 mm, calyculate; bracts of calyculus 3 or 4, linear, ca. 1/2 as long as phyllaries, apically acute, phyllaries 5, oblong or oblong-lanceolate, 3–4 × 1.5–2 mm, subleathery, glabrous, margin narrowly scarious, apically slightly acute or obtuse. Florets 5, exserted from involucres; corolla yellow ca. 7 mm, with ca. 3 mm tube and campanulate limb; lobes ovate-lanceolate, 1.5–2 mm, apically acute. Anthers ca. 4 mm, basally obtuse-auriculate; antheropodia rather short, basally slightly dilated. Style branches obtuse or truncate, shortly fringed. Achenes 2–3 mm, glabrous. Pappus white, 4–5 mm. Fl. Jul, fr. Aug.

• Wet places along riversides in valleys; ca. 3000 m. Yunnan.

40. Synotis lucorum (Franchet) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 334. 1984.

丽江合耳菊 li jiang he er ju

Senecio lucorum Franchet, J. Bot. (Morot) 10: 415. 1896; *S. bulleyanus* Diels.

Herbs, rhizomatous. Rhizomes thick, woody. Stems 1–3, erect, 30–60 cm tall, at first sparsely arachnoid and fulvous pubescent, usually ± glabrescent, simple or branching in synflorescence, leafless or with only small scalelike leaves in lower part at anthesis. Leaves sessile or rarely subpetiolate; blade adaxially green, narrowly oblong-elliptic to lanceolate, 7–12 × 1.2–2.5 cm, papery, abaxially pallid and thinly arachnoid, adaxially sparsely arachnoid, sparsely fulvous pubescent and glabrescent, pinnately veined, lateral veins 10–14, arcuate-ascending, base attenuate, sometimes dilated and subamplexicaul, margin minutely denticulate to coarsely sinuate-dentate with mucronulate teeth, apex acute-acuminate. Upper leaves smaller, lanceolate. Capitula homogamous, discoid, numerous, usually 20–25 in rather dense terminal corymbs on synflorescence branches; peduncles 5–15 mm, densely fulvous pubescent and at first also white arachnoid, with a linear bract or bracteole. Involucres narrowly campanulate, 5–6 × 2–3.5 mm, calyculate; bracts of calyculus 4 or 5, linear, equaling or exceeding phyllaries, apically acute; phyllaries 8, oblong-lanceolate, 1–1.5 mm wide, subleathery, thinly arachnoid, glabrescent, margin narrowly scarious, apically acute and shortly ciliate. Ray florets absent. Disk florets 9–11; corolla yellow, ca. 9 mm, with ca. 3 mm tube and funnelform limb; lobes oblong-lanceolate, apically acute. Anthers ca. 3.3 mm, anther tails ca. 0.5 × as long as antheropodia; appendages ovate-oblong; antheropodia robust, basally somewhat dilated. Style branches ca. 2 mm, fringed with short papillae, terminal tuft not evident. Achenes ca. 3 mm, glabrous. Pappus straw-colored, ca. 6 mm. Fl. Jul–Aug.

• Forests, thickets, open slopes; 2800–4000 m. NW Yunnan.

41. Synotis birmanica C. Jeffrey & Y. L. Chen, Kew Bull. 39: 335. 1984.

缅甸合耳菊 mian dian he er ju

Herbs, rhizomatous. Rhizomes thick, woody. Stems 1–3, erect, 30–60 cm tall, at first sparsely arachnoid and densely fulvous pubescent, usually ± glabrescent, shortly branching in synflorescence, leafless or with only small scalelike leaves in lower part at anthesis. Leaves sessile or subpetiolate; blade adaxially green, elliptic to oblanceolate, 4–8 × 1–1.7 cm, papery, abaxially pallid and thinly arachnoid, adaxially sparsely arachnoid, sparsely pubescent and glabrescent, pinnately veined, lateral veins 10, arcuate-ascending, base cuneate to attenuate, sometimes subamplexicaul at attachment to stem, margin rather remotely denticulate with mucronulate teeth, apex shortly acuminate. Upper leaves smaller, otherwise similar. Capitula radiate, usually 3–8 in rather dense terminal corymbs on synflorescence branches; peduncles 5–15 mm, white arachnoid and shortly fulvous pubescent, with a linear bract or bracteole. Involucres narrowly campanulate, 3–4 × ca. 3 mm, calyculate; bracts of calyculus 3–5, linear, equaling or exceeding phyllaries, apically acute; phyllaries 8, oblong, ca. 1 mm, subleathery, laxly white arachnoid and sparsely puberulent, margin narrowly scarious, apically acute and puberulent. Ray florets 5 or 6; corolla tube ca. 2.5 mm; lamina yellow, oblong, 5–7 × ca. 1.5 mm, 4-veined, 3-denticulate. Disk florets ca. 15; corolla yellow, ca. 7 mm, with ca. 2.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 2.7 mm, obtusely long auriculate or subcaudate; anther tails only ca. 0.25 × as long as antheropodia; appendages ovate-oblong; antheropodium stout, basally hardly dilated. Style branches ca. 2 mm, fringed with short papillae, terminal tuft not evident. Pappus straw-colored, ca. 4.5 mm. Fl. Sep.

Alpine meadows; 3000–3300 m. NW Yunnan (Gaoligong Shan) [W Myanmar].

42. Synotis setchuenensis (Franchet) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 336. 1984.

四川合耳菊 si chuan he er ju

Senecio setchuenensis Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 145. 1891.

Herbs, rhizomatous. Rhizomes thick, woody, creeping. Stem usually solitary, erect, 45–60 cm tall, sparsely arachnoid, not branched below synflorescence, leafless in lower part at anthesis. Leaves subpetiolate or sessile; petiole 3–5 mm, narrowly winged; blade adaxially green, lanceolate or narrowly elliptic, 7–15 × 1.5–3 cm, papery, abaxially densely and except for midvein persistently white tomentose, adaxially sparsely arachnoid, scattered puberulent and glabrescent, pinnately veined, lateral veins 10–14, arcuate-ascending, base attenuate, not auriculate, margin remotely and minutely mucronulate-denticulate, apex shortly acuminate. Upper leaves smaller; uppermost leaves linear-lanceolate to linear, bractiform. Capitula discoid, numerous (15–17) in rather dense terminal compound corymbs; peduncles 5–15 mm, apex acute. Involucres narrowly campanulate, 5–6 × ca. 3 mm, calyculate; bracts of calyculus 2–4, linear, equaling phyllaries; phyllaries 8, oblong, 1.5–2 mm wide, subleathery and somewhat carinate, white arachnoid-tomentose, margin narrowly scarious, apically acute and ciliate. Ray florets absent. Disk florets 8 or 9; corolla yellow, 8–9 mm, with ca. 3.2 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 3.5 mm; anther tails ca. 0.75 × as long as antheropodia; appendages ovate-lanceolate; antheropodia slightly dilated at base. Style branches ca. 1.5 mm, fringed with short papillae, terminal tuft short. Achenes 3–3.5 mm, glabrous. Pappus dirty white or pale straw-colored, 7–8 mm. Fl. Aug–Sep.

• Thickets, streamsides, roadsides; 2500–3200 m. W Sichuan (Kangding).

Synotis setchuenensis is characterized by its phyllaries subleathery and carinate and leaves densely white tomentose abaxially. It superficially resembles *Senecio densiserratus*, which differs by having densely serrate leaf margins and anthers not caudate.

43. Synotis atractylidifolia (Y. Ling) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 338. 1984.

术叶合耳菊 shu ye he er ju

Senecio atractylidifolius Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 24. 1937.

Subshrubs, with thick, woody, branching, procumbent or ascending rhizomes. Aerial stems several, erect, 20–60 cm tall, glabrous, not branched below synflorescence, leafy except toward base. Leaves very shortly petiolate or sessile; blade lanceolate, sometimes slightly falcate, 5–10 × 0.5–1.5 cm, subleathery, glabrous or nearly so, pinnately veined, lateral veins 10–14, strongly ascending, inconspicuous, base cuneate, margin regularly and closely mucronulate-serrate, apically shortly obtusely acuminate-apiculate; upper leaves smaller. Capitula radiate, numerous, arranged in terminal compound corymbs, ca. 1.5 cm in diam.; peduncles 1–2 cm, slender, slightly dilated and white arachnoid in upper part, with 1–3 narrowly oblanceolate bracts or bracteoles at or near base. Involucres subcampanulate, 3–4 × 2.5–3 mm, laxly calyculate; bracts of calyculus 4 or 5, narrowly oblanceolate or linear; phyllaries 8; oblong-linear, ca. 1.5 mm wide, apically triangular-obtuse or subacute and ciliate. Ray florets: corolla tube ca. 3 mm; lamina yellow, oblong-elliptic, 8–10 × 2–3 mm, 4-veined, 3-denticulate. Disk florets ca. 10; corolla yellow, ca. 6.5 mm, with 2.5–3 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 2 mm, apically acute. Anthers ca. 3 mm; anther tails ca. 1.25 × as long as antheropodia; appendages ovate-oblong; antheropodia stout, broad, basally slightly expanded. Style branches fringed with short obtuse papillae, terminal tuft not evident. Achenes ca. 4 mm, sparsely pubescent. Pappus white, 4–5 mm. Fl. Aug.

• Rocky places, wet valleys; 1500–2300 m. Nei Mongol, Ningxia (A-qi-Baqi, Helan Shan).

107. CISSAMPELOPSIS (Candolle) Miquel, Fl. Ned. Ind. 2: 102. 1856.

藤菊属 teng ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

Cacalia sect. *Cissampelopsis* Candolle, Prodr. 6: 331. 1838.

Subshrubs or perennial herbs, large, scandent, climbing by means of prehensile petioles. Stems much branched, woody when old. Leaves simple, alternate; petiole prehensile, with thickened persistent bases, not auriculate; blade broadly ovate, ovate, or triangular, base cordate, unlobed, palmately 3–7-veined from near base, central vein with 1 or 2 pairs of ascending laterals. Capitula numerous, in upper axillary and terminal cymes, compounded into divaricately branching, pyramidal or paniculoid thyrses, heterogamous and radiate or homogamous and discoid, pedunculate. Involucres calyculate, cylindric or narrowly campanulate; receptacle flat; phyllaries 8 or 13, free, herbaceous, margin scarious. Ray florets absent, 5, 6, or 8; lamina yellow, spreading, 4- or 5-veined, apically usually 3-denticulate. Disk florets 8–20; corolla white, pinkish, or yellow; anthers distinctly caudate, with tail 0.5–2 × as long as antheropodia; antheropodia subcylindric or somewhat balusterform, basally hardly to slightly dilated, with somewhat enlarged basal lateral cells; endothecial cell wall thickenings comparatively few, polar and radial, cells rather short; style branches truncate or convex, with short to rather long marginal papillae and with or without a prominent central tuft of much longer papillae. Achenes cylindric, ribbed, glabrous, epidermal cells striate or smooth. Pappus capillary-like, uniform, present in all florets, white, dirty white, or rubescent.

Ten species: tropical Asia; six species (three endemic) in China.

The genus is divisible into two well-marked sections (not described here), characterized by discoid and radiate capitula, respectively.

1a. Capitula radiate; corolla truly yellow.
2a. Phyllaries 5 or 8; ray florets 5 or 6, lamina 3–5 mm; pappus whitish ..... 5. *C. buimalia*
2b. Phyllaries 13; ray florets 8, lamina ca. 10 mm; pappus reddish ..... 6. *C. erythrochaeta*
1b. Capitula discoid; corolla pale yellow, white, or pinkish.
3a. Leaves leathery, margin callose-denticulate, both surfaces glabrous; phyllaries glabrous ..... 1. *C. corifolia*
3b. Leaves papery to subleathery, margin repand-dentate or denticulate, abaxially tomentose, arachnoid-tomentose, or glandular pubescent; phyllaries hairy.
4a. Florets 15–17; leaves abaxially with dense persistent yellowish white tomentum, peduncles and phyllaries densely tomentose ..... 4. *C. spelaeicola*
4b. Florets 8–10; leaves, stems, peduncles, and phyllaries arachnoid-tomentose or glandular pubescent.
5a. Leaves at least when young abaxially grayish arachnoid-tomentose; peduncles and phyllaries sparsely arachnoid-tomentose ..... 2. *C. volubilis*
5b. Leaves abaxially fulvous glandular pubescent; peduncles and phyllaries glandular pubescent ..... 3. *C. glandulosa*

1. Cissampelopsis corifolia C. Jeffrey & Y. L. Chen, Kew Bull. 39: 342. 1984.

革叶藤菊 ge ye teng ju

Subshrubs or herbs, large, scandent, to 3–7 m. Stem becoming woody, glabrous or nearly so. Petiole 3–6 cm, glabrous; leaf blade ovate or broadly ovate, 8–14 × 4.5–10.5 cm, leathery or subleathery, glabrous, palmately 5–7-veined from base, veins prominent abaxially, base cordate or sometimes subtruncate, margin minutely to sometimes coarsely callose-denticulate, apex acuminate. Upper and synflorescence leaves smaller, ovate or ovate-lanceolate, basally subcordate, rounded, or truncate. Capitula discoid, numerous, arranged in usually dense terminal and upper axillary compound corymbs, forming large divaricately branching paniculoid thyrses; synflorescence branches exceeding leaves, sparsely or densely glandular pubescent; peduncles (3–)8–15 mm, slender, glandular pubescent, basally bracteolate; bracts and bracteoles linear-lanceolate, 1–2 mm, apically acute. Involucres cylindric, 5–6 × 2–3 mm, calyculate; bracts of calyculus 4 or 5, linear-lanceolate, 1–2 mm; phyllaries 8, linear-oblong, 1–1.5 mm wide, subleathery, glabrous, margin broadly scarious, glabrous, apically acute or subobtuse and puberulent. Ray florets absent. Disk florets ca. 10; corolla pale yellow, cream, or pinkish white, 8–9 mm, with ca. 3.5 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 3.5 mm; anther tails ca. equaling or slightly exceeding antheropodia; appendages oblong-lanceolate; antheropodia hardly dilated toward base. Style branches ca. 2 mm, fringed with short papillae, terminal tuft rather short, longer than laterals. Achenes cylindric, 2.5–3 mm, glabrous. Pappus white, 8–8.5 mm. Fl. Sep–Jan of next year.

Climbing on trees and shrubs in mixed forests and thickets; 1500–2800 m. Xizang, Yunnan [Bhutan, India, Myanmar, Thailand].

2. Cissampelopsis volubilis (Blume) Miquel, Fl. Ned. Ind. 2: 102. 1856.

藤菊 teng ju

Cacalia volubilis Blume, Bijdr. 908. 1826; *Senecio araneosus* Candolle; *S. blumei* Candolle; *S. cacaliifolius* Schultz Bipontinus var. *araneosus* (Candolle) Franchet; *S. hoi* Dunn; *S. ligularia* J. D. Hooker var. *araneosus* (Candolle) H. Léveillé; *Vernonia esquirolii* Vaniot.

Subshrubs or herbs, large, scandent, to 3 m or more. Stems becoming woody, ± white arachnoid-tomentose and sometimes also sparsely brown setulose, ± glabrescent. Petiole 3–6 cm, stout, ± tomentose and sometimes sparsely brown setulose; leaf blade adaxially green, ovate or broadly ovate, to 15 × 12 cm, subleathery, abaxially grayish with dense to sparse arachnoid-floccose tomentum and sometimes also brownish setulose on veins, adaxially sparsely arachnoid, glabrescent and sometimes shortly scarious-setulose, palmately 5–7-veined from base, base cordate or sometimes hastate, margin rather remotely minutely to coarsely repand-dentate with mucronulate teeth, apically acute-acuminate-apiculate. Upper and synflorescence leaves smaller, basally cordate to rounded. Capitula discoid, numerous, arranged in rather lax to dense terminal and upper axillary compound corymbs, divaricately branching; branches sparsely to densely white tomentose and sometimes also with brownish glandular hairs; peduncles 5–15 mm, slender, arachnoid-tomentose, basally bracteate, 3–5-bracteolate; bracts and bracteoles linear, 3–4 mm, pubescent. Involucres cylindric, 7–8 × 2–3 mm, calyculate; bracts of calyculus 4 or 5, small; phyllaries ca. 8, linear-oblong, 1.5–2 mm wide, herbaceous, sparsely arachnoid, puberulent, or glabrous, margin broadly scarious, apically acute. Ray florets absent. Disk florets 8–10; corolla white, pale yellow, or purplish, 9–10 mm, with 4–4.5 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 3.5 mm, anther tails 0.75–0.8 × as long as antheropodia; appendages ovate-lanceolate; antheropodia elongated, narrow, basally only slightly dilated. Style branches ca. 3.7 mm, fringed with rather short papillae, terminal tuft prominent, much longer than laterals. Achenes cylindric, ca. 4 mm, glabrous. Pappus white, 8–9 mm. Fl. Oct–Jan.

Climbing on trees and shrubs in forests and thickets; 800–2000 m. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [NE India, Malesia, Myanmar, Thailand, Vietnam].

3. Cissampelopsis glandulosa C. Jeffrey & Y. L. Chen, Kew Bull. 39: 345. 1984.

腺毛藤菊 xian mao teng ju

Subshrubs or herbs, large, scandent. Stems becoming woody, glandular pubescent. Leaves adaxially green, ovate or broadly ovate, 7–14 × 5–10 cm, papery, abaxially densely glandular fulvous pubescent, adaxially thinly arachnoid and glabrescent to subglabrous, base cordate, margin repand-denticulate or dentate with apiculate teeth, apex acute-acuminate. Upper and synflorescence leaves smaller, ovate, basally subtruncate. Capitula discoid, numerous, arranged in dense terminal and upper axillary compound corymbs, forming narrow thyrse; synflorescence branches mostly shorter than leaves, densely glandular pubescent; peduncles 4–10 mm, slender; bracts and/or bracteoles 2 or 3, linear-subulate, 2–3 mm, glandular pubescent. Involucres broadly cylindric, 7–8 × 2.5–3.5 mm, calyculate; bracts of calyculus 3–5, linear-subulate, ca. 2 mm; phyllaries 8, linear-oblong, 1.5–2 mm wide, herbaceous, sparsely finely pubescent, margin broadly scarious, sparsely finely pubescent, apically acute. Ray florets absent. Disk florets ca. 10; corolla white, ca. 12 mm, with 5–5.5 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 3.2 mm, apically acute. Anthers ca. 4.5 mm; anther tails ca. 0.5 × as long as antheropodium; appendages oblong-lanceolate; antheropodia stout, basally somewhat dilated. Style branches ca. 3 mm, fringed with short papillae, central tuft much longer, stout, conspicuous. Achenes cylindric, 4.5–5 mm, glabrous. Pappus white or dirty white, ca. 11 mm. Fl. Jan.

• Climbing in ravines; 2300–2400 m. Yunnan.

4. Cissampelopsis spelaeicola (Vaniot) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 346. 1984.

岩穴藤菊 yan xue teng ju

Vernonia spelaeicola Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 123. 1903; *Senecio spelaeicola* (Vaniot) Gagnepain; *S. yalungensis* Handel-Mazzetti.

Subshrubs or herbs, large, scandent, to 5 m or more. Stems becoming woody, at first white arachnoid-tomentose, ± glabrescent. Petiole 3–6 mm, stout, densely tomentose; leaf blade abaxially yellowish white, adaxially green, ovate or broadly ovate, 4–11 × 4–8 cm, papery, abaxially densely arachnoid, adaxially at first sparsely arachnoid and glabrescent, palmately 3–5-veined from base, base cordate, margin repand-denticulate, apex acute-acuminate-apiculate. Upper and synflorescence leaves smaller, ovate or ovate-lanceolate, basally cordate to cuneate. Capitula discoid, numerous, arranged in 7–10-headed terminal and upper axillary compound corymbs; synflorescence branches divaricate, densely tomentose; peduncles short, 3–5 mm, densely tomentose, usually basally bracteate; bract linear. Involucres cylindric, 6–7 × 2.5–4 mm, calyculate; bracts of calyculus 6–8, linear, unequal, densely tomentose; phyllaries 8, linear-oblong, 1.5–2 mm, herbaceous, densely tomentose, margin broadly scarious, densely tomentose, apically acutely triangular and puberulent. Ray florets absent. Disk florets 15–17; corolla white, 9–10 mm, with ca. 4 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 1.8 mm, apically acute. Anthers ca. 4 mm; anther tails slightly shorter than to ca. 2 × as long as antheropodia; appendages oblong-lanceolate, antheropodia somewhat dilated toward base. Style branches 3–3.5 mm, fringed with rather long papillae, terminal tuft stout, distinct, much exceeding laterals. Achenes cylindric, ca. 5 mm, glabrous. Pappus white or dirty white, ca. 9 mm. Fl. Nov–Dec.

• Climbing on trees and shrubs in mixed forests; 1000–2000 m. Guangxi, Guizhou, Sichuan, Yunnan.

5. Cissampelopsis buimalia (Buchanan-Hamilton ex D. Don) C. Jeffrey & Y. L. Chen, Kew Bull. 41: 937. 1986.

尼泊尔藤菊 ni bo er teng ju

Senecio buimalia Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 178. 1825.

Subshrubs or herbs, large, scandent, to 3–5 m. Stems becoming woody, white tomentose. Petiole 3–5 cm, densely to sparsely arachnoid, sometimes also fulvous hairy; leaf blade abaxially grayish white, adaxially deep green, ovate or ovate-triangular, 5–10 × 3.5–7 cm, thinly papery, abaxially arachnoid, adaxially at first sparsely arachnoid, glabrescent, palmately 3–5-veined, base cordate, margin ± sinuate-denticulate with mucronulate teeth, apex acute-acuminate-apiculate. Upper and synflorescence leaves smaller, ovate to lanceolate, basally cordate to cuneate. Capitula radiate, 8–12 mm in diam., numerous, arranged in usually 3–5-headed terminal and upper axillary compound corymbs, forming rather lax divaricately branching thyrsoid clusters; peduncles 10–15 mm, slender, densely gray tomentose, with 1 or 2 linear-subulate bracts or bracteoles. Involucres cylindric to narrowly campanulate, 8–12 × 4–6 mm, calyculate; bracts of calyculus 5, linear-subulate, unequal, much shorter than phyllaries; phyllaries 5 or 8, oblong-lanceolate, 2.5–3 mm wide, herbaceous, densely to sparsely arachnoid-tomentose, margin broadly scarious, apically obtuse to acute and puberulent. Ray florets 5 or 6; corolla tube 7–8 mm; lamina yellow, oblong-linear, 3–5 × 1–1.5 mm, 4- or 5-veined, apex entire or 3-denticulate. Disk florets 10–12; corolla yellow, 13–14 mm, with ca. 7.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers 3.5–4 mm; anther tails shorter than antheropodia; appendages ovate-lanceolate; antheropodia dilated toward base. Style branches ca. 2.5 mm, fringed with short papillae, terminal tuft absent. Achenes cylindric, ca. 5.5 mm, glabrous. Pappus white or dirty white, yellowish at base, 11–12 mm. Fl. Feb.

Climbing in scrub; ca. 2100 m. Yunnan [Bhutan, India (Sikkim), Nepal].

6. Cissampelopsis erythrochaeta C. Jeffrey & Y. L. Chen, Kew Bull. 39: 349. 1984.

赤缨藤菊 chi ying teng ju

Senecio buimalia Buchanan-Hamilton ex D. Don var. *bambusetorum* Handel-Mazzetti.

Subshrubs or herbs, large, scandent. Stems becoming woody, at first white arachnoid, glabrescent. Petiole 3–7 cm,

abaxially sparsely arachnoid or subglabrescent; leaf blade abaxially grayish, adaxially green, ovate or triangular, 7–13 × 4–12 cm, papery or submembranous, abaxially arachnoid, adaxially sparsely arachnoid and glabrescent, palmately 3–7-veined from base, base cordate, margin repand or sinuate-denticulate with mucronulate teeth, apex acutely shortly acuminate-apiculate. Upper and synflorescence leaves smaller, basally cordate or truncate. Capitula radiate, 2.5–3 cm in diam., numerous, arranged in usually 5–10-headed terminal and upper axillary compound corymbs, forming pyramidal, divaricately branched paniculoid thyrses; peduncles 1–2 cm, stout, sparsely arachnoid and shortly glandular pubescent, with 1 or 2 linear-subulate bracts or bracteoles. Involucres narrowly campanulate, 8–10 × 6–8 mm, calyculate; bracts of calyculus 7 or 8, linear-subulate, 4–6 mm, pubescent, spreading or reflexed; phyllaries 13, linear-subulate, 1–2 mm wide, herbaceous, sparsely arachnoid, margin scarious, apically acute and puberulent. Ray florets 8; corolla tube 5–5.5 mm; lamina yellow, oblong, ca. 10 × 2–2.5 mm, 4-veined, 3-denticulate. Disk florets ca. 20; corolla yellow, 10–11 mm, with 3–3.5 mm tube and narrowly funnelform limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers ca. 4.5 mm; anther tails ca. equaling antheropodium; appendages ovate-oblong; antheropodia hardly expanded toward base. Style branches ca. 4 mm, fringed with very short papillae, terminal tuft absent. Achenes cylindric, ca. 4 mm, glabrous. Pappus reddish, 9–10 mm. Fl. Sep–Oct.

• Climbing on bamboos and shrubs; 900–1200 m. Hunan (Wugang).

108. SENECIO Linnaeus, Sp. Pl. 2: 866. 1753.

千里光属 qian li guang shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey, Leszek Vincent

Herbs perennial or annual, erect, rarely stoloniferous, decumbent, or rarely scandent, rhizomatous. Stems usually leafy, rarely subscapiform. Leaves simple; radical leaves usually petiolate, not auriculate, deltoid, lyrate or pinnately divided; stem leaves usually sessile, pinnately veined, basally often auriculate, lyrate or pinnately lobed, rarely unlobed, ± dentate. Capitula rarely solitary, axillary, usually few to numerous, arranged in terminal simple or compound corymbs or thyrses, heterogamous and radiate or homogamous and discoid, erect or nodding, usually pedunculate. Involucres calyculate, hemispheric, campanulate, or cylindric; receptacle flat; phyllaries 5–22, usually free, rarely connate to middle or above, herbaceous or leathery, margin scarious or membranous. Ray florets absent or 1–17(–24); lamina yellow, usually conspicuous, sometimes minute, 2–9-veined, apically usually 3-denticulate. Disk florets 3 to many; corolla yellow; limb funnelform or cylindric; lobes 5. Anthers oblong to linear, usually shortly obtuse-auriculate, rarely ± caudate with tail to 0.25 × as long as antheropodium; antheropodia balusterform, basally slightly to markedly dilated, with enlarged basal lateral cells; endothecial cell wall thickenings numerous, radial (inner anticlinal), cells often elongated. Style branches truncate or less often convex, with rather obtuse semicircle of marginal papillae, not appendiculate and devoid of a central tuft of longer papillae. Achenes cylindric, ribbed, glabrous or pubescent, epidermal cells smooth or papillose. Pappus capillary-like, uniform or sometimes dimorphic by presence of apically fluked hairs, white, straw-colored, or reddish brown, sometimes absent from ray florets or rarely from all florets.

At least 1,200 species: worldwide (except Antarctica) in the sense adopted here, but generic limits in some areas still uncertain; 65 species (39 endemic) in China.

The generic concept provided here is considered to cover *Senecio* s.s. plus a fringe of taxa that can be considered peripheral to *Senecio* s.s. but not extending to *Senecio* s.l. (fide Vincent).

A recent molecular taxonomic study (Pelser et al., Taxon 56: 1077–1104. 2007) suggests that certain elements should be removed from *Senecio*, namely, *S.* ser. *Extremiorientales* and *S.* ser. *Erucifolii* (to genus *Jacobaea* Miller), *S.* sect. *Madaractis* (to genus *Madaractis*), and *S.* sect. *Flexicaules* (to a new, as yet undescribed genus), while confirming the reference to *Senecio* s.s. of *S.* ser. *Arnicoidei*, *S.* ser. *Nemorenses*, *S.* ser. *Monticolarum*, and *S.* sect. *Senecio*. However, the study included no representatives of *S.* sect. *Pinnati*, nor of *S.* ser. *Densiserrati*, *S.* ser. *Coriaceisquami*, *S.* ser. *Stenoglossi*, *S.* ser. *Cernui*, *S.* ser. *Purpureolobati*, *S.* ser. *Malacophylli*, *S.* ser. *Subscaposi*, and *S.* ser. *Asperifolii*; therefore, their disposition remains in doubt. For this reason, *Senecio* is treated here in a broad sense, although its paraphyly (and perhaps polyphyly) as so circumscribed is acknowledged.

The following three taxa, described or reported from China, are of uncertain identity:

Senecio pelleifolius King ex J. R. Drummond (Bull. Misc. Inform. Kew 1911: 271. 1911). One of us (Jeffrey) notes that this is a name of uncertain application, perhaps an older synonym of *Parasenecio palmatisectus*.

Senecio campestris (Retzius) Candolle var. *oliganthus* Franchet (Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 54. 1883). One of us (Jeffrey) indicates that this belongs to a species of *Tephroseris*, either *T. subdentata* or *T. kirilowii*, and another of us (Nordenstam) concurs.

Senecio lancifer J. R. Drummond (Bull. Misc. Inform. Kew 1911: 270. 1911; *Ligularia lancifera* (J. R. Drummond) R. C. Srivastava & C. Jeffrey). One of us (Jeffrey) treats this as a *Ligularia* species, while another of the Asteraceae coauthors (Illarionova) has not seen any material of this species and does not know to which genus it belongs –according to the description, *S. lancifer* is unlike any species of *Ligularia* distributed in Xizang.

1a. Plants annual.
2a. Capitula discoid, without marginal radiate female florets.
3a. Phyllaries 18–22; calyculus bracts 7–11, long blackish tipped; synflorescences compact, peduncles 0.5–2 cm ..... 62. *S. vulgaris*

3b. Phyllaries ca. 15; calyculus bracts 4 or 5, without or sometimes with short blackish tip; synflorescences lax, peduncles 1.5–4 cm ..... 61. *S. dubitabilis*
2b. Capitula radiate, with at least a few, though sometimes inconspicuous, marginal radiate female florets.
4a. Capitula solitary, axillary; achenes glabrous, pappus hairs few, unequal, ca. 1.5 mm ..... 65. *S. yungningensis*
4b. Capitula cymose; achenes pubescent, pappus hairs numerous, 3–6 mm.
5a. Laminae of marginal female florets conspicuous, ca. 6 mm, much exceeding involucre.
6a. Leaves undivided, broadly linear to oblong, marginally few toothed or subentire; phyllaries 13, with 2–5 green calyculus bracts; ray florets 7 or 8 ..... 58. *S. subdentatus*
6b. Leaves pinnatifid, leaf lobes oblong or linear-oblong, marginally entire or 1- or 2-denticulate; phyllaries 15–20, with 8–10 blackish tipped calyculus bracts; ray florets 8–12 ..... 59. *S. desfontainei*
5b. Laminae of marginal female florets very short, scarcely exceeding involucre.
7a. Phyllaries united in lower 1/3–3/4; pappus hairs fasciculately connate, persistent; achenes sparsely puberulent ..... 64. *S. oryzetorum*
7b. Phyllaries free; pappus hairs free, deciduous; achenes densely pubescent.
8a. Leaves pinnatifid; leaf lobes broad, oblong-lanceolate, marginally entire or remotely denticulate; ray florets ca. 12; pappus hairs ca. 3 mm ..... 63. *S. exul*
8b. Leaves pinnatipartite; leaf lobes narrowly linear; ray florets 4–7; pappus hairs ca. 5.5 mm ..... 60. *S. krascheninnikovii*
1b. Plants perennial.
9a. Capitula discoid, without marginal radiate female florets.
10a. Phyllaries 12–22, usually 13, 18, or 21.
11a. Basal and lower stem leaves deltoid; phyllaries leathery.
12a. Upper stem leaves without winged petioles; auricles inconspicuous or absent ..... 15. *S. tricuspis*
12b. Upper stem leaves with broadly winged petioles; auricles conspicuous, toothed ..... 18. *S. nigrocinctus*
11b. Basal and lower stem leaves pinnatifid or pinnatipartite.
13a. Median stem leaves pinnatipartite; phyllaries broadly lanceolate, marginally fimbriate ..... 31. *S. saussureoides*
13b. Median stem leaves lyrate-pinnatifid; phyllaries lanceolate, marginally entire ..... 32. *S. muliensis*
10b. Phyllaries 5–10, usually 5 or 8.
14a. Leaves abaxially densely white tomentose ..... 1. *S. kumaonensis*
14b. Leaves abaxially green, not densely tomentose.
15a. Basal and lower stem leaves lyrate-pinnatifid or runcinate.
16a. Achenes pubescent ..... 40. *S. diversipinnus*
16b. Achenes glabrous.
17a. Involucres 8–10 mm, phyllaries 8; median stem leaves with up to 10 lateral lobes ..... 8. *S. pseudomairei*
17b. Involucres ca. 6 mm, phyllaries 5; median stem leaves with 14–20 lateral lobes ..... 11. *S. acutipinnus*
15b. Basal and lower stem leaves deltoid.
18a. Phyllaries 5, florets 5 or 6 ..... 16. *S. humbertii*
18b. Phyllaries 8–10, florets 10–26.
19a. Upper stem leaves with broadly winged petioles; phyllaries leathery, apically and on upper margin dark ..... 18. *S. nigrocinctus*
19b. Upper stem leaves with unwinged or with narrowly winged petioles; phyllaries herbaceous, apically and marginally puberulent or fimbriate-hairy.
20a. Capitula numerous, arranged in terminal corymb, ca. 7 × 3 mm; florets ca. 10 ..... 17. *S. liangshanensis*
20b. Capitula solitary or rarely paired in axils of uppermost leaves, forming a terminal racemose cyme, 8–10 × 5–8 mm; florets 15–18 ..... 14. *S. lijiangensis*
9b. Capitula radiate, with at least a few, though sometimes inconspicuous, marginal radiate female florets.
21a. Laminae of marginal female florets minute, inconspicuous, shorter than style ..... 9. *S. graciliflorus*
21b. Laminae of marginal female florets obvious, at least 4 mm, longer than style.
22a. Achenes, at least of disk florets, pubescent, or at least with few hairs.
23a. Plants subscapose; stem leaves small and bractlike in comparison to radical leaves.
24a. Basal leaves long petiolate ..... 44. *S. analogus*
24b. Basal leaves sessile.
25a. Involucres 3–4 × 2–4 mm ..... 42. *S. obtusatus*
25b. Involucres 5–7 × 5–8 mm.
26a. Leaves elliptic, oblanceolate, or spatulate, margin with repand-denticulate teeth, adaxially glabrous ..... 41. *S. spathiphyllus*
26b. Leaves oblong-lanceolate, margin pinnatifid or subpinnatipartite, thinly arachnoid-tomentose ..... 48. *S. nudicaulis*
23b. Plants with leafy stems; stem leaves well developed.

27a. Stems scandent or subscandent.
28a. Leaves petiolate; plants truly scandent; synflorescence branches and peduncles widely divaricate .. 57. *S. scandens*
28b. Leaves sessile, subamplexicaul; plants scrambling; synflorescence branches and peduncles ascending.
29a. Leaves pinnately lobed ..... 55. *S. fukienensis*
29b. Leaves all or mostly subentire or dentate.
30a. Leaf blade ovate-lanceolate to narrowly oblong-lanceolate, laxly pilose or glabrous ..... 54. *S. stauntonii*
30b. Leaf blade lanceolate to linear, asperulous or hispid, especially abaxially ..... 52. *S. asperifolius*
27b. Stems erect.
31a. Phyllaries 5 or 6; ray florets 2 ..... 35. *S. biligulatus*
31b. Phyllaries at least 8, usually 12–22; ray florets 5 or more.
32a. Leaves all or mostly unlobed, subentire, or dentate.
33a. Lower and median stem leaves long petiolate.
34a. Phyllaries leathery; ray lamina ca. 8 mm ..... 19. *S. coriaceisquamus*
34b. Phyllaries herbaceous; ray lamina 10–12 mm ..... 56. *S. tarokoensis*
33b. Lower and median stem leaves shortly petiolate or subsessile.
35a. Leaves auriculate, subamplexicaul ..... 54. *S. stauntonii*
35b. Leaves not auriculate.
36a. Leaves papery, asperulous, margin remotely dentate or subentire and revolute; capitula arranged in elongate thyrsoid cymes; involucres 7–9 mm ..... 52. *S. asperifolius*
36b. Leaves membranous, sparsely finely pubescent, margin closely dentate and flat; capitula arranged in spreading compound cymes; involucres 4.5–6 mm ..... 6. *S. morrisonensis*
32b. Leaves bipinnately, pinnately, or lyrately lobed.
37a. Stems weak, subscandent; median stem leaves 3–5 cm, lobes entire ..... 55. *S. fukienensis*
37b. Stems stout, erect; median stem leaves 6–30 cm, lobes dentate.
38a. Stem leaves basally not auriculate, not subamplexicaul.
39a. Ray florets 8–12; lower and median stem leaves petiolate, petioles 3–8 cm ..... 56. *S. tarokoensis*
39b. Ray florets 5(or 6); lower and median stem leaves subsessile, or if petiolate then petioles not exceeding 2 cm.
40a. Involucres 4.5–6 mm; stem leaves serrate to serrate-lobulate or deeply pinnately lobed ..... 6. *S. morrisonensis*
40b. Involucres 8–10 mm; stem leaves very deeply and narrowly bipinnately or tripinnately lobed ..... 7. *S. kuanshanensis*
38b. Stem leaves basally with dentate or laciniate subamplexicaul auricles.
41a. Ray florets absent or 5; phyllaries 8 or 9 ..... 40. *S. diversipinnus*
41b. Ray florets 10–15; phyllaries 10–15, rarely 8.
42a. Involucres 3–4 × 3–4 mm; pappus straw-colored or pale brownish ..... 44. *S. analogus*
42b. Involucres 5–8 × 5–10 mm; pappus white.
43a. Ray lamina ca. 12 mm; involucres 7–8 × 6–10 mm; pappus persistent in all florets ... 49. *S. ambraceus*
43b. Ray lamina 8–10 mm; involucres 5–6 × 5–7 mm, pappus deciduous in ray florets ..... 51. *S. jacobaea*
22b. Achenes all glabrous.
44a. Capitula pendulous, peduncles cernuous.
45a. Leaves abaxially white tomentose.
46a. Involucres 5–6 × 3–5 mm; ray florets 6–8 ..... 24. *S. drukensis*
46b. Involucres 7–8 × 10–15 mm; ray florets 18–21 ..... 23. *S. nodiflorus*
45b. Leaves abaxially green, both surfaces glabrous.
47a. Basal and lower leaves present at anthesis, leaf blade flat, with 5 pairs of lateral veins; phyllaries 17, fulvous pubescent; ray florets 18 ..... 22. *S. atrofuscus*
47b. Basal and lower leaves withered at anthesis, leaf blade revolute when dry, with 2 or 3 pairs of lateral veins; phyllaries 15, glabrous; ray florets 8–11 ..... 25. *S. daochengensis*
44b. Capitula and peduncles erect or ascending.
48a. Basal and lower stem leaves basally cordate or hastate, margin not pinnately lobed, present at anthesis.
49a. Ray lamina 15–22 × ca. 1 mm.
50a. Involucres 6–7 × 2–3 mm; phyllaries 8; ray florets 3, lamina ca. 15 mm ..... 21. *S. lingianus*
50b. Involucres 8–10 × 3–5 mm; phyllaries 10–13; ray florets 4, lamina 20–22 mm ..... 20. *S. arachnanthus*
49b. Ray lamina shorter and comparatively broader, 4–10 mm.
51a. Plants 10–25 cm tall; capitula 3–5; phyllaries 15–18, with dark margins ..... 33. *S. dodrans*
51b. Plants 40–100 cm tall; capitula numerous; phyllaries 6–8 or 10–13, without dark margins.

52a. Lower stem leaves triangular, basally deeply cordate; ray florets 3, lamina ca. 4 mm ..... 34. *S. actinotus*
52b. Lower stem leaves ovate or ovate-oblong, basally weakly cordate; ray florets 10–13, lamina ca. 6.5 mm ..... 44. *S. analogus*
48b. Basal and lower stem leaves basally broadly cuneate to attenuate, margin unlobed or pinnatisect, lyrate-pinnatifid, or runcinate, present or withered at anthesis.
53a. Pappus absent in ray florets.
54a. Disk florets without a pappus ..... 47. *S. echaetus*
54b. Disk florets with a pappus.
55a. Stem leaves undivided, serrate-dentate, 5–10 cm ..... 53. *S. wightii*
55b. Stem leaves lyrate-pinnatisect or lyrate-pinnatifid, median ones 10–22 cm.
56a. Involucres 5–7 × 4–10 mm; ray lamina ca. 8 mm, pappus reddish brown ..... 46. *S. raphanifolius*
56b. Involucres 3–4 × 3–4 mm; ray lamina ca. 6.5 mm; pappus straw-colored or pale brownish ... 44. *S. analogus*
53b. Pappus present in ray florets.
57a. Peduncles hollow and expanded below capitula; achenes 7–8 mm ..... 2. *S. pseudoarnica*
57b. Peduncles slender; achenes 2–5 mm.
58a. Leaves lanceolate, closely regularly denticulate, abaxially densely white tomentose ..... 4. *S. densiserratus*
58b. Leaves not as above.
59a. Plants subscapose; stem leaves small and bractlike in comparison to basal ones.
60a. Median stem leaves linear-lanceolate to linear, basally expanded, glabrous ..... 41. *S. spathiphyllus*
60b. Median stem leaves oblong or oblong-lanceolate, lyrate-pinnatifid, basally auriculate-amplexicaul with toothed or lobed auricles, ± tomentose.
61a. Capitula numerous; involucres 3–4 mm; ray florets 10–13, lamina ca. 6.5 mm ..... 44. *S. analogus*
61b. Capitula 2–6; involucres ca. 8 mm; ray florets 16–21, lamina 10–11 mm ..... 45. *S. tibeticus*
59b. Plants with leafy stems; stem leaves well developed.
62a. Shoots dwarf, 2–20 cm tall; capitula 1–10 in each synflorescence; median stem leaves 2.5–4 cm; upper stem leaves with small entire auricles or not auriculate.
63a. Capitula large, solitary at apex; involucres 15–20 mm wide, basally 10–13-calyculate; phyllaries 21–23; ray florets 10–13 ..... 28. *S. megalanthus*
63b. Capitula smaller, few corymbose; involucres less than 10 mm wide, basally 4–8-calyculate; ray florets fewer than 10.
64a. Phyllaries 13; involucres 4–8 × 3–6 mm.
65a. Involucres 4–5 × 3–4 mm; ray florets 5 or 6, lamina ca. 4 mm ..... 30. *S. kongboensis*
65b. Involucres 6–8 × 5–6 mm; ray florets ca. 10, lamina 5–6 mm ..... 27. *S. thianschanicus*
64b. Phyllaries 18–21; involucres 8–10 × 6–8 mm.
66a. Plants 2–6 cm tall; ray lamina ca. 7.5 mm ..... 29. *S. lhasaensis*
66b. Plants 8–20 cm tall; ray lamina 10–12 mm ..... 26. *S. albopurpureus*
62b. Shoots more robust, 30–150 cm tall; capitula numerous in each synflorescence, or if plant shorter and with few capitula per synflorescence then upper stem leaves with coarsely dentate auricles.
67a. Stem leaves unlobed, dentate.
68a. Leaf petioles basally with small to minute auricles; pappus straw-colored ..... 3. *S. cannabifolius*
68b. Leaf petioles without auricles; pappus white.
69a. Ray florets 8–10, lamina 11–13 mm; involucres 6–7 × 4–5 mm ..... 5. *S. nemorensis*
69b. Ray florets 5 or 6, lamina 8–9 mm; involucres 4.5–6 × 2–4 mm ..... 6. *S. morrisonensis*
67b. Stem leaves at least lower ones bipinnately, pinnately, or runcinately lobed.
70a. Phyllaries 5–10, usually 5–8.
71a. Leaf blade of lower and median stem leaves basally cuneate, narrowly decurrent to petiole, 11–30 × 4–15 cm, with 2 or 3 ascending, oblong-lanceolate, serrulate lateral lobes on each side ..... 3. *S. cannabifolius*
71b. Leaf blade and lateral lobes of lower and median stem leaves not as above.
72a. Median stem leaves runcinate, with large terminal lobe, 1 or 2 pairs of lateral lobes, and largest lateral lobes uppermost; involucres 1.5–2 mm wide; ray florets 3 or 4 ..... 36. *S. faberi*
72b. Median stem leaves pinnatisect, with small terminal lobe, 3–12 pairs of lateral lobes, and largest lateral lobes at or below middle, or if leaves ± lyrate with large terminal lobe then involucre 3–4 mm wide and ray florets 8–13.
73a. Lateral lobes of median and upper stem leaves 8–12 on each side.
74a. Involucres 6–9 mm; ray lamina ca. 7 mm ..... 10. *S. multilobus*
74b. Involucres 3–4 mm; ray lamina ca. 4.5 mm ..... 38. *S. pteridophyllus*

73b. Lateral lobes of median and upper stem leaves 3–6 on each side.
75a. Involucres 7–8 mm; ray lamina ca. 6 mm; pappus ca. 6 mm ..... 12. *S. cinarifolius*
75b. Involucres 3–5 mm; pappus 4–4.5 mm.
76a. Involucres campanulate; pappus straw-colored or pale brownish; median stem leaves lyrate-pinnatifid; ray lamina ca. 6.5 mm; roots not tomentose .... 44. *S. analogus*
76b. Involucres narrowly campanulate-cylindric; pappus white; median stem leaves pinnatipartite; ray lamina ca. 4 mm; roots tomentose ..... 13. *S. royleanus*
70b. Phyllaries 12–22, usually 13 or 21.
77a. Plants with elongated, well-developed stolons ..... 37. *S. filifer*
77b. Plants not stoloniferous.
78a. Stem leaves petiolate, not auriculate ..... 6. *S. morrisonensis*
78b. Stem leaves sessile, with basal dentate or laciniate auricles.
79a. Capitula large, involucres 5–7 × 8–15 mm; ray lamina 9–12 mm.
80a. Pappus reddish brown, scant in ray florets, 4–5 mm ..... 46. *S. raphanifolius*
80b. Pappus white, abundant on all florets, ca. 6 mm.
81a. Bracts of calyculus 10–12; ray lamina ca. 9 mm ..... 43. *S. multibracteolatus*
81b. Bracts of calyculus 2–6; ray lamina ca. 12 mm ..... 49. *S. ambraceus*
79b. Capitula small, involucres 3–6 × 3–7 mm; ray lamina 4.5–9 mm.
82a. Basal and lower stem leaves lyrate, with comparatively large, broad, dentate terminal lobes ..... 44. *S. analogus*
82b. Basal and lower stem leaves pinnatisect, with small, narrow terminal lobes.
83a. Involucres 5–6 × 6–7 mm; ray florets 10–13, lamina 8–9 mm ..... 50. *S. argunensis*
83b. Involucres 3–5 × 3–6 mm; ray florets 5–8, lamina 4–8 mm.
84a. Ray lamina ca. 4.5 mm; pappus ca. 4 mm ..... 38. *S. pteridophyllus*
84b. Ray lamina ca. 8 mm; pappus ca. 5.5 mm ..... 39. *S. chungtienensis*

1. Senecio sect. **Pinnati** (H. Koyama) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 357. 1984.

羽脉千里光组 yu mai qian li guang zu

Cacalia ser. *Pinnatae* H. Koyama, Mem. Fac. Sci. Kyoto Univ., Ser. Biol. 2(2): 180. 1969.

Herbs, perennial, erect, rather woody at base. Stems leafy. Leaves ovate or ovate-oblong, abaxially densely white arachnoid, base cordate or rounded-subtruncate. Capitula discoid, pendulous. Anthers basally shortly, rather obtusely, sagittate; antheropodia short, broad. Achenes with epidermal cells not papillose, cuticle thick; mechanical tissue in 10 closely approximate tracts, bi-allantoid (shaped like 2 sausages joined) in cross section.

One species: Bhutan, China, N India, Nepal.

1. Senecio kumaonensis Duthie ex C. Jeffrey & Y. L. Chen, Kew Bull. 39: 357. 1984.

须弥千里光 xu mi qian li guang

Cacalia penninervis H. Koyama; *Koyamacalia penninervis* (H. Koyama) H. Robinson & Brettell.

Herbs, perennial, with thick woody rhizome. Stem solitary or few fasciculate, erect, 50–90 cm tall, rather woody at base, sparsely arachnoid and shortly crisped-pubescent, not branched below synflorescence. Radical and lower stem leaves withered and shed by anthesis; median stem leaves long petiolate; petiole 3–6 cm, not winged; blade ovate or ovate-oblong, 10–13 × 4–5.5 cm, papery, abaxially densely white arachnoid-tomentose, adaxially at first sparsely arachnoid and shortly crisped-pubescent, pinnately veined with 14–18 arcuate lateral veins, base weakly cordate, margin mucronulate-dentate, apex acute to obtuse, ± acuminate, mucronulate. Upper leaves smaller and narrower upward, lanceolate, base cuneate. Capitula discoid, pendulous, numerous, arranged in narrow terminal and upper axillary panicles; peduncles 3–8 cm, shortly crisped-pubescent. Involucres cylindric, 7–8 × 2–3 mm, calyculate; bracts of calyculus ca. 3, linear; phyllaries 5(or 6), narrowly oblong, 6–7 × ca. 1 mm, herbaceous, sparsely puberulent, inconspicuously 3-veined, apically obtuse and puberulent. Florets 5–7; corolla yellow, ca. 6 mm, with ca. 2 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically acute. Anthers ca. 2.2 mm, basally obtuse-auriculate, appendages ovate-lanceolate. Style branches ca. 1 mm. Achenes cylindric, 2–3 mm, glabrous. Pappus dirty white, 4–5 mm. Fl. Jun–Aug.

Shaded slopes; 3600–4500 m. S Xizang (Gyirong) [Bhutan, N India, Nepal].

2. Senecio sect. **Crociseris** (Reichenbach) Hallier & Wohlfarth, Syn. Deut. Schweiz. Fl., ed. 3, 1486. 1897.

番红菊组 fan hong ju zu

Cineraria sect. *Crociseris* Reichenbach, Fl. Germ. Excurs. 2423. 1831.

Herbs, perennial, erect, with leafy stems. Leaves cuneate to attenuate at base. Capitula radiate, erect. Anthers obtuse to rounded at base. Achenes epidermal cells not papillose, cuticle thin; mechanical tissue in 9 or 10 contiguous tracts, forming a complete cylinder.

Maybe ca. 100 species: temperate to tropical Africa, Asia, Europe; 51 species (34 endemic) in China.

1. Senecio ser. **Arnicoidei** Schischkin ex C. Jeffrey & Y. L. Chen, Kew Bull. 39: 358. 1984.

拟阿尾菊系 ni a wei ju xi

Leaves sessile, subamplexicaul. Peduncles robust, dilated toward apex. Capitula and achenes large.

One species: Aleutian Islands, China, Japan, Russia (Far East), North America.

2. Senecio pseudoarnica Lessing, Linnaea 6: 240. 1831 [*"Pseudo-Arnica"*].

多肉千里光 duo rou qian li guang

Arnica maritima Linnaeus, Sp. Pl. 2: 884. 1753; *Senecio maritimus* (Linnaeus) Koidzumi (1910), not Linnaeus f. (1782).

Herbs, perennial, with short, thick rhizomes. Stem solitary, erect or ascending, 35–70 cm tall, hollow, simple, sparsely arachnoid, puberulent. Radical and lower stem leaves soon withering; median stem leaves sessile, ovate-oblong, oblong, elliptic, or obovate-oblong, 12–20 × 4.5–5.5 cm, thickly papery, abaxially paler and sparsely arachnoid, adaxially glabrous, pinnately veined, with 10–14 arcuate lateral veins, base cuneate-attenuate and subamplexicaul, margin coarsely mucronulate-dentate, apex obtuse. Upper leaves smaller, basally more rounded. Capitula 3.5–4.5 cm in diam., 2–20 in lax terminal corymbs; peduncles 1.5–3.5 cm, thick, usually dilated at apex, sparsely arachnoid and pubescent, bracteolate; bracteoles linear or linear-filiform, 5–15 mm. Involucres broadly campanulate or subhemispheric, 10–15 × 12–17 mm, calyculate; bracts of calyculus 8, narrowly linear, ca. equaling phyllaries; phyllaries 20 or 21, oblong or narrowly oblong, 10–15 × ca. 3 mm, herbaceous, sparsely puberulent, margin broadly scarious, apically acuminate and ciliate. Ray florets 15–17(–24); corolla tube 5–6.5 mm; lamina yellow, elliptic-oblong, 13–15 × 3–5 mm, 9-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.7 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally shortly obtuse-auriculate; appendages ovate; antheropodia short, broad. Style branches ca. 1.5 mm. Achenes cylindric, 7–8 mm, glabrous. Pappus dirty white, fulvous tinged at base, ca. 8 mm. Fl. Aug–Sep. $2n = 40$.

Seashores; sea level. Heilongjiang [N Japan, Russia (Far East); Aleutian archipelago, subarctic North America].

2. Senecio ser. **Extremiorientales** (Schischkin) C. Jeffrey & Y. L. Chen, Kew Bull. 39: 359. 1984.

麻叶千里光系 ma ye qian li guang xi

Senecio sect. *Extremiorientales* Schischkin, Fl. URSS 26: 883. 1961.

Leaves petiolate, basally often auriculate, pinnately lobed or unlobed. Peduncles slender. Capitula numerous, small. Achenes small. Pappus yellowish.

One species: Aleutian Islands, China, Japan, Korea, Mongolia, Russia (Far East, E Siberia).

3. Senecio cannabifolius Lessing, Linnaea 6: 242. 1831.

麻叶千里光 ma ye qian li guang

Herbs, perennial, rhizomatous. Stem solitary, erect, 1–2 m tall. Radical and lower stem leaves withered by anthesis. Median stem leaf petioles short, base auriculate; auricles circular or semicircular, small; blade abaxially pale green, adaxially dark green, oblong-lanceolate, 11–30 × 4–15 cm, margin undivided or pinnately divided into 5–7 lobes, papery, abaxially crisped-puberulent, adaxially glabrous, base cuneate, margin serrate, apex acuminate; terminal lobe large, oblong-lanceolate, apex acute-acuminate; upper leaves 3-partite or undivided, gradually smaller upward. Capitula radiate, numerous, arranged in broad terminal compound corymbs; peduncles 10–20 mm, slender; bracteoles 2 or 3, linear, 2–3 mm, sparsely puberulent. Involucres cylindric, 5–6 × 2–3 mm, calyculate; bracts of calyculus 3 or 4, linear; phyllaries 8–10, oblong-lanceolate, ca. 5 × 1.5 mm, herbaceous, sparsely puberulent or subglabrous, margin broadly scarious, apically acute and puberulent. Ray florets 8–10; corolla tube ca. 3 mm; lamina yellow, ca. 10 × 2.5 mm, 4-veined, 3-denticulate. Disk florets ca. 21; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute, papillose. Anthers 2–3 mm, basally shortly, rather obtusely, sagittate; appendages ovate-lanceolate; antheropodia rather long and narrow, basally dilated. Style branches ca. 1.5 mm. Achenes cylindric, 3.5–4 mm, glabrous. Pappus straw-colored, ca. 6 mm. Fl. Jul. $2n = 40$.

Meadows, forests. Hebei, Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Mongolia, Russia (Far East, E Siberia); Aleutian archipelago].

1a. Leaves pinnately lobed ..... 3a. var. *cannabifolius*
1b. Leaves unlobed, oblong-lanceolate .... 3b. var. *integrifolius*

3a. Senecio cannabifolius var. **cannabifolius**

麻叶千里光(原变种) ma ye qian li guang (yuan bian zhong)

Jacobaea cannabifolia (Lessing) E. Wiebe; *J. palmata* (Pallas) Sennikov; *Senecio cannabifolius* f. *pubinervis* Kita-

gawa; *S. palmatus* (Pallas) Ledebour (1845), not Lapeyrouse (1818); *Solidago palmata* Pallas.

Leaves pinnately lobed.

Meadows. Hebei, Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Russia (Far East, E Siberia); Aleutian archipelago].

3b. Senecio cannabifolius var. **integrifolius** (Koidzumi) Kitamura, Acta Phytotax. Geobot. 6: 275. 1937.

全叶千里光 quan ye qian li guang

Senecio palmatus var. *integrifolius* Koidzumi, Bot. Mag. (Tokyo) 30: 77. 1916; *S. litvinovii* Schischkin; *S. otophorus* Maximowicz.

Leaves unlobed, oblong-lanceolate.

Meadows, forests. Jilin (Changbai Shan) [Japan, Russia (Far East)].

3. Senecio ser. **Densiserrati** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 361. 1984.

密齿千里光系 mi chi qian li guang xi

Herbs, tall, with leafy stem. Leaves unlobed, narrowly lanceolate or linear-lanceolate, densely denticulate, abaxially white tomentose. Capitula radiate, erect; phyllaries 8, herbaceous. Ray florets 5; disk florets 7–9. Anthers shortly obtuse-auriculate at base; antheropodia rather elongated, somewhat dilated below middle.

• One species: China.

4. Senecio densiserratus C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 56. 1935.

密齿千里光 mi chi qian li guang

Herbs, perennial, rhizomatous. Stem solitary, erect, 70–120 cm tall, simple below synflorescence, sparsely arachnoid-tomentose, glabrescent. Basal and lower stem leaves withered by anthesis; median stem leaves numerous, shortly petiolate; blade adaxially green, narrowly lanceolate or linear-lanceolate, 7–16 × 1–2 cm, papery, abaxially white tomentose except for midvein, adaxially adpressed pubescent, pinnately veined, lateral veins 18–22, obscure, base cuneately attenuate into petiole, margin densely denticulate, apex acute-acuminate-attenuate. Upper leaves smaller; uppermost leaves linear, small. Capitula radiate, numerous, arranged in terminal and upper axillary compound corymbs; peduncles 3–5 mm, slender, densely puberulent, with 2 or 3 filiform bracteoles. Involucres cylindric-campanulate, ca. 5 × 1.5–2.5 mm, calyculate; bracts of calyculus ca. 3, filiform, 1–2 mm; phyllaries 8, linear, ca. 5 × 0.5–0.8 mm, herbaceous, pubescent, margin narrowly scarious, apically acute, puberulent and sometimes purplish. Ray florets 5; corolla tube ca. 3 mm; lamina oblong, ca. 4 × 0.7 mm, 4-veined, 3-denticulate. Disk florets 7–9; corolla yellow, ca. 6 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate, apically obtuse; antheropodia rather elongate, somewhat dilated in lower half. Style branches ca. 1 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus white, ca. 5 mm. Fl. Aug–Sep.

• Upland valleys; 2400–3000 m. Gansu, ?Shaanxi, Sichuan (Guanxian, Heishui).

4. Senecio ser. **Nemorenses** Gagnidze, Bot.-Geogr. Anal. Florotz. Kompl. Subalp. Vysokotrav. Kavkaza, 16. 1974.

林荫千里光系 lin yin qian li guang xi

Herbs tall, with leafy stems. Roots tomentose. Leaves unlobed or pinnately lobed, abaxially not tomentose. Capitula radiate or discoid, usually erect; phyllaries 5, 8, 9, or 12–18, usually herbaceous. Ray florets absent, or 1 or 2 or 4–10. Disk florets 3–16. Anthers shortly obtuse-auriculate at base; antheropodia rather short to rather elongated, basally hardly or somewhat dilated but not markedly so.

About 15 species: Asia, Europe; nine species (six endemic) in China.

5. Senecio nemorensis Linnaeus, Sp. Pl. 2: 870. 1753.

林荫千里光 lin yin qian li guang

Senecio ganpinensis Vaniot; *S. kematogensis* Vaniot; *S. nemorensis* var. *octoglossus* (Candolle) Ledebour; *S. nemorensis* var. *subinteger* H. Hara; *S. nemorensis* var. *taiwanensis* (Hayata) Yamamoto; *S. octoglossus* Candolle; *S. octoglossus* var. *macer* Candolle; *S. sarracenicus* Linnaeus, p.p.; *S. taiwanensis* Hayata; *S. tozanensis* Hayata.

Herbs, perennial, rhizomatous. Stems solitary or sometimes several, erect, to 1 m tall, not branched below synflorescence, sparsely pubescent or subglabrous. Basal and lower stem leaves withered by anthesis; median stem leaves numerous, subsessile, lanceolate or oblong-lanceolate, 10–18 × 2.5–4 cm, papery, both surfaces sparsely puberulent or subglabrous, pinnately veined, lateral veins 14–18, base cuneately attenuate and ± subamplexicaul, margin densely serrate, rarely coarsely dentate, apex acute-acuminate or acuminate; upper leaves somewhat smaller. Capitula radiate, numerous, arranged in terminal and upper axillary compound corymbs; peduncles 1.5–3 cm, slender; bracteoles 3 or 4, linear, 5–10 mm, sparsely pubescent. Involucres subcylindric, 6–7 × 4–5 mm, calyculate; bracts of calyculus 4 or 5, linear, shorter than involucre; phyllaries 12–18, oblong, 6–7 × 1–2 mm, herbaceous, puberulent, margin broadly scarious, puberulent, apically triangular-acuminate and brown puberulent. Ray florets 8–10; corolla tube ca. 5 mm; lamina yellow, linear-oblong, 11–13 × 2.5–3 mm, 4-veined, 3-denticulate. Disk florets 15 or 16; corolla yellow, 8–9 mm wide, with 3.5–4 mm tube and funnelform limb; lobes ovate-trian-

gular, ca. 1 mm, apically acute, papillose. Anthers ca. 3 mm, basally auriculate, appendages ovate-lanceolate; antheropodium rather short. Achenes cylindric, 4–5 mm, glabrous. Pappus white, 7–8 mm. Fl. Jun–Dec. $2n = 40$.

Open places in forests, meadows, streamsides; 700–3000 m. Anhui, Fujian, Gansu, Guizhou, Hebei, Henan, Hubei, Jilin, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Zhejiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Far East, Siberia); Europe].

6. Senecio morrisonensis Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 155. 1911.

玉山千里光 yu shan qian li guang

Herbs, perennial, rhizomatous. Stem solitary, erect, 30–60 cm tall, not branched below synflorescence or branching from near base, glabrous. Basal and often also lower stem leaves withered by anthesis; stem leaves numerous, subsessile or shortly petiolate; leaf blade broadly lanceolate to oblong-lanceolate, 7–14 × 1.3–3.5 cm, papery, glabrous, base cuneate-attenuate, margin unlobed and rarely serrate or usually coarsely serrate-lobulate or coarsely dentate, or deeply pinnately lobed, with 8–10 oblong, irregularly mucronulate-lobulate lateral lobes, apex acute-acuminate or acuminate-attenuate; upper leaves smaller. Capitula radiate, numerous, arranged in terminal or terminal and upper axillary corymbs; peduncles 1–2 cm; bracteoles 2 or 3, linear, 2–3 mm, sparsely pubescent or subglabrous. Involucres subcylindric, 4.5–6 × 2–4 mm, calyculate; bracts of calyculus 4 or 5, linear, ca. 1.5 mm; phyllaries usually 13, oblong, 0.5–1 mm wide, herbaceous, glabrous, margin narrowly scarious, apically triangular-acuminate, subobtuse, purplish and puberulent. Ray florets 5 or 6; corolla tube ca. 4.5 mm; lamina yellow, 8–9 × ca. 1.5 mm, 4-veined, 3-denticulate. Disk florets 14 or 15; corolla yellow, 6–6.5 mm, with 3.5–4 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.5 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather broad, basally gradually dilated. Achenes cylindric, ca. 3 mm, sparsely hirtellous to subglabrous. Fl. Jun–Oct.

• Forests, forest margins, mountain slopes, rocky riverbeds; 1600–3300 m. Taiwan.

1a. Leaves pinnatifid to pinnatipartite into narrow often coarsely lobulate lobes ..... 6a. var. *morrisonensis*
1b. Leaves lanceolate, marginally unlobed, serrate, coarsely serrate, or serrate-lobulate ..... 6b. var. *dentatus*

6a. Senecio morrisonensis var. **morrisonensis**

玉山千里光(原变种) yu shan qian li guang (yuan bian zhong)

Senecio taitungensis S. S. Ying.

Leaves pinnatifid to pinnatipartite into narrow often coarsely lobulate lobes.

• Forests, rocky riverbeds; 2000–3300 m. Taiwan.

Senecio taitungensis represents a subscapose variant of *S. morrisonensis* var. *morrisonensis* (into which it intergrades), inhabiting exposed places at 2000–3000 m.

6b. Senecio morrisonensis var. **dentatus** Kitamura, Acta Phytotax. Geobot. 6: 274. 1937.

齿叶玉山千里光 chi ye yu shan qian li guang

Senecio angustifolius Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 154. 1911, not (Thunberg) Willdenow (1803), nor Candolle (1838); *S. nemorensis* Linnaeus var. *dentatus* (Kitamura) H. Koyama.

Leaves lanceolate, marginally unlobed, serrate, coarsely serrate, or serrate-lobulate.

• Open forests, forest margins, mountain slopes; 1600–3300 m. Taiwan.

7. Senecio kuanshanensis C. I Peng & S. W. Chung, Bot. Bull. Acad. Sin. 43: 155. 2002.

关山千里光 guan shan qian li guang

Herbs, perennial, rhizomatous. Stems solitary, erect, 32–44 cm tall, branching in upper part, glabrous. Basal and lower stem leaves withered by anthesis; stem leaves numerous, shortly petiolate; petiole 1–2 cm; median stem leaf blade broadly lanceolate, 11–13 × 3.5–5 cm, papery, glabrous, very deeply and narrowly bipinnately or tripinnately lobed, lobes spreading, lanceolate to linear, margin coarsely dentate or incised, apex attenuate, acute; upper leaves smaller, linear-lanceolate to linear, remotely dentate. Capitula radiate, numerous, in lax terminal corymbs; peduncles 3–7 cm, slender, sparsely pubescent or glabrous; bracteoles 1–3, linear, 2–3 mm, sparsely pubescent or subglabrous. Involucres subcylindric, 8–10 × 4–6 mm, calyculate; phyllaries usually 13, linear, 0.5–1 mm wide, herbaceous, glabrous, margin narrowly scarious, apex acute to subobtuse, puberulent. Ray florets 5(or 6); corolla tube ca. 8.5 mm; lamina yellow, 9–14 × ca. 3.5 mm, 4-veined, 3-denticulate. Disk florets 14 or 15; corolla yellow, 7–8 mm, with 4–5 mm tube and funnelform limb; lobes oblong-lanceolate, 1–1.5 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally shortly auriculate, appendages ovate-lanceolate. Achenes cylindric, 2–3 mm, sparsely hirtellous on ribs. Pappus white, ca. 7.5 mm. Fl. Aug–Oct.

• Forests, bamboo thickets; 2500–3300 m. Taiwan.

8. Senecio pseudomairei H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 345. 1914.

西南千里光 xi nan qian li guang

Senecio beauverdianus H. Léveillé.

Herbs, perennial, rhizomatous. Stems somewhat flexuous, erect, to 120 cm tall, simple or branched in upper part, puberulent when young. Basal and lower leaves withered by anthesis; median stem leaf petioles 2–3 cm, not winged, basally somewhat expanded; blade ovate-oblong or oblong-lanceolate, 15–20 × 4–6 cm, papery, sparsely shortly adpressed pubescent adaxially and on veins abaxially, midvein and veins prominent abaxially, pinnately partite into a lanceolate, acute, acuminate, or attenuate terminal lobe and ca. 10 oblong-lanceolate to subrhombic, irregularly dentate-mucronulate or lacerate-mucronulate lateral lobes, basally ± cuneate. Upper leaves smaller, with

fewer lateral lobes. Uppermost leaves shortly petiolate or subsessile; blade linear or linear-lanceolate, margin sharply serrate, apically acuminate-attenuate. Capitula discoid, few to many in lax terminal and upper axillary thyrsoid corymbs; peduncles 3–5 mm, densely fulvous puberulent; bracteoles 2 or 3, subulate. Involucres cylindric or narrowly campanulate, 8–10 × 2–4 mm, calyculate; bracts of calyculus 3 or 4, subulate; phyllaries 8, purplish, linear or linear-lanceolate, ca. 1 mm wide, subleathery, sparsely puberulent, margin narrowly scarious, apically obtuse, purplish and sparsely puberulent. Disk florets 10–12; corolla red or purple, ca. 10 mm, with 4–5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1.2 mm, apically acute, papillose. Anthers yellow, ca. 3 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather short, somewhat dilated in lower half. Style branches ca. 1 mm. Achenes (immature) ca. 2.5 mm, glabrous. Pappus white, 6–7 mm. Fl. Aug–Sep.

• Montane slopes, shaded places in valleys, among bamboos; 1700–3200 m. Guizhou, Sichuan, Yunnan.

9. Senecio graciliflorus Candolle, Prodr. 6: 365. 1838.

纤花千里光 xian hua qian li guang

Senecio graciliflorus var. *pleopterus* (Diels) Handel-Mazzetti; *S. mairei* H. Léveillé; *S. pleopterus* Diels.

Herbs, perennial, rhizomatous. Stem solitary, erect, 50–120 cm tall, branching in upper part, sparsely pubescent when young, glabrescent. Leaves petiolate, radical and lower stem leaves withered by anthesis; median stem leaf petiole 2–4.5 cm, slender, basally somewhat dilated but not auriculate; blade ovate or ovate-oblong, 10–25 × 6–12 cm, pinnatipartite into an oblong-lanceolate, acuminate or acuminate-caudate terminal lobe and 8–10 oblong-lanceolate, long acuminate, coarsely serrate lateral lobes, papery, sparsely shortly adpressed pubescent adaxially and especially on main veins abaxially. Upper leaves smaller, less deeply divided and with fewer lateral lobes. Capitula obscurely radiate, numerous, arranged in terminal and upper axillary compound corymbs; peduncles 3–5 mm, slender, linear-bracteolate, densely fulvous puberulent. Involucres narrowly cylindric, 8–9 × 1.5–2 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate, 2–3 mm, puberulent; phyllaries 5, linear, ca. 8 × 1 mm, herbaceous, sparsely minutely puberulent, obscurely 3-veined, margin narrowly scarious, apically obtuse and puberulent. Ray florets 1 or 2; corolla yellow, filiform, apically truncate or with a minute lamina much shorter than style branches. Disk florets 3; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 2.2 mm, basally obtuse-auriculate or sagittate, appendages ovate-lanceolate; antheropodia rather broad, basally slightly dilated. Style branches ca. 1.8 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, 4–5 mm. Fl. May–Oct. $2n = 40$.

Open places in forests, forest margins, grassy slopes, streamsides; 2000–4100 m. Guizhou, Sichuan, Xizang, Yunnan [India (Sikkim), Kashmir, W Malaysia].

10. Senecio multilobus C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 53. 1935.

多裂千里光 duo lie qian li guang

Herbs, perennial. Stem solitary, erect, to 150 cm tall, fistulose, sparsely puberulent, glabrescent, not branched below, much branched into synflorescence in upper part. Basal and lower stem leaves petiolate; blade abaxially pale green, adaxially dark green, oblong-lanceolate, 10–15 × 5–6 cm, abaxially sparsely minutely pilose on veins, adaxially sparsely puberulent, pinnatipartite into small, linear-lanceolate, acuminate, entire or obscurely denticulate terminal lobe and 20–26 opposite or subopposite, narrowly oblong or oblong-lanceolate, 2–3 × 0.5–0.8 cm, spreading, acute, acutely few serrulate lateral lobes; upper leaves similar but smaller. Capitula radiate, very numerous, arranged in terminal and upper axillary compound corymbs; peduncles 5–12 mm, slender, puberulent; bracteoles 1 or 2, filiform, 1–2 mm, puberulent. Involucres cylindric, 6–7 × 2.5–3 mm, calyculate; bracts of calyculus 5 or 6, filiform; phyllaries 8 or 9, linear, 6–7 × ca. 0.8 mm, subleathery, glabrous, margin narrowly scarious, apically obtuse and puberulent. Ray florets 5; corolla tube ca. 4 mm; lamina orange-yellow, oblong, ca. 7 × 1–1.2 mm, 4-veined, 3-denticulate. Disk florets 10; corolla orange-yellow, ca. 8.5 mm, with ca. 3.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 2.7 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodium rather elongated, basally slightly expanded. Style branches ca. 1.5 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Sep–Nov.

• Forest and thicket margins; 2700–3000 m. Yunnan (Longchuan Jiang–Nu Jiang divide).

11. Senecio acutipinnus Handel-Mazzetti, Symb. Sin. 7: 1127. 1936.

尖羽千里光 jian yu qian li guang

Herbs, perennial, rhizomatous. Stems solitary or few fasciculate, weakly trailing below, ascending to erect above, 60–150 cm tall, not branched below synflorescence, fulvous puberulent when young. Basal and lower stem leaves withered and shed by anthesis; median stem leaf petioles 2–2.5 cm, slender, glabrous, not auriculate; blade oblong-lanceolate, 4–10 × 2–4 cm, papery, abaxially pallid and sparsely puberulent on veins, adaxially subglabrous, runcinate-pinnatipartite into a small linear-lanceolate, acute, terminal lobe and 14–20 oblong-lanceolate or lanceolate, acute, apically mucronulate, entire or obscurely denticulate, basally somewhat contracted lateral lobes; upper leaves smaller. Capitula discoid, numerous, arranged in terminal compound corymbs, crowded, nodding; peduncles 1–3 mm, slender, fulvous puberulent; bracteoles 2 or 3, linear-subulate. Involucres cylindric-campanulate, ca. 6 × 1.5–2 mm, calyculate; bracts of calyculus 1 or 2, linear-subulate, ca. 2 mm; phyllaries 5, oblong-linear, ca. 6 × 1 mm, dark at apex and on upper margins, herbaceous, glabrous, margin narrowly scarious, apically obtuse. Disk florets 6; corolla orange-yellow, ca. 8 mm, with 3–3.5 mm tube and funnelform limb; lobes ovate-triangular, 1–2 mm, apically acute, papillose. Anthers linear, ca. 2 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodium rather elongated, basally not dilated. Style branches ca. 1.2 mm. Achenes cylindric,

ca. 2.5 mm, glabrous. Pappus white, ca. 6.5 mm. Fl. Sep–Nov.

● Thicket margins; ca. 3300 m. Yunnan (Longchuan Jiang–Nu Jiang divide).

12. Senecio cinarifolius H. Léveillé, Repert. Spec. Nov. Regni Veg. 12: 283. 1913.

瓜叶千里光 gua ye qian li guang

Herbs, perennial, rhizomatous. Stem solitary, erect, 60–120 cm tall, simple, somewhat flexuous, adpressed puberulent when young; basal and lower stem leaves withered and shed by anthesis; median stem leaf petioles 1.5–2 cm, basally auriculate; auricle leaflike, irregularly serrate or lacerate, subamplexicaul; blade adaxially dark green, abaxially pale green, ovate-elliptic or ovate-oblong, to 16 × 9–10 cm, papery, abaxially sparsely puberulent on distinctly reticulate veins, adaxially sparsely shortly pubescent, pinnatipartite into an oblong-lanceolate attenuate terminal lobe and 8–14 oblong or oblong-lanceolate, acuminate or attenuate, irregularly sharply serrate or lacerate lateral lobes. Upper leaves smaller, few, less deeply lobed; uppermost leaves linear-lanceolate or linear, margin shallowly toothed or subentire. Capitula radiate, numerous, arranged in rather dense terminal and upper axillary corymbs; peduncles 5–10 mm, densely fulvous puberulent, with 2 or 3 linear bracteoles. Involucres cylindric or narrowly campanulate, 7–8 × 2–3 mm, prominently calyculate; bracts of calyculus 5 or 6, green, linear, unequal, to 1/2 as long as involucre; phyllaries 8, oblong-lanceolate, ca. 1 mm wide, herbaceous, puberulent, margin narrowly scarious, apically obtuse, purplish and puberulent. Ray florets 5; corolla tube ca. 4 mm; lamina yellow, oblong, ca. 6 mm, 4-veined, 3-denticulate. Disk florets 15 or 16; corolla yellow, ca. 8 mm, with ca. 4 mm tube; lobes ovate-lanceolate, apically acute, papillose. Anthers ca. 2 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia elongate, gradually slightly dilated in lower half. Style branches ca. 1.2 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

● Montane meadows; 2300–3200 m. Yunnan.

13. Senecio royleanus Candolle, Prodr. 6: 366. 1838.

珠峰千里光 zhu feng qian li guang

Senecio graciliflorus Candolle var. *hookeri* C. B. Clarke; *S. tanacetoides* Kunth & C. D. Bouché.

Herbs, perennial, rhizomatous. Stem solitary, erect, ca. 60 cm tall, ± flexuous in upper part, not branched below synflorescence, fulvous puberulent when young. Basal and lower stem leaves withered and shed by anthesis; median stem leaf petioles 1.5–3 cm, sparsely puberulent, without or with small, entire or toothed auricles; blade adaxially green, ovate-oblong, 10–15 × 6–8 cm, papery, abaxially sparsely puberulent on rather prominent veins, adaxially glabrous or sparsely puberulent, pinnatipartite into a triangular-lanceolate, attenuate terminal lobe and 10–12 ovate-lanceolate or oblong-lanceolate, acuminate-attenuate, mucronulate-serrate lateral lobes. Upper leaves smaller, not auriculate. Uppermost leaves lanceolate or linear-lanceolate, basally cuneate, shortly petiolate or subsessile, margin unequally serrate, apically acuminate or long acuminate. Capitula radiate, numerous, arranged in dense compound terminal and upper axillary corymbs; peduncles 3–5(–10) mm, slender, sparsely to densely puberulent, with 1–3 linear-subulate bracteoles. Involucres narrowly campanulate, 4–5 × 1.5–2.5 mm, calyculate; bracts of calyculus 5 or 6, linear, unequal, 1–3 mm; phyllaries 8, linear, ca. 1 mm wide, herbaceous, sparsely puberulent, margin narrowly scarious, apically obtuse, purplish and puberulent. Ray florets 4 or 5; corolla tube ca. 3.5 mm; lamina yellow, oblong, ca. 4 × 1 mm, 3- or 4-veined, 3-denticulate. Disk florets 8 or 9; corolla yellow, ca. 6 mm, with ca. 3 mm tube and funnelform limb; lobes 5, ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia moderately long, basally slightly dilated. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 4.5 mm. Fl. Aug–Sep.

Grassy slopes, by streams; 2900–3600 m. Xizang (Yadong) [Bhutan, Kashmir, Myanmar].

5. Senecio ser. **Coriaceisquami** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 371. 1984.

革苞千里光系 ge bao qian li guang xi

Herbs, erect, with leafy stems. Leaves ± deltoid, abaxially not tomentose, basally cordate or hastate. Capitula discoid or rarely radiate, usually nodding. Phyllaries 5, 8, or 13, rarely 12 or 14, usually leathery. Ray florets absent or rarely 5–7. Disk florets 5 to many. Anthers shortly obtuse-auriculate or subauriculate at base; antheropodia rather short to elongated, basally hardly or somewhat dilated but not markedly so.

● Six species: China.

14. Senecio lijiangensis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 371. 1984.

丽江千里光 li jiang qian li guang

Herbs, perennial, rhizomatous. Stems 1 or 2, erect, 30–40 cm tall, not branched, ± puberulent when young. Basal and lower stem leaves withered by anthesis; median stem leaves long petiolate; petiole 3–6 cm, glabrous, not winged, basally slightly expanded, not auriculate; blade abaxially pale green, triangular, 3–5 × 2–4 cm, membranous, abaxially glabrous, adaxially shortly scattered pilose or subglabrous, pinnately veined, base cordate or hastate, margin coarsely dentate, apically shortly obtuse-acuminate, mucronulate; upper leaves smaller. Uppermost leaves lanceolate or linear, margin remotely denticulate or subentire. Capitula discoid, nodding, solitary or rarely paired in axils of uppermost leaves, forming a terminal racemose cyme; peduncles cygneous, mostly shorter than subtending leaves, puberulent, not bracteolate. Involucres narrowly campanulate, 8–10 × 3–6 mm, calyculate; bracts of calyculus 3 or 4, linear, less than 1/2 as long as involucre, apically obtuse;

phyllaries 8 or 9, rarely 13, oblong-linear or linear-lanceolate, 8–10 × 1–2 mm, herbaceous, puberulent or glabrous, margin narrowly scarious, apically subacute or obtuse and puberulent. Disk florets 15–18; corolla yellow, 7–7.5 mm, with ca. 3 mm tube and narrowly campanulate limb; lobes 5, ovate-triangular, ca. 1 mm, apically acute. Anthers ca. 2 mm, basally obtuse-auriculate; antheropodia rather short, basally somewhat dilated and rounded. Style branches ca. 0.8 mm. Achenes cylindric, ca. 4 mm, glabrous. Pappus white, ca. 6 mm. Fl. Sep.

• Montane meadows; 3000–3500 m. Sichuan (Muli), Yunnan (Lijiang).

15. Senecio tricuspis Franchet, J. Bot. (Morot) 8: 357. 1894.

三尖千里光 san jian qian li guang

Cacalia tricuspis (Franchet) Handel-Mazzetti.

Herbs, perennial, rhizomatous. Stems 1 or 2, erect, 60–80 cm tall, simple, glabrous. Basal and lower leaves withered by anthesis; median stem leaves long petiolate; petiole 3–7 cm, slender, not winged, glabrous, not auriculate; blade broadly triangular, 5–8 × 3–5 cm, membranous, glabrous, pinnately veined, veins inconspicuous, base hastate, margin unequally coarsely dentate or sublacerate in upper part and with 2–4 spreading, serrate-lacerate lateral lobes at base, apex acuminate-attenuate. Upper leaves shortly petiolate, similar but smaller upward. Capitula nodding, discoid, solitary, terminal and in axils of upper leaves, forming a lax terminal racemose cyme; peduncles erect, elongated, cygneous at apex, usually exceeding leaves, sparsely puberulent, with 1 or 2 linear bracteoles. Involucres campanulate, 8–10 × 7–9 mm, calyculate; bracts of calyculus 3 or 4, linear-subulate; phyllaries 12 or 13, ovate-lanceolate, ca. 8 × 1.5–2 mm, leathery or subleathery, glabrous, margin narrowly scarious, apically acutely acuminate and purplish. Disk florets many; corolla yellow, 7–8 mm, with 3–3.5 mm tube and funnelform limb; lobes ovate-oblong, 1–1.2 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather short, basally somewhat dilated. Style branches ca. 1 mm. Achenes cylindric, 4–5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Sep–Oct. $2n = 40$*.

• Montane meadows; 3500–3800 m. Sichuan, Yunnan.

16. Senecio humbertii C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 7: 153. 1936.

弥勒千里光 mi le qian li guang

Herbs, perennial, rhizomatous, stoloniferous. Stem solitary, erect, 60–70 cm tall, not branched below synflorescence, sparsely puberulent when young, soon glabrous. Basal and stolon leaves long petiolate; petiole 3.5–12 cm, slender, basally expanded but not auriculate; blade deltoid, small, 2–3 × 2–3 cm, membranous, abaxially glabrous, adaxially sparsely puberulent or glabrous, base subtruncate or weakly cordate, margin irregularly sinuate-dentate, apex acuminate. Basal and lower stem leaves withered by anthesis; lower stem leaves with narrowly winged petioles, basally subauriculate. Median stem leaves similar but larger; petiole 3.5–6 cm, narrowly winged, basally auriculate; blade 5–15 × 4–8 cm, base subtruncate or hastate, pinnately veined. Upper leaves smaller, with shorter, broadly winged petioles, basally dilated into conspicuous rounded subamplexicaul auricles. Uppermost leaves sessile, lanceolate, basally cordate-semiamplexicaul, apically caudate-acuminate. Capitula at first erect, later nodding, discoid, numerous, arranged in dense long-stalked terminal and upper axillary rounded corymbs; peduncles 2–3 mm, fulvous puberulent; bracteoles 2 or 3, filiform. Involucres cylindric, 6–7 × 1.5–2 mm, calyculate; bracts of calyculus 2 or 3, minute; phyllaries 5, linear, ca. 1 mm wide, subleathery, glabrous, margin narrowly membranous, apically obtuse and black. Disk florets 5 or 6, corolla yellow, 6–7 mm, with 2–2.5 mm tube and funnelform limb; lobes ovate-triangular, 0.8–1 mm, apically acute, papillose. Anthers 2–2.5 mm, basally obtusely subauriculate, appendages lanceolate; antheropodia rather long, basally gradually dilated. Style branches ca. 0.7 mm. Achenes (immature) cylindric, ca. 1.5 mm, glabrous. Pappus deciduous, white, 5–6 mm. Fl. Sep.

• Forests on slopes; 2000–2400 m. Yunnan (Mile).

17. Senecio liangshanensis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 374. 1984.

凉山千里光 liang shan qian li guang

Senecio faberi Hemsley var. *discoideus* Lauener & D. K. Ferguson; *S. milleflorus* H. Léveillé (1914), not Greene (1900).

Herbs, perennial, rhizomatous. Stem solitary, erect, 30–60 cm tall, not branched below synflorescence, sparsely puberulent when young, soon glabrous. Basal and lower stem leaves withered by anthesis; median stem leaf petioles 3.5–12 cm, slender, narrowly winged, basally expanded into a toothed, subamplexicaul auricle; blade narrowly deltoid, 6–15 × 3.5–8 cm, papery, glabrous, pinnately veined, lateral veins 10–14, veins rather prominent abaxially, base hastate with triangular-lanceolate lateral basal lobes, margin irregularly coarsely mucronulate-dentate, apex acuminate. Upper leaves smaller, with shorter, rather more broadly winged petioles and more conspicuous auricles. Uppermost leaves sessile, lanceolate-attenuate, base subamplexicaul, margin denticulate. Capitula soon pendulous, discoid, numerous, arranged in rather congested terminal corymbiform stalked clusters; peduncles 5–7 mm, slender, minutely puberulent; bracteoles 2 or 3, filiform. Involucres cylindric-campanulate, ca. 6 × 2–2.5 mm, calyculate; bracts of calyculus 3 or 4, linear-subulate, unequal; phyllaries 8, linear, ca. 1 mm wide, herbaceous, glabrous, margin narrowly scarious, apically obtuse, blackish and fimbriate. Disk florets 10; corolla yellow, ca. 6.5 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 1.8 mm, basally shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather elongated, narrow, basally hardly dilated. Style branches ca. 0.8 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

• Montane woods and meadows; 2600–3400 m. SW Sichuan, Yunnan.

18. Senecio nigrocinctus Franchet, J. Bot. (Morot) 10: 417. 1896 [*"nigro-cinctus"*].

黑苞千里光 hei bao qian li guang

Senecio delavayi Franchet, J. Bot. (Morot) 8: 364. 1894, not Franchet (1892); *S. pteropodus* W. W. Smith.

Herbs, perennial, rhizomatous. Stem solitary, ascending then erect, 30–60 cm tall, puberulent when young, soon glabrous. Basal and lower stem leaves withered by anthesis, long petiolate; petiole 4–8 cm, not winged, basally expanded but not auriculate; blade ovate-triangular, 4–6 × 2.5–5 cm, papery, base cordate or hastate, margin coarsely sharply dentate, apex acute. Median stem leaves larger; petiole 3–5 cm, broadly winged, basally expanded into prominent subamplexicaul dentate auricle; blade ovate-triangular, 6–10 × 4–6 cm, otherwise similar, glabrous, pinnately veined, lateral veins 10–14. Upper leaves sessile; blade ovate-lanceolate or oblong-lanceolate, 4–9 × 1.5–3 cm, with auricle and petiolar wings confluent with blade, margin irregularly deeply dentate, apex long acuminate. Capitula at first erect, then nodding, discoid, numerous, arranged in terminal and upper axillary rather dense rounded corymbiform clusters; peduncles 5–12 mm, densely fulvous puberulent; bracteoles 1–3, linear. Involucres obconic-campanulate, 6–7 × 2.5–4 mm, calyculate; bracts of calyculus 4 or 5, linear, unequal, 3–6 mm, apically acute, dark; phyllaries 8–13, spreading or reflexed in upper part, linear-lanceolate, 6–7 × 1–1.5 mm, leathery, puberulent to glabrous, apically acute-acuminate, dark at apex and on upper margin. Disk florets (13–)22–26; corolla yellow, ca. 7.5 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-triangular, apically acute. Anthers ca. 2 mm, basally shortly obtuse-auriculate, appendages ovate-oblong; antheropodia elongated, basally gradually slightly dilated. Style branches ca. 1 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 5 mm. Fl. Jul–Sep.

• Alpine meadows, slopes, forest margins; 3200–4000 m. SE Xizang, NW Yunnan.

19. Senecio coriaceisquamus C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 50. 1935.

革苞千里光 ge bao qian li guang

Herbs, perennial, rhizomatous. Stems solitary or few fasciculate, ascending, flexuous, ca. 45 cm tall, crisped-pubescent. Petioles of radical leaves 2–2.5 cm, densely pilose, narrowly winged, basally expanded but not auriculate; blade of radical leaves triangular or ovate, 3–3.5 × 2.5–3 cm, papery, both surfaces densely crisped-pilose, pinnately veined, base cordate, margin entire or obscurely mucronulate-crenulate or denticulate, apex obtuse. Basal and lower stem leaves withered and shed by anthesis; median stem leaves similar; petiole 2–4 cm, winged, basally gradually dilated into conspicuous rounded entire or few-denticulate subamplexicaul auricle; blade triangular or ovate-triangular, 4–6 × 2–4 cm. Uppermost leaves lanceolate, basally cuneate to petiole, apically acute-acuminate. Capitula erect, radiate, 5–10 in terminal rather dense corymbs; peduncles 5–20 mm, densely pubescent, bracteate at base, bracteolate. Involucres campanulate, 8–9 × 4–5 mm, calyculate; bracts of calyculus 7 or 8, green, linear, 5–7 mm; phyllaries 12–14, ca. 8 × 1–1.5 mm, leathery, puberulent, margin narrowly subcartilaginous, apically acute, black. Ray florets 5–7; corolla tube 4–4.5 mm; lamina oblong, ca. 8 × 2.5 mm, 4-veined, apically 3-denticulate or 3-lobed. Disk florets many; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-triangular, ca. 1.6 mm, marginally papillose, apically acute. Anthers ca. 2 mm, basally obtusely subauriculate, appendages ovate-oblong; antheropodia somewhat elongated, basally somewhat dilated. Style branches ca. 1.2 mm. Achenes (immature) cylindric, ca. 3.5 mm, puberulent. Pappus white, ca. 6 mm. Fl. May.

• Open wet places, by streams; ca. 3000 m. Yunnan (Longchuan Jiang–Nu Jiang divide).

6. Senecio ser. **Stenoglossi** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 378. 1984.

狭舌千里光系 xia she qian li guang xi

Herbs, erect, tall, with leafy stems. Leaves ± deltoid, abaxially not tomentose, basally cordate or subhastate. Capitula radiate, erect. Phyllaries 8–12, ± leathery. Ray florets 3 or 4, lamina elongated, narrow. Disk florets 8–19. Anthers obtuse-auriculate at base; antheropodia rather short and broad, basally slightly or somewhat dilated but not markedly so.

• Two species: China.

20. Senecio arachnanthus Franchet, J. Bot. (Morot) 8: 355. 1894.

长舌千里光 chang she qian li guang

Cacalia arachnantha (Franchet) Handel-Mazzetti.

Herbs, perennial, rhizomatous. Stem solitary, erect, to 100 cm tall, not branched below synflorescence, puberulent when young. Leaves long petiolate, basal and lower stem leaves withered by anthesis; petiole to 24 cm, not winged, sparsely pubescent; blade broadly ovate, to 26 cm long and broad, membranous or thinly papery, abaxially sparsely shortly pilose, adaxially minutely pubescent on veins, pinnately veined, base deeply cordate or hastate, margin acutely irregularly coarsely dentate, apex acuminate-attenuate or acute. Median and upper stem leaves broadly triangular, basally broadly cordate, with shorter petioles not winged or winged and expanded and subamplexicaul. Uppermost leaves ovate-triangular or ovate-lanceolate, basally cuneate, shortly petiolate or subsessile. Capitula radiate, rather few to numerous, arranged in long stalked terminal compound corymbs; peduncles 6–10 mm, bracteate; bracteoles 3, linear, 5–10 mm, pubescent. Involucres cylindric, 8–10 × 3–5 mm, calyculate; bracts of calyculus 6–8, green, linear, ca. 1/3 as long as involucre; phyllaries 10–13, linear-lanceolate, ca. 8 × 1.5–2 mm, leathery, glabrous, margin narrowly scarious, apically obtuse to acute and finely ciliate. Ray florets 4; corolla

tube ca. 7 mm, puberulent in upper part; lamina yellow, linear, 20–22 × 0.5–0.7 mm, 2- or 3-veined, apically 3-denticulate. Disk florets 17–19; corolla yellow, ca. 10 mm, with 5.5–6 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.5 mm, apically acute, papillose. Anthers ca. 3.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather broad, basally slightly expanded. Style branches ca. 1.2 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus white, ca. 2 mm. Fl. Aug–Sep.

• Wet places in forests, by springs, streams; ca. 3000 m. NW Yunnan (Dali, Heqing).

21. Senecio lingianus C. Jeffrey & Y. L. Chen, Kew Bull. 39: 379. 1984.

君范千里光 jun fan qian li guang

Senecio myriocephalus Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 93. 1981, not Schultz Bipontinus ex A. Richard (1848), nor Baker (1884).

Herbs, perennial, rhizomatous. Stem solitary, erect, to 120 cm tall, branching into synflorescence, sparsely puberulent when young. Leaves petiolate; basal and lower stem leaves withered by anthesis; median stem leaf petiole 3–6 cm, narrowly winged; blade ovate-triangular or triangular, 10–14 × 8–13 cm, membranous or thinly papery, abaxially sparsely puberulent, adaxially glabrous, base broadly cuneate and attenuate into petiole, margin irregularly dentate, apex acuminate. Upper leaves smaller, subsessile, ovate-lanceolate or lanceolate, 9–11 × 1.5–3.5 cm, base cuneate-attenuate, apex acuminate. Capitula radiate, numerous, arranged in rather crowded terminal compound corymbs; peduncles 7–15 mm, slender, puberulent, often bracteate; bracteoles 2 or 3, linear, ca. 5 mm. Involucres subcylindric, 6–7 × 2–3 mm, calyculate; bracts of calyculus 2 or 3, linear, ca. 1/2 as long as involucre; phyllaries 8, linear-oblong, 6–7 × 1–1.5 mm, subleathery, glabrous, margin scarious, apically acute, blackish, and ciliate. Ray florets 3; corolla tube 4–5 mm, sparsely puberulent in upper part; lamina yellow, linear, ca. 15 × 1 mm, 4-veined, apically deeply 2- or 3-lobed. Disk florets 8 or 9; corolla yellow, ca. 8.5 mm, with ca. 4.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.7 mm, apically acute. Anthers ca. 2.3 mm, basally shortly obtuse-auriculate, appendages ovate; antheropodia somewhat expanded toward base. Style branches ca. 1 mm. Achenes ca. 2.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

• Open forests, alpine shrubby meadows; 3600–4000 m. Xizang (Bomi, Mêdog).

7. Senecio ser. **Cernui** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 380. 1984.

垂头千里光系 chui tou qian li guang xi

Herbs, erect, rather small, with leafy stems. Leaves ovate to oblanceolate, abaxially glabrous or tomentose, basally subtruncate to attenuate. Capitula radiate, nodding. Phyllaries 5 or 6 or 17–20, subleathery or herbaceous. Ray florets 6–8 or 18–20. Disk florets 23 to many; corolla lobes dark colored at apices. Anthers obtusely or subacutely auriculate at bases; antheropodia robust, elongated, basally only slightly dilated.

• Four species: China.

22. Senecio atrofuscus Grierson, Notes Roy. Bot. Gard. Edinburgh 22: 433. 1958.

黑褐千里光 hei he qian li guang

Herbs, slender, rhizomatous. Stem solitary, erect, 35–65 cm tall, simple, glabrous. Basal and lower stem leaves mostly present at anthesis; petiole to 15 cm, slender, basally expanded; blade ovate or ovate-oblong, 1–4 × 1–1.5 cm, membranous, minutely glandular ciliate on margin, otherwise glabrous, pinnately veined, base cordate to truncate or cuneate, margin remotely apiculate-denticulate, apex obtuse to acute. Median stem leaves sessile; blade oblong or oblong-lanceolate, 3–6(–8) × 0.5–1.5 cm, base cuneate, apex acute. Upper leaves linear, basally subamplexicaul, margin mucronulate-dentate or subentire, apically acuminate or acute. Capitula 1–3, terminal, lax, nodding, 2–2.5 cm in diam.; peduncles 1.5–3.5 cm, sparsely arachnoid to subglabrous; bracteoles 1 or 2, linear. Involucres broadly campanulate, 6–8 × 6–10 mm, calyculate; bracts of calyculus 9–12, linear or linear-subulate, 4–5 mm, purple, sparsely arachnoid or glabrous, ciliate on margin, apically acute; phyllaries ca. 17, ca. 2 mm wide, subleathery, blackish on veins and upper margins, sparsely fuscous pubescent at base, 3-veined, margin narrowly scarious, apically acute and ciliate. Ray florets 18; corolla tube ca. 3 mm; lamina yellow, elliptic, 10–11 × ca. 4 mm, 4-veined, apically acute, 3-denticulate. Disk florets many; corolla yellow, 7–7.5 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically blackish, acute. Anthers ca. 2.2 mm, basally shortly obtuse-auriculate, appendages lanceolate; antheropodia elongated, robust, basally slightly dilated. Style branches ca. 1.5 mm. Achenes cylindric, ca. 3.5 mm, glabrous. Pappus white, 7–7.5 mm. Fl. Aug.

• Grassy slopes; ca. 3900 m. Xizang (Gongbo'gyamda), NW Yunnan.

23. Senecio nodiflorus C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 54. 1935.

节花千里光 jie hua qian li guang

Senecio drukensis C. Marquand & Airy Shaw var. *nodiflorus* (C. C. Chang) Handel-Mazzetti.

Herbs, rhizomatous. Stem usually solitary, erect, 10–50 cm tall, simple or branching into synflorescence, densely to laxly white arachnoid. Basal and lower stem leaves mostly present at anthesis; petiole 2.5–8 cm, sparsely arachnoid or glabrescent, basally somewhat expanded; blade ovate to elliptic-oblong, 4–6 × 1–3.5 cm, papery, abaxially white and densely arachnoid, adaxially sparsely arachnoid and ± glabrescent, pinnately

veined, base cuneate, margin irregularly mucronate-dentate, apex rounded to subacute. Median stem leaves shortly petiolate; blade elliptic-oblong or oblong-lanceolate. Upper leaves sessile, oblong-linear to linear, gradually smaller, base subamplexicaul; uppermost leaves linear, bractlike. Capitula 1–15, terminal on synflorescence branches, rather lax, thyrsoid, ca. 3 cm in diam., nodding; peduncles erect, apically recurved, 1–4.5 cm, stout, densely arachnoid-tomentose, bracteate; bracteoles 1 or 2, linear-lanceolate or linear, 5–12 mm. Involucres campanulate, 7–8 × 6–10 mm, calyculate; bracts of calyculus 8, purplish, linear, 4–6 mm, arachnoid-tomentose; phyllaries ca. 20, linear, 7–8 × 0.5–1 mm, subleathery, blackish purple on veins and in upper part, sparsely arachnoid, ± glabrescent, obscurely 3-veined, apically acute and villous. Ray florets 18–21; corolla tube ca. 4.5 mm; lamina bright yellow, oblong, ca. 8 × 2–3 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 8 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-triangular, apically purplish, acute, and papillose. Anthers ca. 2.3 mm, basally obtusely or subacutely auriculate, appendages ovate-lanceolate; antheropodia elongated, robust, basally slightly dilated. Style branches ca. 1.3 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus white, 7–8 mm. Fl. Aug–Oct.

• Wet stony pastures, rocky places, gravelly places, boulder screes; 3000–4500 m. Xizang, Yunnan (Dêqên).

24. Senecio drukensis C. Marquand & Airy Shaw, J. Linn. Soc., Bot. 48: 191. 1929.

垂头千里光 chui tou qian li guang

Herbs, rhizomatous. Stem solitary, erect, 15–35 cm tall, at first white arachnoid, glabrescent. Basal leaves mostly withered by anthesis; lower stem leaf petiole equaling or shorter than blade, narrowly winged, basally expanded; blade oblanceolate or spatulate, 4–6 × 0.8–1.5 cm, abaxially densely white tomentose, adaxially sparsely arachnoid and glabrescent, pinnately veined, base attenuate into petiole, margin mucronulate-denticulate, apex obtuse. Median and upper leaves subsessile; blade oblanceolate to linear, 3–5 × 0.3–0.6 cm, base slightly expanded and subamplexicaul, apex obtuse or subacute. Capitula radiate, nodding, few to rather numerous, arranged in a narrow elongated terminal thyrse; bracts oblanceolate-linear, similar to upper leaves but smaller, to 3 cm; peduncles 0.5–2.5 cm, densely arachnoid-tomentose, recurved at apex, with 1 or 2 linear-subulate bracteoles. Involucres cylindric or narrowly campanulate, 5–6 × 3–5 mm, calyculate; bracts of calyculus 5 or 6, purplish, linear-subulate, 1–3 mm; phyllaries 13(–15), linear, ca. 6 × 0.6–1 mm, herbaceous, blackish on veins and in upper part, sparsely arachnoid, glabrescent, with narrow scarious margins, apically acute, fimbriate and sometimes villous. Ray florets 6–8; corolla tube ca. 3.5 mm; lamina yellow, oblong-linear, 6–6.5 × 2–2.5 mm, 4-veined, apically 3-denticulate. Disk florets 23–25; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically purplish, acute, and papillose. Anthers ca. 2.5 mm, basally subacutely auriculate, appendages ovate-lanceolate; antheropodia elongated, robust, basally slightly dilated. Style branches ca. 1 mm. Achenes cylindric, 1.5–2 mm, glabrous. Pappus white, ca. 7 mm. Fl. Jul–Sep.

• Wet places, riverbanks, gravel of riversides, streambeds; 2900–3600 m. E Xizang (Bomi, Gongbo'gyamda).

25. Senecio daochengensis Y. L. Chen, Acta Phytotax. Sin. 26: 56. 1988.

稻城千里光 dao cheng qian li guang

Herbs, perennial, rhizomatous. Stem solitary, erect, green or becoming purplish above, 20–25 cm tall, not branched, glabrous or sometimes sparsely arachnoid-pubescent. Basal leaves withered and shed by anthesis; lower stem leaves long petiolate; petiole 3–3.5 cm, not winged, basally slightly expanded; blade ovate or ovate-elliptic, 2.5–3 × 1.2–2 cm, both surfaces glabrous, lateral veins 4–6, base cuneate-attenuate, margin entire or inconspicuously denticulate, reflexed when dry, apex obtuse or rounded. Median and upper stem leaves sessile or subsessile; blade narrowly lanceolate to linear, 2.5–4.5 × 0.5–5 cm, base slightly expanded, amplexicaul, apex slightly acute or obtuse. Capitula radiate, usually 3 or 4 in terminal raceme, with linear bracts 10–15 mm; peduncles pendulous, 5–10(–40) mm, sparsely arachnoid-pubescent. Involucres campanulate or cylindric, 7–10 × 5–8 mm; bracteoles 5–8, black-purplish; phyllaries ca. 15, linear-lanceolate, distinctly shorter than disk, 1–2 mm wide, glabrous, apically acute and puberulent. Ray florets 8–11; corolla tube ca. 3 mm, puberulent above; lamina yellow, oblong or oblong-elliptic, ca. 7 × 2–3.5 mm, 4- or 5-veined, apically 3-denticulate. Disk florets 20–25; corolla yellow, 7–8 mm, with 1.5–2 mm tube and funnelform limb, lobes ovate-oblong, apically dark brown, puberulent. Anthers linear, basally obtuse. Style branches reflexed, subtruncate, papillose. Achenes subcylindric, 2.5–3 mm, glabrous. Pappus white, ca. 7 mm. Fl. Aug–Sep.

• Montane meadows; ca. 4800 m. Sichuan (Daocheng).

8. Senecio ser. **Monticolarum** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 257. 1984 [*"Monticolae"*].

山生千里光系 shan sheng qian li guang xi

Senecio sect. *Montani* Schischkin in Schischkin & Bobrov, Fl. URSS 26: 883. 1961, not Muschler (1909).

Herbs, dwarf, rhizomatous, with leafy stems. Leaves oblanceolate-oblong to spatulate, abaxially usually tomentose, basally cuneate to attenuate, at least stem leaves often pinnately lobed. Capitula radiate, erect. Phyllaries 13 or 18–20, herbaceous. Ray florets 5 or 6 or 10–14. Disk florets 15 to many. Anthers subacutely auriculate at bases; antheropodia rather stout, basally gradually dilated.

About six species: Himalaya and Myanmar to Russia; five species (three endemic) in China.

26. Senecio albopurpureus Kitamura, Fauna Fl. Nepal Himalaya 1: 271. 1955.

白紫千里光 bai zi qian li guang

Senecio bracteolatus J. D. Hooker, Fl. Brit. India 3: 339. 1881, not Hooker & Arnott (1841).

Herbs, dwarf, rhizomatous. Stems erect, 8–20 cm tall,

slender, simple, arachnoid-tomentose, glabrescent. Basal leaves mostly present at anthesis, long petiolate; blade elliptic or obovate-elliptic, obtusely few toothed or sublobulate; median stem leaves shorter petiolate; petiole somewhat expanded at base, not auriculate; blade oblong or oblong-lanceolate, 3–5 × 1–1.5 cm, pinnately lobed or pinnatifid with 6–10 oblong or ovate-oblong shallowly denticulate or subentire lateral lobes, abaxially densely tomentose, adaxially sparsely arachnoid, pinnately veined. Upper leaves smaller, lanceolate to linear-lanceolate, lobed or subentire, basally sessile and subamplexicaul. Capitula radiate, 2–6 in lax terminal corymb, rarely solitary; peduncles to 5 cm, sparsely arachnoid, with 2 or 3 linear or linear-subulate bracteoles. Involucres campanulate, 8–10 × 7–8 mm, calyculate; bracts of calyculus 6–8(–10), green or purplish, linear-subulate, 3–5 mm, acute, sparsely arachnoid; phyllaries 18–20, green or purplish, linear-lanceolate, 1–1.5 mm wide, dark brown or purplish on upper margin, herbaceous, sparsely arachnoid, glabrescent, apically acuminate and white pubescent. Ray florets 10–13; corolla tube ca. 5 mm; lamina yellow, oblong, 10–12 × ca. 2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, 7–8 mm, with 3–3.5 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.5 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally subacutely auriculate, appendages ovate-lanceolate; antheropodia elongate, basally somewhat dilated. Style branches ca. 1.5 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white or straw-colored at least at base, ca. 7 mm. Fl. Jul–Aug.

Streamsides; 3900–4300 m. S Xizang (Gyirong) [Bhutan, India (Sikkim), Nepal].

27. Senecio thianschanicus Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 311. 1880.

天山千里光 tian shan qian li guang

Senecio acromaculus Y. Ling; *S. acromaculus* f. *elatus* Y. Ling; *S. drummondii* Babu & S. N. Biswas; *S. kawaguchii* Kitamura.

Herbs, dwarf, rhizomatous. Stems solitary or several fasciculate, ascending or erect, 5–20 cm tall, simple or sometimes branching from base, sparsely arachnoid when young, ± glabrescent. Basal and lower stem leaves mostly present at anthesis, petiolate; blade adaxially green, obovate or spatulate, 4–8 × 0.8–1.5 cm, abaxially ± arachnoid-pubescent and ± glabrescent to glabrous, adaxially subglabrous or glabrous, base attenuate into petiole, margin subentire, shallowly dentate, or pinnatifid, apex obtuse to subacute. Median stem leaves sessile; blade oblong or oblong-linear, 2.5–4 × 0.5–1 cm, pinnately veined, base subamplexicaul, margin shallowly dentate to pinnatifid or rarely pinnatipartite, apex obtuse. Upper leaves smaller, linear or linear-lanceolate, margin ± entire. Capitula radiate, 2–10 in lax terminal corymbs, rarely solitary; peduncles 0.5–2.5 cm, ± arachnoid; bracteoles linear or linear-subulate, 3–5 mm, apically acute. Involucres campanulate, 6–8 × 3–6 mm, calyculate; bracts of calyculus 4–8, 3–5 mm, apically acuminate, often purplish; phyllaries ca. 13, linear-oblong, 6–7 × 1–1.5 mm, usually dark colored and often fimbriate, or villous, herbaceous, sparsely arachnoid, glabrescent, margin scarious, apically acuminate. Ray florets ca. 10; corolla tube ca. 3 mm; lamina yellow, oblong-linear, 5–6 × 1.5–2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets ca. 26 or 27; corolla yellow, 6–7 mm, with 3–3.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers linear, ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia balusterform, basally dilated. Style branches ca. 1 mm. Achenes cylindric, 3–3.5 mm, glabrous. Pappus white, ca. 8 mm. Fl. Jul–Sep.

Grassy slopes, open wet places, streamsides; 2400–5000 m. Gansu, Nei Mongol, Qinghai, Sichuan, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, N Myanmar, Russia].

28. Senecio megalanthus Y. L. Chen, Acta Phytotax. Sin. 26: 57. 1988.

大花千里光 da hua qian li guang

Herbs, perennial, rhizomatous. Rhizomes shorter. Stem erect or rather flexuous at base, 5–15 cm tall, slender, simple, white arachnoid or sometimes glabrate. Basal and lower leaves present at anthesis, long petiolate; petiole slightly expanded, but not amplexicaul; blade adaxially green, ovate or obovate, rarely spatulate or suborbicular, 1.5–4 × 1–1.7 cm, abaxially densely white arachnoid, adaxially sparsely arachnoid or ± glabrous, lateral veins 4–6-paired, inconspicuous, base cuneate-attenuate into petiole 1.5–3 cm, margin subentire or undulate-dentate, apex obtuse or rounded, rarely rather acute. Median stem leaves subsessile or shortly petiolate; blade oblong or oblong-spatulate, 2–4 × 5–8 cm, base cuneate, slightly expanded and amplexicaul, margin subentire or inconspicuously dentate, apex obtuse or slightly acute. Uppermost leaves smaller, bractlike, linear, 5–10 mm. Capitula solitary, terminal, erect or nodding, subsessile or shortly pedunculate. Involucres campanulate or campanulate-subglobose, 10–13 × 15–20 mm, basally 10–13 linear-lanceolate bracteolate; bracteoles 5–7 mm, sparsely arachnoid or glabrescent, margin brown scarious-fimbriate, apically acuminate; phyllaries 21–23, linear-lanceolate, 10–11 × 1–1.5 mm, herbaceous, puberulent or glabrous, margin narrowly scarious, apically purplish and puberulent. Ray florets 10–13; corolla tube 3.5–4 mm; lamina yellow, oblong, 10–11 × 2.5–3 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, 8–9 mm, with ca. 3 mm tube and narrowly funnelform limb; lobes triangular-ovate, apically acute, puberulent. Anthers linear, basally obtuse. Style branches obtuse, papillose. Achenes cylindric, 2–2.5 mm, glabrous. Pappus white, 10–11 mm.

• Alpine rocky slopes; 4100–4800 m. Sichuan (Kangding, Xiangcheng).

29. Senecio lhasaensis Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 90. 1981.

拉萨千里光 la sa qian li guang

Herbs, dwarf, perennial. Stems solitary or sometimes paired, erect, 2–6 cm tall or nearly obsolete, sparsely arachnoid. Basal leaves rosulate, petiolate, present at anthesis; petiole 1–4 cm, basally expanded and subamplexicaul; blade oblanceolate-spatulate, 2–5 × 0.7–2 cm, papery, abaxially densely white tomentose, adaxially sparsely arachnoid on midvein and glabrescent, margin lyrate-pinnatifid with ovate or ovate-triangular

terminal lobe and 6–8 ovate-oblong or subtriangular, obtuse, 1- or 2-dentate lateral lobes, or sometimes subentire, apex obtuse. Stem leaves lyrate-pinnatifid, similar to basal leaves; uppermost leaves smaller. Capitula radiate, 2 or 3 in a terminal corymb or solitary, shortly pedunculate or subsessile. Involucres campanulate, 8–9 × 6–8 mm, calyculate; bracts of calyculus 3 or 4, linear-lanceolate or linear, 5–6 mm, sparsely arachnoid, fimbriate on margin, apically acuminate; phyllaries ca. 20, linear-lanceolate, 8–9 × 1.5–2 mm, herbaceous, sparsely arachnoid, margin narrowly scarious, apically acuminate, blackish brown and ciliate on upper margins and apex. Ray florets 13 or 14; corolla tube ca. 3.5 mm; lamina yellow, oblong, ca. 7.5 × 2.5 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 6.5 mm, with ca. 3 mm tube; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally subacutely auriculate, appendages ovate; antheropodia rather slender, basally slightly dilated. Style branches ca. 1.2 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

• Alpine meadows; 4000–5400 m. Xizang.

30. Senecio kongboensis Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 5: 281. 1976.

工布千里光 gong bu qian li guang

Herbs, dwarf, perennial. Stem solitary, erect, 2–4 cm tall, simple, arachnoid-pubescent, ± glabrescent. Basal leaves present at anthesis, rosulate; petiole short, basally expanded and subamplexicaul; blade oblanceolate-oblong or spatulate, 1.5–4 × 0.5–0.7 cm, abaxially densely white arachnoid-tomentose except for midvein, adaxially sparsely pilose and glabrescent, base cuneate-attenuate, margin mucronulate-dentate, apex obtuse to acute. Stem leaves subsessile; blade oblong or oblong-lanceolate, margin remotely dentate to deeply serrate or lyrate-pinnatifid, apex obtuse. Capitula radiate, 5–7 in a compact terminal corymb; peduncles 2–3 mm, arachnoid, linear-bracteolate. Involucres campanulate, 4–5 × 3–4 mm, calyculate; bracts of calyculus 4 or 5, linear or linear-lanceolate, 4–5 × ca. 1 mm, apically acuminate, fimbriate or minutely denticulate, dark brown; phyllaries ca. 13, ca. 6 × 0.5–1 mm, dark purplish red and ciliate on upper margins and apex, herbaceous, sparsely arachnoid to glabrous, margin narrowly scarious, apically acuminate. Ray florets 5 or 6; corolla tube ca. 4 mm; lamina yellow, ca. 4 × 0.8 mm, 4-veined, apically 3-denticulate. Disk florets ca. 15; corolla yellow, ca. 6.5 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1 mm, brownish, apically acute, papillose. Anthers ca. 1.8 mm, basally subacutely auriculate; antheropodia gradually dilated toward base. Style branches ca. 1 mm. Achenes (immature) cylindric, ca. 1.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug–Sep.

• Alpine grasslands, wet scree slopes; 3600–3900 m. Xizang (Bomi, Gongbo'gyamda).

9. Senecio ser. **Purpureolobati** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 388. 1984.

紫裂千里光系 zi lie qian li guang xi

Herbs, perennial (?or biennial), erect. Leaves pinnately divided, not auriculate. Capitula discoid, nodding. Phyllaries 13–20, herbaceous, usually purplish, fimbriate, bearded at apex. Disk florets many; corolla limb and tube purplish or purplish tinged; lobes dark purple. Anthers basally subacutely to acutely auriculate; antheropodia moderately elongated, basally somewhat dilated.

• Two species: China.

31. Senecio saussureoides Handel-Mazzetti, Acta Horti Gothob. 12: 294. 1938.

风毛菊状千里光 feng mao ju zhuang qian li guang

Herbs, perennial (or ?biennial). Stem solitary, erect, 30–80 cm tall, simple, subglabrous. Basal and lower leaves withered by anthesis, long petiolate; median stem leaf petiole 2–5 cm, slender, glabrous, not winged, basally slightly expanded, not auriculate; blade elliptic or lanceolate, to 15 × 5–6 cm, papery, abaxially pallid and sparsely pilose on main veins or glabrous, adaxially glabrous, margin pinnatipartite to (in basal half) pinnatisect into a triangular-lanceolate or lanceolate, long acuminate or attenuate, subentire, remotely dentate, or few lobulate terminal lobe and 10–12 spreading, ovate to oblong-lanceolate, acute, irregularly coarsely serrate or lacerate lateral lobes. Upper leaves smaller, shortly petiolate or subsessile; uppermost leaves linear, bractiform. Capitula discoid, nodding, 3–8 in lax terminal corymb; peduncles erect, apically recurved, to 20 cm, stout, not bracteolate. Involucres broadly campanulate, 6–8 × 6–10 mm, calyculate; bracts of calyculus 8–10, linear-lanceolate, purplish, dark at apex and on upper margins, ± fimbriate, white pubescent at least at apex; phyllaries 15–20, broadly lanceolate, 6–8 × ca. 2 mm, dark green or purple, dark at apex and on upper margins, fimbriate, herbaceous, sparsely arachnoid or fulvous puberulent, apically white bearded. Disk florets many; corolla yellow, 6.5–7.5 mm, with 2.5–3 mm tube and purplish tinged funnelform limb; lobes triangular-lanceolate, dark purple, apically acute, papillose. Anthers yellow, ca. 2.3 mm, basally subacutely auriculate, appendages ovate-lanceolate; antheropodia rather long, basally slightly dilated. Style branches ca. 12 mm. Achenes cylindric, 3–3.5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Sep.

• Shrubs by meadows; 3900–4200 m. Sichuan (Dawu, Taining), Xizang (Gongbo'gyamda).

32. Senecio muliensis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 389. 1984.

木里千里光 mu li qian li guang

Herbs, perennial (?or biennial). Stem solitary, erect, ca. 35 cm tall, simple, sparsely arachnoid, glabrescent. Basal and lower leaves withered by anthesis, long petiolate; median stem leaf petiole purplish, 1–3.5 cm, slender, sparsely arachnoid to subglabrous, not winged, basally slightly expanded, not auriculate; blade narrowly oblanceolate-oblong, 5–10 × 0.5–1.5 cm,

papery, both surfaces sparsely arachnoid and glabrescent, pinnatifid into a large lanceolate, acute, acutely dentate terminal lobe and in lower half 6–10 small, short, triangular-lanceolate, few-denticulate lateral lobes progressively smaller toward leaf base. Upper stem leaves shortly petiolate or subsessile, linear-lanceolate or linear, smaller upward, 1–3 cm, margin dentate, apex acuminate. Capitula discoid, nodding, 3 or 4 in a terminal corymb; peduncles erect, apically recurved, to 3–4 cm, stout, puberulent, not bracteate. Involucres broadly campanulate, 7–8 × ca. 8 mm, calyculate; bracts of calyculus 8–10, purplish, linear or linear-subulate, 6–7 × ca. 0.5 mm, entire, sparsely puberulent, white bearded at apex; phyllaries 13–15, lanceolate, 6–8 × ca. 2 mm, purple with darker veins, tips, and upper margins, sparsely arachnoid and purple puberulent, apically acute, fimbriate and white bearded. Disk florets many; corolla purplish, ca. 9 mm, with ca. 4 mm tube, apically acute, papillose. Anthers ca. 2.5 mm, basally subacutely to acutely auriculate, appendages ovate-lanceolate; antheropodia gradually somewhat expanded toward base. Achenes cylindric, 3–3.5 mm, glabrous. Pappus white, ca. 7 mm. Fl. Sep–Oct.

• Grassy mountain slopes; ca. 4000 m. Sichuan (Muli).

10. Senecio ser. **Malacophylli** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 389. 1984.

软叶千里光系 ruan ye qian li guang xi

Herbs, perennial, erect, sometimes robust, with leafy stems. Leaves usually lyrate-pinnately divided or basally sometimes undivided, ovate to triangular-lanceolate and ± cordate at base. Capitula usually radiate, erect, usually small and numerous or very numerous. Phyllaries 5–13(–18), herbaceous, apically usually obtuse. Ray florets 2–8, rarely absent. Disk florets 2–18, rarely many. Antheropodia rather small, comparatively short and narrow, basally slightly dilated, rarely distinctly so. Achenes glabrous or rarely pubescent.

Eight species: Bhutan, China, India (Sikkim), Myanmar, Nepal; eight species (seven endemic) in China.

33. Senecio dodrans C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 152. 1895.

黑缘千里光 hei yuan qian li guang

Herbs, perennial, rhizomatous. Stem solitary, ascending, then erect, 10–25 cm tall, simple, glabrous. Basal leaves mostly present at anthesis, long petiolate; petiole 2–6 cm, slender, glabrous or sparsely pilose, basally dilated but not auriculate; blade broadly ovate to suborbicular, 1.5–3 × 2.5–4 cm, thinly papery, glabrous, pinnately veined, base weakly cordate or subtruncate, margin irregularly coarsely dentate, apex rounded to shortly obtuse-acuminate. Lower stem leaves similar to basal leaves; petiole with small basal auricle; median stem leaf petiole with basal auricle coarsely dentate, semiamplexicaul; blade ovate to suborbicular, 5–8 × 1.5–3 cm, base truncate and suddenly contracted into winged, denticulate, basally conspicuously auriculate petiole, margin acutely dentate, apex acute-acuminate. Upper leaves sessile, gradually smaller upward, lanceolate, base auriculate, margin irregularly dentate or lacerate, apex acuminate. Capitula radiate, 3–5 in lax terminal corymb; peduncles 5–15 mm, sparsely fulvous puberulent; bracteoles 2 or 3, linear. Involucres campanulate or hemispheric, 6–8 × 6–10 mm, calyculate; bracts of calyculus 8–10, linear, 3–6 mm, apically acute, dark at apex and on upper margins; phyllaries 15–18, linear-lanceolate, 6–8 × 1–1.5 mm, herbaceous, sparsely fulvous puberulent, blackish brown at apex and on margins, apically acuminate. Ray florets ca. 8; corolla tube ca. 3 mm; lamina yellow, oblong, 9–10 × ca. 2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 8 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.3 mm, apically acute, papillose. Anthers ca. 2.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather short, basally slightly dilated. Style branches ca. 1.2 mm. Achenes cylindric, ca. 2 mm, glabrous. Pappus white, ca. 6 mm. Fl. Aug.

• Alpine meadows; ca. 4400 m. Sichuan (Songpan).

34. Senecio actinotus Handel-Mazzetti, Symb. Sin. 7: 1121. 1936.

湖南千里光 hu nan qian li guang

Senecio actinotus f. *simplicifolius* Y. Ling.

Herbs, perennial, rather robust, rhizomatous. Stem solitary, erect, to 100 cm tall, simple or branching into synflorescences in upper part, obscurely pubescent, glabrescent to glabrous. Basal and lower stem leaves usually present at anthesis, long petiolate; petiole to 19 cm, basally gradually expanded and somewhat sheathing but not auriculate; blade triangular, 13–15 × 10–12 cm, papery, glabrous, pinnately veined, base deeply cordate, margin coarsely obtusely triangular-dentate, apex shortly obtuse-acuminate. Median stem leaves similar, to 18 cm; petiole 12–13 cm, basally auriculate; auricle orbicular or reniform; blade 1.5–4 cm in diam., base semiamplexicaul, margin coarsely dentate. Upper leaves shortly petiolate or sessile, elliptic, ovate, or lanceolate, auriculate, pinnately lobed with a large triangular-lanceolate, attenuate, cuneate terminal lobe and 2–4 spreading, oblong-lanceolate lateral lobes. Uppermost leaves sessile, lanceolate, basally auriculate, margin subentire. Capitula radiate, very numerous, arranged in an abundant, spreading terminal compound corymb, branches and peduncles pubescent; peduncles ca. 3 mm, slender, usually bracteate at base, 2- or 3-bracteolate, bracts and bracteoles linear. Involucres narrowly campanulate, 4–5 × ca. 2 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate; phyllaries 6–8, linear, ca. 4 × 1–1.5 mm, herbaceous, sparsely puberulent or subglabrous, margin narrowly scarious, apically obtuse. Ray florets 3; corolla tube 2.5–3 mm; lamina yellow, oblong, ca. 4 × 1.3 mm, 3- or 4-veined, apically 3-denticulate. Disk florets 7–9; corolla yellow, 5–5.5 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse-auriculate, appendages ovate; antheropodia small, basally slightly dilated. Style branches ca. 0.8 mm.

Achenes cylindric, ca. 2 mm, glabrous. Pappus white, ca. 4 mm. Fl. Jun.

• Montane thickets, moors; 1200–1300 m. Guangxi (Lucheng), Hunan (Wugang).

35. Senecio biligulatus W. W. Smith, J. Proc. Asiat. Soc. Bengal 7: 69. 1911.

双舌千里光 shuang she qian li guang

Senecio gyirongensis Y. L. Chen & K. Y. Pan; *S. ramsbottomii* Handel-Mazzetti.

Herbs, perennial, rhizomatous. Stem solitary, erect, 60–90 cm tall, flexuous, fulvous pubescent or glabrous. Basal leaves withered by anthesis; lower and median stem leaf petiole ± interruptedly winged in upper part, basally continuously and gradually more broadly winged, auriculate; auricle subamplexicaul, dentate; blade abaxially often purple, triangular or triangular-lanceolate, 7–12 × 2–5 cm, abaxially puberulent mostly on veins or glabrous, adaxially obscurely scattered pubescent, pinnately veined, veins rather prominent abaxially, base cordate to sagittate or subhastate and sometimes lyrately 2–4-lobed, margin irregularly coarsely dentate, apex acuminate. Upper leaves sessile, gradually smaller upward, triangular-lanceolate to linear-lanceolate, 5–10 × 1–2 cm, base cuneate, margin often lyrate-pinnatifid, confluent with auricle at base, apex acuminate-attenuate. Capitula small, radiate, numerous, arranged in dense terminal compound corymbs; peduncles very short, 1–2 mm, fulvous pubescent, minutely 1- or 2-bracteolate. Involucres cylindric, ca. 5 × 1 mm, calyculate; bracts of calyculus 5–7, minute, linear-subulate, black at apex; phyllaries 5 or 6, linear, ca. 3 mm, herbaceous, sparsely puberulent, margin narrowly scarious, apically obtuse and black. Ray florets 2; corolla tube ca. 2 mm; lamina yellow, ca. 4 × 1 mm, apically 3-denticulate. Disk florets 2 or 3; corolla yellow, ca. 6 mm, with ca. 2.3 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.2 mm, apically acute. Anthers ca. 1.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather short, slender, basally slightly dilated. Style branches ca. 0.7 mm. Achenes cylindric, ca. 1 mm, sparsely puberulent. Fl. Jun–Sep.

Open places; 3000–3900 m. Xizang [Bhutan, India (Sikkim), Myanmar, Nepal].

36. Senecio faberi Hemsley, J. Linn. Soc., Bot. 23: 452. 1888.

峨眉千里光 e mei qian li guang

Senecio kaschkarowii C. Winkler.

Herbs, perennial, robust, rhizomatous. Stem solitary, erect, 80–150 cm tall, stout, fistulose, simple or branching into synflorescence above, sparsely pubescent when young, glabrescent. Basal leaves mostly withered by anthesis, long petiolate; petiole gradually expanded and somewhat sheathing but not auriculate at base; blade ovate, margin lyrate-pinnate with large irregularly coarsely dentate or lobulate terminal lobe and 2–4 small basal lobes. Lower and median stem leaf petioles 8–10 cm, ± winged, basally rounded-auriculate and subamplexicaul; blade lyrate-pinnatifid, to 40 cm, submembranous, abaxially sparsely pubescent on main veins, adaxially glabrous, with large ovate-triangular, to 18 × 13–15 cm, acuminate, irregularly coarsely dentate, hastate to truncate terminal lobe and 2–4 smaller, unequal, oblong-lanceolate, acuminate, dentate lateral lobes. Upper leaves smaller, sessile; blade ovate-lanceolate to oblong, 10–25 × 5–12 cm, blade confluent into prominent rounded semiamplexicaul dentate auricle, margin irregularly coarsely dentate and pinnately narrowly lacerate-lobulate, apex acuminate. Uppermost leaves linear-lanceolate to linear, apically acuminate-attenuate. Capitula radiate, very numerous, arranged in abundant terminal compound corymbs; peduncles 3–10 mm, slender, pubescent, usually linear-bracteate at base; bracteoles 2 or 3, linear-subulate. Involucres narrowly campanulate, 3–5 × 1.5–2 mm, calyculate; bracts of calyculus 3 or 4, linear; phyllaries 8, linear, 3–4 × ca. 1 mm, herbaceous, glabrous, margin narrowly scarious, apically obtuse, purplish and minutely fimbriate. Ray florets 3 or 4; corolla tube ca. 2.5 mm; lamina yellow, linear, ca. 4.5 × 1 mm, 3- or 4-veined, 2- or 3-denticulate. Disk florets 6–9; corolla yellow, ca. 5.5 mm, with ca. 2.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 1.6 mm, basally obtuse-auriculate, appendages ovate-oblong; antheropodia rather short, slender, basally slightly dilated. Style branches ca. 1 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus white, ca. 4 mm. Fl. Jun–Aug.

• Forests, thickets, grassy slopes, shaded wet places; 900–2700 m. Guizhou, Shaanxi, Sichuan.

37. Senecio filifer Franchet, J. Bot. (Morot) 10: 416. 1896 [*"filiferus"*].

匐枝千里光 fu zhi qian li guang

Senecio filifer var. *dilatatus* Handel-Mazzetti.

Herbs, perennial, stoloniferous, rhizomatous. Stolons slender, with long internodes, leafy or usually leaves reduced to small scales. Stem solitary, erect, 60–100 cm tall, simple, laxly pubescent and sometimes also thinly arachnoid-tomentose when young, glabrescent. Basal leaves mostly present at anthesis; petiole 3–6 cm, often ± winged in upper part, basally expanded but not auriculate; blade pandurate or usually ± lyrate, 12–18 × 3.5–6 cm, papery, glabrous, with large oblong-lanceolate, obtuse or subacute, unequally dentate or sinuate-dentate terminal lobe and 2–6 much smaller ovate-triangular to oblong lateral lobes. Median stem leaves with broadly winged petioles or sessile, oblong-lanceolate, blade ± confluent into rounded, dentate, amplexicaul auricle at base, margin coarsely dentate, sometimes ± lyrate-pinnatifid in lower part, apex obtuse. Upper leaves sessile, gradually smaller upward, lanceolate or linear-lanceolate, base rounded-auriculate, apex acuminate. Uppermost leaves narrower, apically attenuate or caudate. Capitula numerous, arranged in terminal simple or compound ± subumbelliform corymbs; peduncles 5–10 mm, slender, sparsely puberulent, mostly basally bracteate, bracteoles 2 or 3, linear-subulate. Involucres narrowly campanulate, 4–5 × 2–3 mm, calyculate, bracts of calyculus 3–5, subulate; phyllaries 13, linear, 4–5 × ca. 1 mm, herbaceous, sparsely puberulent, glabrescent, margin broadly scarious, apically obtuse, purplish and puberulent. Ray florets 5; corolla tube ca. 3.5 mm, apically sparsely puberulent; lamina yellow, oblong, 4–4.5 × ca. 1.5 mm, 4-veined, apically 3-den-

ticulate. Disk florets 11–13; corolla yellow, ca. 4.5 mm, with ca. 2 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute. Anthers ca. 1.7 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather small, slightly dilated in lower half. Style branches ca. 0.5 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 6 mm. Fl. May–Aug.

• Wet places in mixed woods, thicket margins, grassy slopes; 700–3700 m. ?Guizhou, SW Sichuan, Yunnan.

38. Senecio pteridophyllus Franchet, J. Bot. (Morot) 8: 364. 1894.

蕨叶千里光 jue ye qian li guang

Herbs, perennial, rhizomatous. Stem solitary, erect, 70–90 cm tall, simple, strongly crisped-pubescent near base, ± glabrescent above. Basal and lower stem leaves sometimes withered by anthesis, more often present; petiole crisped-pubescent, base expanded but not auriculate; blade oblanceolate-oblong or narrowly so, 12–35 × 4–8 cm, lyrate-pinnately narrowly many lobed. Median stem leaves sessile, thinly papery, abaxially pubescent on main veins, adaxially shortly adpressed pubescent to glabrous, pinnately lobed, with small terminal lobe and 30–40 spreading or slightly ascending, oblong-lanceolate or lanceolate, acute-acuminate, irregularly sharply dentate or lacerate-lobulate lateral lobes, basally often auriculate; auricle broad, deeply incised, amplexicaul, sometimes absent. Upper leaves smaller, with narrow, linear-lanceolate or linear, entire or few-dentate lobes. Capitula radiate, numerous, arranged in terminal compound corymbs; peduncles 3–8 mm, slender, fulvous pubescent, linear-bracteate, with 2 or 3 linear bracteoles. Involucres narrowly campanulate, 3–4 × ca. 2 mm, calyculate; bracts of calyculus 5 or 6, 2–3 mm; phyllaries ca. 13, linear, ca. 4 × 0.5 mm, herbaceous, finely scattered pubescent, margin narrowly scarious, apically obtuse and purplish and puberulent. Ray florets 5; corolla tube ca. 2.5 mm, sparsely puberulent above; lamina yellow, oblong, ca. 4.5 × 1 mm, 4-veined, apically 3-denticulate. Disk florets 11–13; corolla yellow, ca. 4.5 mm, with ca. 2 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.5 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather small, basally slightly dilated. Style branches ca. 0.5 mm. Achenes cylindric, ca. 2 mm, glabrous. Pappus white, ca. 4 mm. Fl. Jul–Oct.

• Wet pastures, meadows; 3000–3800 m. NW Yunnan.

39. Senecio chungtienensis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 397. 1984.

中甸千里光 zhong dian qian li guang

Herbs, perennial, rhizomatous. Stem solitary, erect, 60–80 cm tall, simple, thinly pubescent, glabrescent to glabrous. Basal and lower stem leaves mostly present at anthesis; petiole 2–5 cm, basally dilated but not auriculate; blade oblanceolate-oblong, 6.5–13 × 1.5–2.5 cm, both surfaces sparsely fulvous puberulent, glabrescent to glabrous, pinnatisect or lyrate-pinnatisect, with an indistinct, oblong-lanceolate, shortly obtuse-acuminate, coarsely pinnately dentate terminal lobe and 12–14 oblong or oblong-lanceolate, entire or few-dentate lateral lobes. Median stem leaves sessile, linear-lanceolate or oblong, 4.5–14 × 1–4 cm, otherwise like lower leaves, basally subauriculate or auriculate; auricle semiamplexicaul. Uppermost leaves smaller, linear, bractlike, apically attenuate, margin entire in upper part. Capitula radiate, rather numerous, arranged in a terminal compound corymb; peduncles 7–20 mm, linear-bracteate, with 2–4 linear-subulate, 2–3 mm bracteoles. Involucres campanulate, 5–6 × 2.5–4 mm, calyculate; bracts of calyculus 5; phyllaries ca. 13, linear or linear-lanceolate, ca. 6 × 1–1.5 mm, herbaceous, puberulent, margin broadly scarious, apically subobtuse, purplish and minutely puberulent. Ray florets 7 or 8; corolla tube ca. 4 mm, glabrous; lamina yellow, oblong, ca. 8 × 2.7 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with narrow ca. 3 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally distinctly obtuse-auriculate, appendages ovate-oblong; antheropodia distinctly somewhat dilated toward base. Achenes cylindric, ca. 3 mm, glabrous. Pappus white, ca. 5.5 mm. Fl. Jul.

• Pastures; ca. 3000 m. Yunnan (Zhongdian).

40. Senecio diversipinnus Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 5: 21. 1937.

异羽千里光 yi yu qian li guang

Herbs, perennial, rhizomatous. Stem solitary, erect, 50–100 cm tall, shortly pubescent, simple or branching into synflorescences in upper part. Basal and lower stem leaves present at or sometimes withered by anthesis; petiole expanded but not auriculate at base; blade oblanceolate-spatulate, to 30 × 10 cm, papery, abaxially sparsely arachnoid or pubescent, adaxially sparsely adpressed pubescent to subglabrous, lyrate-pinnatipartite with large, triangular-hastate, 8–10 × 6–8 cm, acuminate, irregularly dentate, basally truncate or subcuneate terminal lobe and 6–12 oblong to lanceolate, acute-acuminate, irregularly dentate smaller lateral lobes. Median stem leaves similar, shortly petiolate or sessile, basally ± auriculate; auricle to 2 cm wide, rounded, incised or lacerate-dentate. Upper stem leaves gradually smaller upward, sessile, with narrower lobes and attenuate terminal lobe, laxly dentate or subentire. Capitula radiate or discoid, numerous, arranged in compound terminal corymbs; synflorescence branches and peduncles fulvous puberulent, peduncles 5–15 mm, slender, linear-bracteate at base; bracteoles 1–3, linear-subulate, 2–3 mm, puberulent. Involucres narrowly campanulate, 5–6 × 2–3 mm, calyculate; bracts of calyculus 3–5, linear; phyllaries 8 or 9, linear-lanceolate, ca. 1 mm, apically acute, purplish and puberulent to glabrous. Ray florets absent or 5; corolla tube ca. 3.5 mm, glabrous; lamina oblong, 6–8 × 1–1.5 mm, 3-denticulate. Disk florets 12–15; corolla yellow, 7–7.5 mm, with ca. 3.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 2.2 mm, basally distinctly subacutely auriculate, appendages ovate-lanceolate; antheropodia short, basally distinctly dilated. Style branches ca. 1.2 mm. Achenes cylindric, 3.5–4.5 mm, pubescent. Pappus white, 6–7 mm. Fl. Jun–Aug, fr. Sep–Oct.

• Open grassy and rocky slopes, scrub; 1900–3800 m. Gansu, Qinghai, Sichuan.

1a. Capitula radiate; fl. Jun–Aug ..... 40a. var. *diversipinnus*
1b. Capitula discoid; fl. Jul–Aug ..... 40b. var. *discoideus*

40a. Senecio diversipinnus var. **diversipinnus**

异羽千里光(原变种) yi yu qian li guang (yuan bian zhong)

Capitula radiate. Fl. Jun–Aug.

• Open grassy and rocky slopes; 1900–3800 m. Gansu, Qinghai, Sichuan.

40b. Senecio diversipinnus var. **discoideus** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 400. 1984.

无舌异羽千里光 wu she yi yu qian li guang

Capitula discoid. Fl. Jul–Aug.

• Grassy slopes, scrub; 2900–3200 m. Sichuan (Dajin Chuan, Heishui).

11. Senecio ser. **Subscaposi** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 400. 1984.

葶状千里光系 ting zhuang qian li guang xi

Herbs, perennial, erect, subscapigerous. Leaves mostly basal, unlobed, elliptic to oblanceolate-spatulate. Capitula radiate, erect, few to numerous, arranged in terminal corymbs. Phyllaries 10–13, herbaceous. Ray florets 6–8. Disk florets many. Antheropodia rather small, basally slightly dilated. Achenes pubescent or sometimes glabrous.

Two species: N Bangladesh, China, NE India, Myanmar, NE Thailand; two species (one endemic) in China.

41. Senecio spathiphyllus Franchet, J. Bot. (Morot) 10: 416. 1896.

匙叶千里光 shi ye qian li guang

Ligularia yui S. W. Liu.

Herbs, perennial, subscapigerous, rhizomatous. Stem solitary, erect, 25–60 cm tall, subscapiform, simple, glabrous. Basal and lowermost stem leaves present at anthesis, rosulate, petiolate; blade elliptic, oblanceolate, or spatulate, to 19 × 1.5 cm, glabrous, obscurely pinnately veined, base cuneate or attenuate into petiole, margin shallowly sinuate-denticulate, apex obtuse. Median and upper stem leaves few, remote, sessile; blade oblanceolate-linear, linear-lanceolate, or linear, 3–7 × 0.4–1 cm, base ± dilated and subamplexicaul, margin callose-denticulate, apex obtusely to acutely ± acuminate; uppermost leaves bractiform. Capitula radiate, 3–10 in a terminal subumbelliform corymb; peduncles 5–15 mm, slender, sparsely pubescent, linear-bracteate, with 3–5 linear-subulate bracteoles. Involucres campanulate-cylindric, 6–7 × 3.5–4 mm, calyculate; bracts of calyculus 7 or 8, linear-subulate, ca. 2 mm, sparsely puberulent, dark at apex; phyllaries ca. 13, oblong-lanceolate, 1–1.5 mm wide, herbaceous, ± glabrous, margin broadly scarious, apically acute, dark and shortly bearded. Ray florets 6–8; corolla tube ca. 3 mm; lamina yellow, oblong, ca. 6 × 2 mm, 4-veined, apically deeply 3-denticulate. Disk florets many; corolla yellow, ca. 7 mm, with ca. 4 mm tube and funnelform limb; lobes ovate-oblong, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather slender, basally slightly dilated. Style branches ca. 0.7 mm. Achenes cylindric, ca. 3 mm, pubescent or glabrous. Fl. May–Aug.

• Wet meadows, grassy slopes; 1500–3000 m. Sichuan (Muli), NW Yunnan.

42. Senecio obtusatus Wallich ex Candolle, Prodr. 6: 367. 1838.

钝叶千里光 dun ye qian li guang

Senecio khasianus N. P. Balakrishnan, nom. illeg. superfl.

Herbs, perennial, subscapigerous, rhizomatous. Stems usually solitary, erect, 30–60 cm tall, slender, simple or branching into synflorescence, pubescent especially near base or ± glabrous, subscapiform. Basal leaves present at anthesis, rosulate, shortly petiolate; petiole obscure, winged, basally expanded but not auriculate; blade elliptic or oblanceolate-elliptic, 5–21 × 2–5 cm, thickly papery, both surfaces sparsely pubescent to glabrous, pinnately veined, lateral veins 14–18, base cuneate or broadly attenuate into winged petiole, margin acutely shallowly sinuate-denticulate, apex obtuse. Median stem leaves few, sessile, oblong to linear, base expanded and subamplexicaul, margin denticulate, apex obtuse; uppermost leaves linear, bractiform. Capitula radiate, few to many in a rather lax terminal corymb or compound corymb, branches slender; peduncles 5–20 mm, slender, sparsely pubescent, linear-bracteate, with 2 or 3 linear bracteoles. Involucres narrowly campanulate, 3–4 × 2–4 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate; phyllaries 10–13, oblong, ca. 1 mm wide, herbaceous, sparsely puberulent, margin broadly scarious, apically acute, dark and shortly bearded. Ray florets ca. 8; corolla tube ca. 3 mm; lamina yellow, oblong or elliptic-oblong, ca. 6.5 × 2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets ca. 25; corolla yellow, ca. 5 mm, with ca. 3 mm tube and fun-nelform limb; lobes ovate-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 1.6 mm, basally distinctly subacutely auriculate, appendages ovate-lanceolate; antheropodia rather small, basally slightly dilated. Style branches ca. 0.8 mm. Achenes cylindric, ca. 4 mm, pubescent. Fl. Apr–Jun.

Both dry and wet meadows and pastures; 1500–3300 m. Guizhou, Sichuan, Yunnan [N Bangladesh, NE India, Myanmar, NE Thailand].

The apparent earlier homonym, "*Senecio obtusatus* Pursh" (Fl. Amer. Sept. 2: 530. 1813) was merely cited as a synonym and was therefore not validly published (*Vienna Code*, Art. 34.1(c)). The replacement name *Senecio khasianus* was therefore nomenclaturally superfluous when published and is consequently illegitimate (Art. 52.1).

12. Senecio ser. **Erucifolii** (Rouy) Schischkin in Schischkin & Bobrov, Fl. URSS 26: 710. 1961.

菊叶千里光系 ju ye qian li guang xi

Senecio subsect. *Erucifolii* Rouy, Fl. France 8: 333. 1903; *Jacobaea* Miller.

Herbs, perennial, erect, with ± arachnoid-pubescent usually leafy stems, rarely subscapigerous. Basal leaves lyrate-pinnately divided, stem leaves pinnately divided. Capitula radiate, erect, medium-sized, several to numerous. Phyllaries 10–22, herbaceous, apically acute-acuminate. Ray florets 10–21. Disk florets many. Antheropodia distinctly to markedly dilated toward base. Achenes all glabrous or all pubescent or ray achenes glabrous and pappus sometimes absent in ray florets, rarely absent in all florets.

About 40 species: mainly temperate and montane Asia and Europe; nine species (one endemic) in China.

One of us (Nordenstam) treats the species of this series within the genus *Jacobaea*.

43. Senecio multibracteolatus C. Jeffrey & Y. L. Chen, Kew Bull. 39: 402. 1984.

多苞千里光 duo bao qian li guang

Jacobaea multibracteolata (C. Jeffrey & Y. L. Chen) B. Nordenstam.

Herbs, perennial, rhizomatous. Stem solitary, erect, to 60 cm tall, sparsely arachnoid, simple. Basal and often also lower stem leaves withered and shed by anthesis; lower and median stem leaves ± sessile; blade obovate-oblong, elliptic-oblong, or ovate-oblong, 6–13 × 2.5–4 cm, thickly papery, abaxially arachnoid, adaxially sparsely arachnoid, glabrescent to glabrous, base ± expanded and lobulate-auriculate, lyrate-pinnatifid or pinnatifid with ovate-oblong or oblong, obtuse or subacute, irregularly dentate or pinnately lobulate terminal lobe and 14–18 oblong or oblong-lanceolate, irregularly dentate or lacerate lateral lobes. Upper leaves similar but smaller, thickly papery; uppermost leaves reduced, bractiform. Capitula radiate, numerous, arranged in terminal corymbs; peduncles 1–3.5 cm, white arachnoid-tomentose, with 2 or 3 linear-subulate bracteoles. Involucres campanulate, ca. 6 × 6–8 mm, calyculate; bracts of calyculus 10–17, linear-subulate, acute, 3–4 mm, apex dark; phyllaries 18–20, linear-lanceolate, 1–1.5 mm wide, herbaceous, thinly arachnoid, glabrescent, margins scarious, gradually acute, apex dark brown, puberulent. Ray florets 10–13; corolla tube ca. 4 mm, slender; lamina yellow, oblong-elliptic, 9–12 × ca. 2.5 mm, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2.3 mm glabrous tube and funnelform limb; lobes ovate-triangular, ca. 0.8 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather elongated, basally somewhat expanded. Style branches ca. 0.8 mm. Achenes cylindric, 2.5–3 mm, glabrous. Pappus white, ca. 6 mm, present in all florets. Fl. Nov.

• Forest margins; 2700–2800 m. Sichuan (Daocheng, Muli), Yunnan (Lijiang).

44. Senecio analogus Candolle, Prodr. 6: 366. 1838.

菊状千里光 ju zhuang qian li guang

Jacobaea analoga (Candolle) Veldkamp; *Senecio chrysanthemoides* Candolle (1838), not Schrank (1789); *S. chrysanthemoides* var. *eustegius* Handel-Mazzetti; *S. chrysanthemoides* var. *khasianus* (C. B. Clarke) J. D. Hooker; *S. chrysanthemoides* var. *sisymbriiformis* (Candolle) J. D. Hooker; *S. chrysanthemoides* var. *spectabilis* (Wallich ex Candolle) J. D. Hooker; *S. laetus* Edgeworth; *S. laetus* var. *analogus* (Candolle) R. Mathur ex Karthikeyan & Moorthy; *S. laetus* var. *sisymbriiformis* (Candolle) Aswal; *S. laetus* var. *spectabilis* (Wallich ex Candolle) R. Mathur ex Karthikeyan & Moorthy; *S. pallens* Wallich ex Candolle var. *khasianus* C. B. Clarke; *S. scapiformis* Y. L. Chen & K. Y. Pan; *S. sisymbriiformis* Candolle; *S. spectabilis* Wallich ex Candolle.

Herbs, perennial, rhizomatous, with leafy stems, rarely subscapigerous. Stem solitary, erect, 40–80 cm tall, simple or branching into synflorescence, sparsely arachnoid, glabrescent. Basal leaves sometimes present at or sometimes withered and shriveled or shed by anthesis; basal and lowest stem leaves petiolate; petiole to 10 cm; blade ovate-elliptic or ovate-lanceolate to oblanceolate, 8–10(–20) × 3–7 cm, papery, abaxially sparsely arachnoid and ± glabrescent, adaxially glabrescent to glabrous, pinnately veined, lateral veins 16–18, base expanded, weakly cordate to cuneate or attenuate, margin dentate, apex obtuse, unlobed or lyrate-pinnately lobed with 2–8 basal lateral lobes decreasing in size toward base of leaf. Median stem leaves oblong or oblanceolate-oblong, 5–22 × 2–7 cm, base auriculate; auricle dentate or lobulate, subamplexicaul, lyrate-pinnatifid or pinnatifid, very variable in dissection, with large to small, ovate to oblong-lanceolate, dentate or lobulate terminal lobe and 10–16 oblong to narrowly oblong-lanceolate, entire or usually irregularly serrate-dentate or lobulate spreading or somewhat ascending lateral lobes. Upper leaves smaller, oblong-lanceolate to oblong-linear, margin coarsely pinnate-dentate. Capitula radiate, numerous, arranged in terminal corymbs or compound corymbs; peduncles 5–25 mm, ± arachnoid-tomentose or fulvous puberulent, ± glabrescent, linear-bracteate, with 2 or 3 linear-subulate bracteoles. Involucres campanulate, 3–4 × 3–4 mm, calyculate; bracts of calyculus 8–10, linear-subulate, 2–3 mm; phyllaries 10–13, oblong-lanceolate, herbaceous, fulvous puberulent toward base, margin broadly scarious, apically acute or acuminate, brownish black and pubescent. Ray florets 10–13; corolla tube ca. 2.5 mm; lamina yellow, oblong, ca. 6.5 × 2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 5–5.5 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 0.8 mm, apically acute. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia slightly elongated, basally somewhat dilated. Style branches ca. 1 mm. Achenes cylindric, 2–2.5 mm, all or disk achenes sparsely pubescent, sometimes ray achenes or rarely all achenes glabrous. Pappus dirty white, straw-colored, or rarely rufous, ca. 4 mm, present in all achenes or sometimes scant or absent in ray achenes, those in ray achenes deciduous. Fl. Apr.

Forests, forest and thicket margins, open grassy places, field margins, roadsides; 1100–3800 m. Guizhou, Hubei, Sichuan, Xizang, Yunnan [Bhutan, NE and NW India, Nepal, NW Pakistan].

45. Senecio tibeticus J. D. Hooker, Fl. Brit. India 3: 340. 1881.

西藏千里光 xi zang qian li guang

Jacobaea tibetica (J. D. Hooker) B. Nordenstam.

Herbs, perennial, rhizomatous. Stems solitary or sometimes 2 or 3, erect, 13–40 cm tall, simple, white arachnoid-to-

mentose, glabrescent. Basal leaves present at anthesis, long petiolate; blade oblanceolate, 8–10 × 1–1.5 cm, abaxially white tomentose, adaxially sparsely arachnoid, lyrate-pinnatifid, with large ovate-lanceolate, obtuse, irregularly dentate terminal lobe and several short, irregularly incised lateral lobes. Median stem leaves sessile, narrowly oblong-lanceolate, pinnatifid, basally auriculate and subamplexicaul. Upper leaves smaller, linear-lanceolate to linear, apically acuminate. Capitula radiate, 2–6 in a lax terminal corymb, long pedunculate; peduncles 2–7 cm, stout, sparsely to densely arachnoid-tomentose, basally bracteate, with 2 or 3 linear-subulate bracteoles. Involucres campanulate, ca. 8 × 6–8 mm, calyculate; bracts of calyculus 6–8, subulate, 1/3–1/2 as long as involucre; phyllaries ca. 20, linear-lanceolate, ca. 1.5 mm, herbaceous, densely tomentose, 3-veined, margin broadly scarious, apically acuminate and pubescent. Ray florets 16–21; corolla tube ca. 4 mm; lamina yellow, oblong, 10–11 × ca. 2.5 mm, 4- or 5-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 8 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-triangular, ca. 1 mm, apically acute, papillose. Anthers ca. 2.7 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia robust, basally distinctly dilated. Style branches ca. 1 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus white, ca. 7 mm, present on all achenes. Fl. Jul–Sep.

Alpine meadows; 3000–3900 m. ?SW Xinjiang [Pakistan].

This taxon has not yet been recorded for China but may well occur in SW Xinjiang (Karakorum Shan).

46. Senecio raphanifolius Wallich ex Candolle, Prodr. 6: 366. 1838.

莱菔千里光 lai fu qian li guang

Jacobaea raphanifolia (Wallich ex Candolle) B. Nordenstam; *Senecio diversifolius* Wallich ex Candolle (1838), not Dumortier (1827).

Herbs, perennial, rhizomatous, with leafy stems. Stems solitary or sometimes 2 or 3, erect, 60–150 cm tall, simple or branching into synflorescence, sparsely arachnoid, glabrescent. Basal leaves sometimes present at but usually withered and shriveled or shed by anthesis; basal and lowest stem leaves long petiolate; petiole 5–8 cm, base expanded; blade oblanceolate, 15–30 × 2–5 cm, papery, abaxially sparsely arachnoid or glabrous, adaxially glabrous, lyrate-pinnatifid with a large, oblong or elliptic-oblong, incised-dentate or lobulate terminal lobe and 12–16 smaller, oblong, incised-dentate lateral lobes smaller toward base of leaf. Median stem leaves sessile; blade oblong, 10–15 × 2.5–4 cm, base auriculate; auricle broad, dentate or lacerate, subamplexicaul; blade pinnatifid or subpinnatisect with somewhat indistinct ovate-oblong terminal lobe and 10–16 oblong, sharply dentate or lacerate-lobulate, spreading or somewhat ascending lateral lobes. Upper leaves smaller, oblong to oblong-lanceolate, pinnately dentate or lobulate. Capitula radiate, numerous, arranged in terminal corymbs or compound corymbs; peduncles 1–3 cm, rather stout, at first sparsely arachnoid, fulvous puberulent, ± glabrescent, with usually 2 or 3 linear bracteoles. Involucres broadly campanulate or hemispheric, 5–7 × 4–10 mm, calyculate; bracts of calyculus 8–10, linear-subulate, ca. 3 mm; phyllaries 12–16, oblong, 1.5–2 mm, herbaceous, fulvous puberulent in lower part, ± glabrescent, margin narrowly scarious, apically acuminate, acute, blackish brown and pubescent. Ray florets 12–16; corolla tube ca. 3 mm; lamina yellow, oblong, ca. 8 × 2–3 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 5 mm, with ca. 2 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1 mm, apically acute, papillose. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather elongated, basally markedly dilated. Style branches ca. 0.8 mm. Achenes cylindric, ca. 3 mm, glabrous. Pappus reddish brown, 4–5 mm, present in disk florets, scant and soon deciduous or absent in ray florets. Fl. Jul–Sep.

Montane forests, meadows, grassy slopes, riverbanks; 2700–4400 m. Xizang [Bhutan, NE India, N Myanmar, Nepal].

47. Senecio echaetus Y. L. Chen & K. Y. Pan, Acta Phytotax. Sin. 19: 94. 1981.

裸缨千里光 luo ying qian li guang

Jacobaea echaeta (Y. L. Chen & K. Y. Pan) B. Nordenstam.

Herbs, perennial, rhizomatous, with leafy stems. Stem solitary, erect, 30–60 cm tall, simple or branching into synflorescence, arachnoid, glabrescent. Basal leaves withered by anthesis, petiolate; lower and median stem leaves sessile; blade oblong-lanceolate, 4.5–8 × 1.5–5 cm, papery, abaxially sparsely finely pubescent on main veins, adaxially glabrous, pinnatifid or subpinnatisect with small, rather indistinct terminal lobe and 18–20 oblong, 2–2.5 × 0.5–1 cm, acutely dentate or lacerate-lobulate, spreading or somewhat ascending lateral lobes; base auriculate; auricle dentate or lacerate, subamplexicaul. Upper leaves smaller, oblong-lanceolate to lanceolate, pinnately lobulate. Capitula radiate, 3–10 in terminal and upper axillary corymbs; peduncles 10–15 mm, arachnoid, with 1 or 2 linear bracteoles. Involucres campanulate or hemispheric, 5–6 × 6–8 mm, calyculate; bracts of calyculus 6–8, linear, 3–4 mm, apically acuminate, purplish; phyllaries 20–22, lanceolate, 4–5 × 1–1.5 mm, herbaceous, sparsely arachnoid-pubescent at base, 3-veined, apically acuminate or acute, dark margined and white bearded. Ray florets 16–18; corolla tube ca. 2.5 mm; lamina yellow, elliptic-oblong, 9–10 × ca. 3 mm, 8-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 5 mm, with 1–1.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2 mm, basally acutely long auriculate, appendages ovate-lanceolate; antheropodia rather short, basally distinctly dilated. Style branches ca. 0.7 mm. Achenes cylindric, ca. 1.7 mm, glabrous. Pappus absent from all florets. Fl. Jul.

Tsuga forests; ca. 2700 m. S Xizang (Gyirong) [Nepal].

48. Senecio nudicaulis Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 178. 1825.

裸茎千里光 luo jing qian li guang

Jacobaea nudicaulis (Buchanan-Hamilton ex D. Don) B. Nordenstam; *Senecio blattariifolius* Franchet; *S. esquirolii* H. Léveillé; *S. pallens* Wallich ex Candolle; *S. rosulifer* H. Léveillé & Vaniot; *S. yunnanensis* Franchet (1894), not Franchet (1893).

Herbs, perennial, ± subscapigerous, rhizomatous. Stems solitary or 2 or 3-fasciculate, erect, 30–70 cm tall, simple. Basal leaves rosulate, sessile, oblong-obovate, 3–18 × 1–6 cm, abaxially sparsely arachnoid, glabrescent to glabrous and sometimes purplish, pinnately veined, lateral veins 10–14, midvein and main veins rather prominent abaxially, attenuate to base, margin subentire or crenate-serrate, apically obtuse or rounded. Stem leaves few, usually 3–5, sessile; blade oblong or oblanceolate-oblong, 2–4 × 0.5–1.5 cm, base expanded, auriculate and subamplexicaul, margin crenate-dentate to lobulate, apex obtuse. Capitula radiate, few to many in terminal compound corymbs; peduncles 1–2.5 cm, sparsely arachnoid or puberulent, bracteate, with 1–3 linear bracteoles. Involucres broadly campanulate, 5–6 × 3–6 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate, 2–3 mm, herbaceous, sparsely arachnoid or subglabrous, 3-veined, margin broadly scarious, apically acute and puberulent. Ray florets 13; corolla tube ca. 4 mm; lamina yellow, oblong, ca. 10 × 2–2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 0.8 mm, apically acute. Anthers ca. 1.8 mm, basally obtusely to subacutely auriculate, appendages ovate-oblong; antheropodia rather short, basally distinctly dilated. Achenes cylindric, ca. 2 mm, pubescent. Pappus whitish, ca. 5 mm. Fl. Mar–Apr.

Forests, grassy slopes; 1500–1900 m. Guizhou, Sichuan, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan].

49. Senecio ambraceus Turczaninow ex Candolle, Prodr. 6: 348. 1838.

琥珀千里光 hu po qian li guang

Jacobaea ambracea (Turczaninow ex Candolle) B. Nordenstam; *Senecio ambraceus* var. *glaber* Kitamura; *S. manshuricus* Kitamura.

Herbs, perennial, rhizomatous. Stem solitary, erect, 45–100 cm tall, sparsely arachnoid-pubescent or subglabrous, simple, branching into synflorescence. Basal leaves mostly withered by anthesis, petiolate; blade obovate, margin serrate-dentate, usually lyrate-pinnately lobulate in lower part, apex obtuse. Lower stem leaves petiolate; blade obovate-oblong, 6–12 × to 4 cm, papery, abaxially sparsely minutely pubescent or glabrous, adaxially glabrous, apex obtuse, margin deeply pinnatisect, with indistinct terminal lobe and 10–16 oblong, irregularly dentate or lobulate lateral lobes. Median stem leaves sessile, basally usually laciniate-auriculate, deeply pinnatisect or pinnatipartite, with oblong-linear, obtuse to acute, dentate to deeply lobulate spreading or ascending lateral lobes. Upper leaves smaller, pinnately lobed, coarsely dentate, or linear and subentire. Capitula radiate, few to rather numerous, arranged in a usually rather spreading terminal compound corymb; peduncles 1.5–6 cm, erect or ascending, sparsely arachnoid-pubescent, glabrescent, bracteate, with a few linear or linear-subulate, 3–5 mm bracteoles. Involucres broadly campanulate to hemispheric, 7–8 × 6–10 mm, calyculate; bracts of calyculus 2–6, linear; phyllaries 13–15, narrowly oblong, 7–8 × 1–2 mm, herbaceous, glabrous, margin narrowly scarious, apically acuminate and bearded. Ray florets 13 or 14; corolla tube ca. 4.5 mm; lamina oblong, ca. 12 × 3–3.5 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 0.7 mm, apically acute, papillose. Anthers ca. 1.8 mm, basally auriculate, appendages ovate-lanceolate; antheropodia distinctly dilated toward base. Style branches ca. 1 mm. Achenes cylindric, ca. 3 mm, glabrous in ray florets, sparsely pubescent in disk florets, rarely all glabrous. Pappus whitish, ca. 6 mm, present in all florets. Fl. Aug–Sep, fr. Sep–Oct.

Grassy places, forest margins; 500–1400 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong [Korea, Mongolia, Russia (Altai, Far East, E Siberia)].

50. Senecio argunensis Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 20(2): 18. 1847.

额河千里光 e he qian li guang

Jacobaea argunensis (Turczaninow) B. Nordenstam; *Senecio argunensis* f. *angustifolius* Komarov; *S. argunensis* var. *blinii* (H. Léveillé) Handel-Mazzetti; *S. argunensis* f. *latifolius* Komarov; *S. blinii* H. Léveillé; *S. erucifolius* Linnaeus subsp. *argunensis* (Turczaninow) E. Wiebe; *S. jacobaea* Linnaeus var. *grandiflorus* Turczaninow ex Candolle.

Herbs, perennial, rhizomatous. Stem solitary, erect, 30–60(–80) cm tall, arachnoid-pubescent, sometimes ± glabrescent, branching into synflorescence. Basal and lower stem leaves withered and usually shed by anthesis; median stem leaves rather crowded, sessile; blade ovate-oblong to oblong, 6–10 × 3–6 cm, papery, abaxially sparsely arachnoid and ± glabrescent, adaxially glabrous, base narrowly auriculate or laciniate-auriculate, pinnatisect to pinnatipartite with small indistinct terminal lobe and ca. 12 narrowly lanceolate or linear, 1–2.5 × 0.1–0.5 cm, apically obtuse to acute, marginally 1- or 2-dentate or narrowly lobulate or entire somewhat ascending lateral lobes. Upper leaves smaller and apically more attenuate, otherwise similar. Capitula radiate, numerous, arranged in terminal compound corymbs; peduncles 1–2.5 cm, slender, sparsely to densely arachnoid, bracteate, with a few linear-subulate, 3–5 mm, acuminate bracteoles. Involucres subcampanulate, 5–6 × 6–7 mm, calyculate; bracts of calyculus ca. 10, linear, 3–5 mm; phyllaries ca. 13, green or sometimes purplish, oblong-lanceolate, 1–1.5 mm, herbaceous, sparsely arachnoid, margin broadly scarious, apically acuminate or acute and shortly bearded. Ray florets 10–13; corolla tube ca. 4 mm; lamina yellow, oblong-linear, 8–9 × 2–3 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with 2–2.5 mm tube and funnelform limb; lobes ovate-oblong, ca. 0.7 mm, apically acute. Anthers ca. 2 mm, basally distinctly subacutely auriculate, appendages ovate-lanceolate; antheropodia rather stout, basally dilated. Style branches ca. 0.7 mm. Achenes cylindric, ca. 2.5 mm, glabrous. Pappus whitish, ca. 5.5 mm. Fl. Aug–Oct.

Montane meadows, grassy slopes; 500–3300 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan [Japan, Korea, Mongolia, Russia (Far East, SE Siberia)].

51. Senecio jacobaea Linnaeus, Sp. Pl. 2: 870. 1753.

新疆千里光 xin jiang qian li guang

Jacobaea vulgaris Gaertner; *Senecio foliosus* Candolle; *S. jacobaea* subsp. *nudus* (Weston) Soják; *S. jacobaea* var. *nudus* Weston; *S. jacobaeoides* Willkomm.

Herbs, biennial, rhizomatous. Stems solitary or 2- or 3-fasciculate, erect, 30–70(–100) cm tall, branching into synflorescence, at first arachnoid, glabrescent to subglabrous. Basal leaves withered and usually shed by anthesis; lower stem leaf petioles 3–4 cm, base expanded; blade oblong-obovate, to 15 × 3–4 cm, papery, abaxially sparsely arachnoid, adaxially glabrous, obtusely dentate or lyrate-pinnatifid, with large terminal lobe and 6–8 smaller, oblong-lanceolate lateral lobes. Median stem leaves rather crowded, sessile, pinnatisect, 8–10 × 1–4 cm, base lacerate-auriculate, with indistinct terminal lobe and linear-lanceolate to linear, obtuse, dentate or subentire somewhat ascending lateral lobes. Upper leaves similar but smaller, with oblong or linear-oblong lateral lobes. Capitula radiate, numerous, arranged in terminal compound corymbs; peduncles 0.5–1.5 cm, sparsely arachnoid, bracteate, with 2 or 3 linear bracteoles. Involucres broadly campanulate or hemispheric, 5–6 × 5–7 mm, calyculate; bracts of calyculus 2–6, linear, 2–3 mm, apically acuminate; phyllaries ca. 13, oblong-lanceolate, ca. 1.5 mm, herbaceous, subglabrous, margin scarious, apically acuminate and puberulent. Ray florets 12–15; corolla tube 2.5–3 mm; lamina yellow, oblong, 8–10 × 2–2.5 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2 mm tube and funnelform limb; lobes triangular-ovate, ca. 0.5 mm. Anthers ca. 2.5 mm, basally distinctly subacutely auriculate, appendages ovate-lanceolate; antheropodia rather short, markedly dilated in lower half. Style branches ca. 1 mm. Achenes cylindric, ca. 2 mm, pubescent in disk florets, longer and glabrous or rarely pubescent in ray florets. Pappus white, ca. 6 mm, persistent in disk florets, readily deciduous in ray florets. Fl. May–Jul. $2n = 40, 80$.

Meadows, lax forests; 500–2000 m. Jiangsu, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia), Tajikistan, Uzbekistan; Europe].

The occurrence of *Senecio jacobaea* in Jiangsu is presumably the result of an introduction; this species was first recorded for this province by Kitamura.

13. Senecio ser. **Asperifolii** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 415. 1984.

糙叶千里光系 cao ye qian li guang xi

Herbs, perennial, erect or semidecumbent, with woody tuberous rhizomes. Leaves sessile, lanceolate, unlobed, abaxially asperulous, basally not auriculate. Capitula radiate, erect, numerous. Phyllaries 13, herbaceous, apically acute-acuminate. Ray florets 12 or 13. Disk florets many. Antheropodia rather stout, basally markedly dilated. Achenes pubescent, all papillose.

• One species: China.

52. Senecio asperifolius Franchet, J. Bot. (Morot) 10: 414. 1896.

糙叶千里光 cao ye qian li guang

Senecio henrici Vaniot; *S. lebrunei* H. Léveillé; *S. luticola* Dunn.

Herbs, perennial, with woody tuberous rhizomes. Stems solitary or 2- or 3-fasciculate, rather woody at base, erect or semidecumbent, 50–90 cm tall, branching, sparsely arachnoid, glabrescent, soon glabrous. Basal and lower leaves withered and shed by anthesis; median stem leaves rather crowded, numerous, sessile; blade lanceolate to linear, abaxially and marginally shortly hispid or asperulous, adaxially sparsely scabrid or glabrous, pinnately veined, lateral veins 12–14, obscure adaxially, base cuneate and not auriculate, margin revolute and obscurely remotely callose-denticulate or subentire, apex acute or apiculate; upper leaves linear, smaller. Capitula radiate, few to numerous, arranged in rather narrow and elongated terminal and upper axillary paniculoid thyrses; peduncles 1–2.5 cm, bracteate, ± arachnoid, with 1–10 linear-subulate bracteoles. Involucres campanulate or shortly turbinate, 7–9 × 4–8 mm, calyculate; bracts of calyculus 6–8, linear-subulate; phyllaries 13, lanceolate, 1–1.5 mm wide, herbaceous, sparsely arachnoid-to-mentose, ± glabrescent, 3-veined, margin broadly scarious, apically acuminate or acute and shortly bearded. Ray florets 12 or 13; corolla tube ca. 4.5 mm; lamina yellow, oblong, 8–9 × ca. 2 mm, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 6 mm, with ca. 2.5 mm tube and funnelform limb; lobes oblong-lanceolate, ca. 1.2 mm, apically acute. Anthers ca. 2.2 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia stout, basally markedly expanded. Style branches ca. 2 mm. Achenes cylindric, 2.5–3 mm, pubescent. Pappus white, 5–6 mm. Fl. Oct–May.

• Dry grassy and rocky slopes; 700–2500 m. Guizhou, Sichuan, Yunnan.

3. Senecio sect. **Madaractis** (Candolle) J. D. Hooker, Fl. Brit. India 3: 342. 1881.

岩生千里光组 yan sheng qian li guang zu

Madaractis Candolle, Prodr. 6: 439. 1838.

Herbs, perennial, erect, rhizomatous, with leafy stems. Leaves pinnately veined. Capitula radiate, erect. Anthers obtuse-auriculate; antheropodia rather slender, basally somewhat dilated. Achene epidermal cells not papillose, cuticle thin; mechanical tissue in 5 somewhat distant tracts, bi-allantoid (shaped like 2 sausages joined) in cross section. Pappus absent from ray florets.

About 12 species: S and SE Asia; one species in China.

One of us (Nordenstam) recognizes the species of this section as the genus *Madaractis*.

53. Senecio wightii (Candolle) Bentham ex C. B. Clarke, Compos. Ind. 197. 1876.

岩生千里光 yan sheng qian li guang

Doronicum wightii Candolle in Wight, Contr. Bot. India, 23. 1834; *Madaractis glabra* Candolle; *Senecio camptodontus* Franchet; *S. gentilianus* Vaniot; *S. saxatilis* Wallich ex Candolle.

Herbs, perennial, with slender rhizomes. Stem solitary, erect or ascending, 60–120 cm tall, simple or branched, glabrous or nearly so, rather slender. Basal leaves withered by anthesis; stem leaves 5–10 × 0.5–1.5 cm; lower leaves elliptic to linear, cuneate or attenuate into a petioloid base; median leaves narrowly oblong or oblong-lanceolate to linear, somewhat attenuate into a slightly expanded subamplexicaul sessile base; all papery, abaxially pubescent on veins to glabrous, adaxially sparsely shortly adpressed pilose to glabrous, pinnately veined, lateral veins 12–14, margin obscurely and remotely to evidently and coarsely acutely callose-dentate or serrate; upper leaves smaller. Capitula radiate, rather few in lax terminal corymbs; peduncles 0.5–2 cm, slender, sparsely pubescent, bracteate, with 2 or 3 linear-subulate, 2–3 mm, acute bracteoles. Involucres hemispheric, 3–4 × 3.5–4 mm, laxly calyculate; bracts of calyculus 3–5, subulate; phyllaries 20–22, green or purplish, oblong-linear, 0.5–1 mm wide, sparsely pubescent or glabrous, strongly 3-veined, apically acuminate and acute. Ray florets 11–13; corolla tube ca. 1 mm, sparsely shortly pilose in distal part; lamina yellow, oblong, 7–8 × ca. 2.2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 3.5 mm, with ca. 1.5 mm tube; lobes ovate-oblong, ca. 0.7 mm, apically acute, papillose. Anthers ca. 1 mm, basally obtuse-auriculate, appendages ovate; antheropodia rather slender, basally moderately dilated. Style branches ca. 0.5 mm. Achenes cylindric, ca. 2 mm, glabrous. Pappus straw-colored, ca. 3 mm, absent in ray florets. Fl. Aug–Nov. $2n = 20$.

Wet places, by streams and ponds, roadsides; 1100–3000 m. Guizhou, Sichuan, Yunnan [Bhutan, India, Myanmar, Thailand].

4. Senecio sect. **Flexicaules** C. Jeffrey & Y. L. Chen, Kew Bull. 39: 417. 1984 [*"Flexicaulis"*].

曲茎千里光组 qu jing qian li guang zu

Herbs, perennial, decumbent or scandent, with woody rhizomes and leafy stems. Leaves deltoid, lanceolate or pinnately or lyrate-pinnately lobed, basally often auriculate. Capitula radiate, ascending. Anthers auriculate or shortly caudate, tails to 0.25 × as long as antheropodia; antheropodia rather elongated, basally slightly expanded. Achene epidermal cells papillose, cuticle thin; mechanical tissue in 5 or 6 distant tracts, bi-allantoid in cross section.

At least five species: E and S Africa, C and S Asia east to Japan and Philippines; four species (three endemic) in China.

One of us (Nordenstam) recognizes this section as generically distinct from *Senecio*.

54. Senecio stauntonii Candolle, Prodr. 6: 363. 1838.

闽粤千里光 min yue qian li guang

Herbs, perennial, weakly erect or subscandent, rhizomatous. Stems erect or weakly ascending, flexuous, usually 30–60 cm tall, branched, angular, glabrous. Basal leaves soon withered; stem leaves numerous, sessile; blade ovate-lanceolate to narrowly oblong-lanceolate, 5–12 × 1–4 cm, leathery, abaxially laxly pilose mainly on veins to glabrous, adaxially scattered pilose to glabrous, pinnately veined, lateral veins 14–18, base auriculate; auricle entire to dentate or shortly lacerate, semiamplexicaul; blade margin revolute and shallowly obscurely to distinctly, rather remotely sinuate-dentate, rarely pinnatisect toward base, apex acute-acuminate or attenuate; upper leaves smaller and relatively narrower, otherwise similar. Capitula radiate, few to rather numerous, arranged in lax terminal corymbs; peduncles 1.5–3.5 cm, glabrous or sparsely puberulent, basally bracteate, with a few linear-subulate bracteoles. Involucres campanulate, ca. 7 × 5–7 mm, calyculate; bracts of calyculus 6–8, linear-subulate, 2–3 mm, puberulent, apically acute; phyllaries 13, linear-lanceolate, 1–1.5 mm wide, herbaceous, glabrous or sparsely puberulent near apex, margin narrowly scarious, acuminate, acute and shortly ciliate on upper margins and apex. Ray florets 8–13; corolla tube ca. 3.5 mm, pubescent near apex; lamina yellow, oblong, ca. 8 × 2.5 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 7 mm, with ca. 3 mm tube and funnelform limb; lobes ovate-lanceolate, ca. 1.2 mm, apically acute, papillose. Anthers ca. 2.3 mm, basally shortly caudate, tails to 0.25 × as long as antheropodia, slender; appendages ovate-oblong; antheropodia rather elongated, slightly dilated in lower half. Style branches ca. 1.2 mm. Achenes cylindric, ca. 3 mm, pubescent. Pappus white, ca. 5.5 mm. Fl. Oct–Nov.

• Thickets, open forests, limestone hills, dry slopes, ravines; ca. 600 m. Guangdong, Guangxi, Hunan.

55. Senecio fukienensis Y. Ling ex C. Jeffrey & Y. L. Chen, Kew Bull. 39: 419. 1984.

闽千里光 min qian li guang

Herbs, perennial, weakly erect or subscandent, rhizomatous. Stems erect or weakly ascending, flexuous, to 70 cm, branched, angular, glabrous. Basal leaves soon withered; stem leaves sessile; blade oblong-elliptic or narrowly so, 3–5 × 0.5–1.5 cm, abaxially sparsely pilose on veins, adaxially glabrous, base auriculate; auricle small, sagittate-denticulate, semiamplex-

icaul; blade pinnatisect with oblong, obtuse-acuminate, remotely denticulate terminal lobe and 6–10 shorter, oblong, spreading or slightly ascending subentire or few-denticulate lateral lobes, margin revolute and shortly ciliate. Upper leaves smaller, linear-lanceolate, margin dentate or subentire. Capitula radiate, few in lax terminal corymbs; peduncles 3–5 cm, slender, glabrous, bracteate at base, with a few subulate 2–3 mm adpressed ascending bracteoles. Involucres campanulate, 5–7 × 5–7 mm, calyculate; bracts of calyculus ca. 8; phyllaries 13, linear or linear-lanceolate, 1–1.5 mm wide, herbaceous, glabrous, 3(–5)-veined, margin scarious, apically acutely to subobtusely acuminate and minutely ciliate-puberulent. Ray florets 7 or 8; corolla tube 2.5–3.5 mm; lamina yellow, oblong-linear, 5–6 × 1–2 mm, 4-veined, apically 3-denticulate. Disk florets many; corolla yellow, ca. 5.5 mm, with ca. 2.5 mm tube and narrowly campanulate limb; lobes ovate-lanceolate, ca. 1 mm. Anthers ca. 2 mm, basally obtusely long auriculate or shortly caudate, tails stout, slightly under 0.25 × as long as antheropodia; antheropodia rather elongated, basally slightly dilated. Style branches ca. 0.8 mm. Achenes cylindric, pubescent, basally slightly attenuate. Pappus white, 3.5–4.5 mm.

● Montane slopes, roadsides; ca. 600 m. Fujian (Liancheng).

56. Senecio tarokoensis C. I Peng, Bot. Bull. Acad. Sin. 40: 57. 1999.

太鲁阁千里光 tai lu ge qian li guang

Herbs, perennial, erect, shortly rhizomatous. Stems erect, 15–75 cm tall, simple, striate, villous toward base, glabrous or subglabrous in upper part. Leaves petiolate, exauriculate; petiole 3–8 cm; blade thickly papery to leathery, lower and median stem leaves triangular-ovate or lanceolate, 3–9 × ca. 2.5 cm, abaxially villous, adaxially almost glabrous, base obtuse, truncate, or cordate, sometimes with 1 or 2 small lateral lobes near base, margins serrate to coarsely serrate or serrate-sublobulate, apically acute, mucronate; upper stem leaves shortly petiolate to subsessile, lanceolate to linear, (3–)4–5 × (0.3–)1–2 cm, irregularly lobed to subentire. Capitula radiate, up to ca. 20 in lax terminal corymbs; peduncles 2.5–6(–12) cm, slender, subglabrous to sparsely puberulent, with 2–5 remote, linear, ascending, 1–4.5 mm bracteoles. Involucres cylindric, ca. 8 × 5–6 mm, calyculate; bracts of calyculus 4 or 5, 3–3.5 mm; phyllaries ca. 20, green, linear-lanceolate, ca. 1.5 mm wide, glabrous to sparsely puberulent, margins membranous, apically tinged purple, acuminate. Ray florets 8–12; corolla tube ca. 5 mm; lamina yellow, 10–12 mm, 4-veined. Disk florets ca. 40; corolla yellow, ca. 6.5 mm, with ca. 2 mm tube and funnelform limb; lobes 1.3–1.5 mm, acute. Anthers 1.8–2.2 mm, basally obtuse, appendages ovate, obtuse; antheropodia basally slightly dilated. Style branches ca. 1.2 mm. Achenes cylindric, 3–4 mm, slightly narrowed at both ends. Pappus white, 4–5.5 mm. Fl. Mar–Jun.

● Rocky limestone ridges; 1000–2000 m. Taiwan.

57. Senecio scandens Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 178. 1825.

千里光 qian li guang

Herbs, perennial, scandent, rhizomatous. Stems elongated, flexuous, 2–5 m, much branched, pubescent or glabrous, becoming woody and with pale bark when old. Leaf petiole 0.5–1(–2) cm, pubescent or subglabrous, base not auriculate or with small auricle; blade ovate-lanceolate to narrowly triangular, 2.5–12 × (1.5–)2–4.5 cm, both surfaces shortly pubescent to glabrous, pinnately veined, base broadly cuneate, truncate, hastate, or rarely cordate, margin rarely subentire, usually shallowly or deeply dentate, sometimes lobulate or pinnatifid, at least toward base, with 2–6 smaller lateral lobes, apex acute-acuminate. Upper leaves smaller, lanceolate or linear-lanceolate, apically attenuate. Capitula radiate, numerous, arranged in abundant, divaricately branching, terminal compound thyrses; branches and peduncles densely to sparsely puberulent; peduncles 1–2 cm, bracteate, usually with 1–10 linear-subulate bracteoles. Involucres cylindric-campanulate, 5–8 × 3–6 mm, calyculate; bracts of calyculus ca. 8, linear-subulate, 2–3 mm; phyllaries 12 or 13, linear-lanceolate, herbaceous, puberulent or glabrous, 3-veined, margin broadly scarious, acuminate and ciliate-puberulent on upper margins and apex. Ray florets 8–10; corolla tube ca. 4.5 mm; lamina yellow, oblong, 9–10 × ca. 2 mm, 4-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, ca. 7.5 mm, with ca. 3.5 mm tube; lobes ovate-oblong, apically acute, papillose. Anthers ca. 2.3 mm, basally obtuse-auriculate; auricles ca. 1/7 as long as antheropodia; appendages ovate-lanceolate; antheropodia elongated, basally slightly expanded. Style branches ca. 1.8 mm. Achenes cylindric, ca. 3 mm, pubescent. Pappus white, ca. 7.5 mm. Fl. Aug–Apr or Oct–Dec. $2n = 20$.

Climbing in forests[s] and thickets, on shrubs, over rocks, on buildings, by streams, mountain slopes; sea level to 4000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Qinghai, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India, Japan, Laos, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

1a. Leaf blade 2–3.5 × ca. 1.5 cm, thick in texture, triangular, incised-dentate with broad triangular teeth, sometimes lobulate toward base; fl. Oct–Dec ..... 57c. var. *crataegifolius*

1b. Leaf blade 2.5–12 × 2–4.5 cm, ovate-lanceolate to lanceolate, dentate or pinnatifid; fl. Aug–Feb or to Apr.

2a. Leaf blade simple, subentire to dentate, unlobed and without small lateral lobes at base; fl. Aug–Apr ..... 57a. var. *scandens*

2b. Leaf blade pinnatifid, or with large terminal lobe and 2–6 small lateral lobes at base; fl. Aug–Feb ..... 57b. var. *incisus*

57a. Senecio scandens var. **scandens**

千里光(原变种) qian li guang (yuan bian zhong)

Cineraria chinensis Sprengel; *C. repanda* Loureiro (1790),

not (J. R. Forster & G. Forster) G. Forster (1786); *Senecio campylodes* Candolle; *S. chinensis* (Sprengel) Candolle; *S. hindsii* Bentham; *S. intermedius* Wight; *S. solanifolius* Jeffrey; *S. stipulatus* Wallich ex Candolle; *S. wightianus* Candolle.

Leaf blade simple, subentire to dentate, unlobed and without small lateral lobes at base. Fl. Aug–Apr.

Climbing in forests and thickets, on shrubs, over rocks, on buildings, by streams; sea level to 3200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India, Japan, Laos, Myanmar, Nepal, Philippines, Thailand, Vietnam].

57b. Senecio scandens var. **incisus** Franchet, J. Bot. (Morot) 10: 418. 1896.

缺裂千里光 que lie qian li guang

Senecio flexicaulis Edgeworth.

Leaf blade pinnatifid, or with large terminal lobe and 2–6 small lateral lobes at base. Fl. Aug–Feb.

Climbing on shrubs, in thickets, over rocks, by streams; sea level to 4000 m. Gansu, Guangdong, Guizhou, Jiangxi, Qinghai, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, S India, Nepal, Sri Lanka].

57c. Senecio scandens var. **crataegifolius** (Hayata) Kitamura, Acta Phytotax. Geobot. 9: 37. 1940.

山楂叶千里光 shan zha ye qian li guang

Senecio crataegifolius Hayata, Icon. Pl. Formosan. 8: 67. 1919.

Leaf blade small, usually 2–3.5 × ca. 1.5 cm, thick in texture, triangular, incised-dentate with broad triangular teeth, sometimes lobulate toward base. Fl. Oct–Dec.

• Mountain slopes, climbing on shrubs; 2100–2900 m. Taiwan.

5. Senecio sect. Senecio

千里光组 qian li guang zu

Herbs, annual (in China), erect. Leaves usually pinnately divided. Capitula radiate or discoid. Phyllaries free or connate. Anthers obtusely ± auriculate at base; antheropodia small, basally somewhat to distinctly dilated. Achene epidermal cells papillose, cuticle thin, mechanical tissues in 9–11 distinct tracts, elliptic in cross section. Pappus often dimorphic, with apically fluked as well as tapered hairs, present in all florets.

Maybe ca. 1,000 species: worldwide (except Antarctica); eight species (two endemic) in China.

58. Senecio subdentatus Ledebour, Fl. Altaic. 4: 110. 1833.

近全缘千里光 jin quan yuan qian li guang

Senecio coronopifolius N. L. Burman var. *subdentatus* (Ledebour) Boissier.

Herbs, annual. Stems erect, 5–25 cm tall, slender, branched from base or middle, branches ascending, glabrous. Leaves sessile; blade oblong or broadly linear, 2.5–6.5 × 0.2–1 cm, glabrous, upper leaves dilated and subamplexicaul at base, margin pinnately few dentate or lobulate or subentire, apex obtuse. Uppermost leaves small, linear, bractlike. Capitula radiate, few to many, terminal, laxly corymbose; peduncles 1.5–4 cm, slender, glabrous or sparsely shortly pilose; bracteoles linear-subulate. Involucres cylindric, ca. 6 × 2–4 mm, calyculate; bracts of calyculus 2–5, linear-subulate; phyllaries ca. 13, oblong-lanceolate, ca. 1 mm wide, herbaceous, with membranous margin, glabrous, apically acute and shortly puberulent. Ray florets 7 or 8; corolla tube ca. 2.5 mm; lamina yellow, oblong, ca. 6 × 2 mm, 5-veined, apically obtuse, 3-denticulate. Disk florets many; corolla yellow, 4.5–5 mm, with ca. 2 mm tube and funnelform limb; lobes oblong, ca. 0.7 mm, apically acute. Anthers ca. 1.7 mm, basally obtuse-auriculate, appendages ovate-lanceolate; antheropodia rather stout, basally markedly dilated. Style branches ca. 0.6 mm. Achenes cylindric, ca. 3.5 mm, densely pubescent. Pappus white, 5–6 mm. Fl. May–Jun.

Gravelly places; 400–700 m. Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia (SC Siberia), Tajikistan, Turkmenistan, Uzbekistan; SW Asia (S Caucasus)].

59. Senecio desfontainei Druce, List Brit. Pl. 2: 61. 1928.

苞叶千里光 bao ye qian li guang

Senecio coronopifolius Desfontaines, Fl. Atlant. 2: 273. 1799, not N. L. Burman (1768); *S. glaucus* Linnaeus subsp. *coronopifolius* Alexander.

Herbs, annual. Stems erect or subdecumbent, 10–25 cm tall, usually branched from base or middle; branches erect or divaricate-ascending, glabrous or sparsely pubescent or pubescent only in leaf axils. Leaves sessile; blade oblong, 1.5–4 × 0.5–1.5 cm, glabrous or sparsely pubescent at least on midvein abaxially, pinnatifid to pinnatisect with 6–8 oblong or oblong-linear, entire or 1- or 2-denticulate lateral lobes, apex obtuse; lower leaves attenuate into a petioloid base, upper ones auriculate and semiamplexicaul at base. Uppermost leaves oblong-linear or linear, pinnatifid or dentate. Capitula radiate, few to rarely many, terminal, laxly corymbose; peduncles 1–3 cm, sparsely pubescent or glabrous, with a few linear-subulate bracteoles. Involucres narrowly campanulate, 4–5 × 2–4 mm, calyculate; bracts of calyculus 8–10, linear-subulate, blackish tipped; phyllaries 15–20, linear-lanceolate, ca. 0.5 mm wide, herbaceous, glabrous, apically acute and sparsely shortly puberulent. Ray florets 8–12; corolla tube ca. 3 mm; lamina yellow, elliptic-oblong, ca. 6 × 2.5–3 mm, 4-veined, apically obtuse, 3-denticulate, becoming revolute. Disk florets many; corolla yellow, ca. 5.5 mm, with 2–2.5 mm tube and funnelform limb; lobes ovate-triangular, ca. 0.7 mm, apically acute. Anthers ca. 1.8 mm, basally distinctly obtuse-auriculate, appendages ovate; antheropodia distinctly dilated at base. Style branches ca. 0.5 mm.

Achenes cylindric, ca. 3 mm, shortly adpressed pubescent. Pappus white, ca. 4.5 mm. Fl. Jul–Aug. $2n = 20$.

Gravelly places by streams; 3100–4600 m. Xizang (Ngari) [NW India, Kashmir; N Africa, SW Asia, Macaronesia (Canary Islands)].

60. Senecio kraschenninnikovii Schischkin, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 15: 410. 1953.

细梗千里光 xi geng qian li guang

Senecio pedunculatus Edgeworth, Trans. Linn. Soc. London 20: 74. 1846, not Schultz Bipontinus (1844).

Herbs, annual. Stems erect, 5–30 cm tall, branching from base or in upper part; branches erect or divaricate-spreading, slender, sparsely pubescent or subglabrous. Leaves sessile; blade ovate-oblong, 1.5–5 × 0.4–1.5 cm, both surfaces sparsely pubescent to subglabrous, base slightly dilated and subamplexicaul, pinnatifid to finely and deeply pinnatisect with 4–8 usually narrow, linear, irregularly denticulate or entire lateral lobes, apex obtuse to subacute. Upper leaves smaller, pinnately lobed to linear and subentire. Capitula radiate, few to many, terminal, laxly corymbose; peduncles 1–3(–5) cm, slender, rather densely to sparsely white pubescent; bracteoles 2–4, linear-subulate. Involucres narrowly campanulate, 5–7 × 1.5–4 mm, calyculate; bracts of calyculus 4 or 5, subulate, inconspicuous; phyllaries 13–15, linear or linear-lanceolate, 0.3–0.5 mm wide, herbaceous, with narrow membranous margins, glabrous, apex acute-acuminate, sometimes dark tipped. Ray florets 4–7; corolla tube 3–3.5 mm; lamina yellow, oblong, very short, 2–2.5 mm, hardly exceeding involucre, 4-veined, apically 3-denticulate, becoming revolute. Disk florets many; corolla yellow, ca. 5.5 mm, with ca. 3 mm tube and narrowly funnelform limb; lobes ovate-oblong, ca. 0.5 mm, apically subobtuse. Anthers ca. 2 mm, basally obtuse-auriculate, appendages ovate; antheropodia distinctly dilated toward base. Style branches ca. 0.5 mm. Achenes cylindric, 2.5–3 mm, sparsely adpressed pubescent. Pappus white, ca. 5.5 mm. Fl. Jun–Sep. $2n = 18, 20$.

Gravelly slopes, sandy places; 1800–3900 m. Qinghai, Xinjiang (Tuoxun), Xizang [NE Afghanistan, NW India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan; SW Asia (Iran)].

61. Senecio dubitabilis C. Jeffrey & Y. L. Chen, Kew Bull. 39: 427. 1984.

北千里光 bei qian li guang

Senecio dubius Ledebour, Fl. Altaic. 4: 112. Jul–Dec 1833, not Beck (May–Jun 1833); *S. coronopifolius* N. L. Burman var. *discoideus* C. Winkler ex Danguy; *S. vulgaris* Linnaeus var. *dubius* Trautvetter.

Herbs, annual. Stems erect, 5–30 cm tall, branching from base or middle; branches erect or spreading, glabrous or sparsely pubescent with long white hairs when young. Leaves sessile; blade spatulate, oblong-lanceolate, oblong, or linear, 3–7 × 0.3–2 cm, lower ones attenuate into a petioloid base, middle ones often ± expanded at base into irregularly toothed subamplexicaul auricles, pinnately shortly lobulate with entire or few-denticulate lobes to remotely dentate or entire, apex obtuse to acute. Upper leaves smaller, lanceolate to linear, margin denticulate or entire. Capitula discoid, few to many, terminal, usually laxly corymbose; peduncles 1.5–4 cm, slender, glabrous or sparsely pubescent, with 1 or 2 linear-lanceolate bracts. Involucres narrowly campanulate, 6–7 × 2.5–5 mm, calyculate; bracts of calyculus 4 or 5, linear-subulate, short, apically acute, sometimes shortly black tipped; phyllaries ca. 15, linear, 0.5–1 mm wide, herbaceous, with narrow membranous margins, glabrous, apically acute, finely shortly bearded and sometimes blackish. Ray florets absent. Disk florets many; corolla yellow, 6–6.5 mm, with 4–4.5 mm tube and cylindric limb; lobes ovate, ca. 0.3 mm. Anthers linear, ca. 1 mm, basally very shortly obtuse-auriculate, appendages ovate-lanceolate; antheropodia dilated toward base. Style branches ca. 0.6 mm. Achenes cylindric, 3–3.5 mm, densely pubescent. Pappus white, 7–7.5 mm. Fl. May–Sep.

Sandy and rocky places, field margins; 2000–4800 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Xinjiang, Xizang [NW India, Kashmir, Kyrgyzstan, Mongolia, Pakistan, Russia (E and W Siberia), Tajikistan, Uzbekistan].

62. Senecio vulgaris Linnaeus, Sp. Pl. 2: 867. 1753.

欧洲千里光 ou zhou qian li guang

Herbs, annual. Stems erect, 12–45 cm tall, branched from base or middle, sparsely arachnoid to glabrous. Leaves sessile; blade oblanceolate-spatulate or oblong, 3–11 × 0.5–2 cm, ± arachnoid especially abaxially, to glabrous, shallowly to deeply pinnatifid with 6–8 oblong or oblong-lanceolate, usually irregularly dentate lateral lobes, lower ones attenuate into a petioloid base, middle ones subamplexicaul, apex obtuse; upper leaves smaller. Capitula discoid, few to many in dense terminal corymbs; peduncles 0.5–2 cm, sparsely pubescent or glabrous, with a few linear-subulate bracteoles. Involucres campanulate, 6–7 × 2–4 mm, calyculate; bracts of calyculus 7–11, linear-subulate, 2–3 mm, usually with long black tips; phyllaries 18–22, linear, ca. 0.5 mm wide, herbaceous, with narrow membranous margin, glabrous, apically acute and blackish. Ray florets absent. Disk florets many; corolla yellow, 5–6 mm, with 3–4 mm tube and funnelform limb; lobes ovate, ca. 0.3 mm, apically obtuse. Anthers ca. 0.7 mm, basally shortly obtuse-auriculate, appendages ovate; antheropodia slender, dilated toward base. Style branches ca. 0.5 mm. Achenes cylindric, 2–2.5 mm, pubescent on ribs. Pappus white, 6–7 mm. Fl. Apr–Oct. $2n = 40$.

Disturbed open places; 300–2300 m. Guizhou, Jilin, Liaoning, Nei Mongol, Sichuan, Taiwan, Xizang, Yunnan [Mongolia; throughout temperate N and S Africa, Asia, and Europe; widely adventive].

63. Senecio exul Hance, J. Bot. 6: 174. 1868.

散生千里光 san sheng qian li guang

Herbs, annual. Stems erect, 20–40 cm tall, branching from base or only in upper part, sparsely pubescent or subglabrous. Leaves sessile; blade oblanceolate to oblong, 4–6 × 0.5–3.5 cm, both surfaces sparsely pubescent to glabrous, lower ones attenuate into a petioloid base, middle ones dilated with entire or denticulate subamplexicaul auricles at base, pinnatipartite with 6–8 unequal, oblong-lanceolate or oblong, obtuse, entire or re-

motely denticulate lateral lobes to pinnatifid or entire, apex obtuse. Upper leaves linear or linear-lanceolate, gradually smaller. Capitula radiate, few to numerous, arranged in lax terminal sometimes subumbelliform corymbs; peduncles 0.5–2.5 cm, slender, glabrous; bracteoles 1–3, linear-subulate. Involucres subcampanulate, 4–5 × 2–3 mm, inconspicuously calyculate; bracts of calyculus 2 or 3, linear-subulate, minute; phyllaries 14 or 15, linear, 0.3–0.5 mm wide, herbaceous, glabrous, margin broadly hyaline, apically acute and sparsely puberulent. Ray florets ca. 12; corolla tube ca. 2 mm; lamina yellow, oblong, minute, 1–1.5 mm, 3-denticulate. Disk florets many; corolla yellow, ca. 3 mm, with ca. 1.7 mm tube and funnelform limb; lobes ovate-triangular, ca. 0.4 mm, apically acute, papillose. Anthers ca. 0.6 mm, basally obtusely subauriculate, appendages ovate-oblong; antheropodia dilated toward base. Style branches ca. 0.4 mm. Achenes cylindric, ca. 2.5 mm, densely shortly pubescent. Pappus white, ca. 3 mm. Fl. Apr–Jun.

River margins, pastures; sea level to 600 m. Chongqing, Guangdong, Hubei, Sichuan, Zhejiang [Thailand].

64. Senecio oryzetorum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 194. 1912.

田野千里光 tian ye qian li guang

Herbs, annual. Stems erect, 20–30 cm tall, branching from base or in upper part, sparsely pubescent to subglabrous. Leaves oblanceolate-linear to oblong-linear, 3–8 × 1–2 cm, papery, sparsely pubescent to ± glabrous, lower ones attenuate into a petioloid base, middle and upper ones sessile, basally scarcely auriculate, margin somewhat remotely coarsely dentate or pinnatifid with 6–10 linear to shortly linear-oblong, acute, remotely denticulate or entire, ascending-spreading lateral lobes, apex acute or subacute. Capitula radiate, few to many, terminal, corymbose; peduncles 5–10 mm, slender, subglabrous, with a few linear-lanceolate bracteoles. Involucres narrowly campanulate, 5–6 × 2.5–3 mm, calyculate; bracts of calyculus 3 or 4, linear-subulate, inconspicuous; phyllaries 13–15, linear-lanceolate, 0.3–0.5 mm wide, connate to middle or above, herbaceous, glabrous, margin narrowly hyaline, apically acute. Ray florets 3; corolla tube ca. 2 mm; lamina yellow, minute, 1–1.5 mm, 3-veined, 3-denticulate. Disk florets many; corolla yellow, ca. 3.5 mm, with ca. 2 mm tube and narrowly funnelform limb; lobes ovate-triangular, ca. 0.5 mm, apically subobtuse. Anthers ca. 0.8 mm, basally very shortly obtuse-auriculate, appendages ovate; antheropodia dilated toward base. Style branches ca. 0.3 mm. Achenes cylindric, 2.5–2.8 mm, sparsely minutely pubescent. Pappus white, ca. 3 mm, bristles expanded at base. Fl. May.

• Open wet pastures; 1500–2400 m. NW Yunnan.

65. Senecio yungningensis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 639. 1937.

永宁千里光 yong ning qian li guang

Herbs, annual, dwarf. Stems 5–12 cm tall, much branched from base; branches spreading, ascending, glabrous. Leaves sessile; blade oblanceolate, 2–3.5 × 0.5–1 cm, glabrous, base scarcely auriculate, margin irregularly coarsely dentate or pinnatifid with 4–6 shortly triangular-oblong to linear-oblong obscurely denticulate lateral lobes, apex obtuse; upper leaves smaller. Capitula minutely radiate, solitary, axillary, subsessile. Involucres narrowly ovoid, 5–6 × 2–3 mm, contracted toward apex, minutely calyculate; bracts of calyculus 2 or 3, linear or linear-subulate, apically obtuse; phyllaries 8–14, oblong-linear, ca. 0.5 mm wide, connate except at apex, herbaceous, apically triangular, rather obtuse, puberulent. Ray florets ca. 7; corolla tube ca. 1.5 mm; lamina yellow, oblong, minute, ca. 0.5 mm, 3-veined, apically 2- or 3-lobulate. Disk florets 13–15; corolla yellow, ca. 2 mm, with ca. 0.7 mm tube and narrowly funnelform limb; lobes ovate, ca. 0.3 mm, apically obtuse. Anthers ca. 0.5 mm, basally distinctly auriculate; appendages ovate; antheropodia short, basally dilated. Style branches ca. 0.3 mm. Achenes cylindric, 3–4 mm, glabrous. Pappus white, ca. 1.5 mm, bristles few, unequal. Fl. May–Jun.

• Lake and swamp margins; 2600–2800 m. Sichuan (Yongning).

109. CRASSOCEPHALUM Moench, Methodus, 516. 1794.

野茼蒿属 ye tong hao shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

Herbs, annual or perennial. Leaves alternate. Capitula discoid or rarely radiate, often pendulous by anthesis, when discoid homogamous; florets numerous, bisexual. Involucre cylindric, calyculate; phyllaries uniseriate, subequal, linear-lanceolate, with narrow scarious margins, erect at anthesis, later spreading and reflexed; receptacle flat, glabrous, areolate. Corolla finely tubular, upper part gradually expanded into a short limb; lobes 5. Anthers obtuse or auriculate at base. Style branches slender, papillose, with a short to long appendage of fused papillae. Achenes narrowly cylindric, ribbed, with gray-white ring at apex. Pappus hairs fine, numerous, white, early deciduous.

About 21 species: mainly in tropical Africa; two species (both introduced) in China.

1a. Capitula several to numerous in terminal corymbiform cymes, shortly pedunculate; corollas dull orange to brick red ..... 1. *C. crepidioides*
1b. Capitula 1–8, solitary on long peduncles; corollas blue, purple, or magenta, rarely pink or red ..... 2. *C. rubens*

1. Crassocephalum crepidioides (Bentham) S. Moore, J. Bot. 50: 211. 1912.

野茼蒿 ye tong hao

Gynura crepidioides Bentham in Hooker, Niger Fl. 438. 1849.

Plants erect, 20–120 cm tall. Stems striate, glabrous. Leaf

petiole 2–2.5 cm; blade elliptic or oblong-elliptic, 7–12 × 4–5 cm, membranous, both surfaces glabrous or subglabrous, base cuneate, margin irregularly serrate or double-serrate, sometimes pinnately lobed at base, apex acuminate. Capitula several to numerous in terminal corymbiform cymes, shortly pedunculate, 3–5 mm in diam. Involucres cylindric, 1–1.2 cm, basally truncate, with few unequal linear bracteoles; bracts of calyculus 6–21, 2–6 mm; phyllaries uniseriate, linear-lanceolate, equal, ca. 1.5 mm wide, margin narrowly scarious, apically puberulent. Florets tubular, bisexual; corolla red-brownish or orange, rarely yellow, 8–10 mm; lobes 5, ca. 1 mm. Style branches acute, papillose. Achenes brownish, narrowly oblong, 1.8–2.3 mm, ribbed, hairy. Pappus 7–13 mm, early deciduous. Fl. Jul–Dec.

Slopes, roadsides, streamsides, thickets; 300–1800 m. ?Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Hubei, ?Jiangsu, Jiangxi, ?Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, ?Zhejiang [native to Africa; pantropical weed of Africa, S and SE Asia, Australia, Central and South America, and Pacific islands].

Crassocephalum crepidioides is used medicinally to invigorate the spleen and treat indigestion; the young leaves are an edible wild vegetable.

2. Crassocephalum rubens (Jussieu ex Jacquin) S. Moore, J. Bot. 50: 212. 1912.

蓝花野茼蒿 lan hua ye tong hao

Senecio rubens Jussieu ex Jacquin, Hort. Vindob. 3: 50. 1777.

Plants erect, 20–100(–150) cm tall. Stems usually repent at base, striate, simple or few branched, pubescent or subglabrous. Leaves sessile; blade obovate, oblanceolate, elliptic, lanceolate, or ovate, 1–20 × 0.5–7.5 cm, pubescent at least abaxially on veins, cuneate or attenuate into petaloid base, margin sinuate-dentate to sinuate-serrate, unlobed or lyrate-pinnately or pinnately lobed, apex rounded to acute. Capitula 1–8, solitary on long peduncles. Involucres cylindric, 0.8–1.3 cm, with 5–22 calycular bracts; phyllaries uniseriate, linear-lanceolate, equal, ca. 1.5 mm wide, often tinged purple below apex, glabrous or sparsely pubescent, apex purple. Florets tubular, bisexual; corollas blue, purple, or mauve, sometimes pink or red; lobes 5. Style branches acute, papillose. Achenes 2–2.5 mm, ribbed, hairy in grooves. Pappus of numerous white setae, 7–12 mm. Fl. Dec–Apr of next year.

Wastelands, roadsides, grasslands; 500–600 m. Yunnan [native to Africa, SW Asia (Yemen), Indian Ocean islands (Comoros, Mascarene Islands), and Madagascar].

Crassocephalum rubens is an invasive species in China.

110. ERECHTITES Rafinesque, Fl. Ludov. 65. 1817.

菊芹属 ju qin shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, annual or perennial, robust. Stems erect, branched. Leaves alternate, glabrous or pubescent, subentire, serrate, or pinnately lobed. Capitula disciform, heterogamous, in terminal paniculate corymbs, few calyculate. Involucres cylindric; phyllaries uniseriate, linear-lanceolate, equal, with scarious margins. Receptacle flat or slightly concave, alveolate or fimbriate. All florets tubular, fertile, outer florets biseriate or uniseriate, female, corolla filiform, 4- or 5-denticulate; central florets bisexual, funnelform, 5-denticulate. Anthers obtuse at base. Style branches elongate, apically truncate or obtuse, papillose. Achenes brownish, subcylindric, 10-ribbed. Pappus hairs many seriate, subequal, slender.

About five species: mainly in the Americas; two species (both introduced) in China.

1a. Stems pubescent; leaves sessile, basally gradually attenuate or subamplexicaul, margin irregularly coarsely dentate; pappus white ..... 1. *E. hieraciifolius*
1b. Stems subglabrous; leaves petiolate, narrowly winged, margin irregularly doubly serrate or pinnately divided; pappus reddish ..... 2. *E. valerianifolius*

1. Erechtites hieraciifolius (Linnaeus) Rafinesque ex Candolle, Prodr. 6: 294. 1838 [*"hieracifolia"*].

梁子菜 liang zi cai

Senecio hieraciifolius Linnaeus, Sp. Pl. 2: 866. 1753 [*"hieracifolius"*].

Herbs, annual. Stem solitary, erect, 40–100 cm tall, simple or much branched in upper part, striate, sparsely pubescent. Leaves sessile, winged; blade lanceolate to oblong, 7–16 × 3–4 cm, both surfaces glabrous or shortly pubescent on veins, pinnately veined, basally gradually attenuate or subamplexicaul, margin irregularly coarsely dentate, apex acute or shortly acuminate. Capitula numerous, arranged in terminal corymb, ca. 15 × 1.5–1.8 mm. Involucres yellowish to brown-green, tubular, calyculate at base, bracteoles linear; phyllaries uniseriate, linear or linear-lanceolate, 8–11 × 0.5–1 mm, glabrous or sparsely pilose, margin narrowly scarious, apically acute or rather obtuse. Florets numerous, greenish or red tinged, tubular; outer florets uni- or biseriate, corolla filiform, 7–11 mm, 4- or 5-denticulate; central florets minutely tubular, 8–12 mm, 5-denticulate. Achenes cylindric, 2.5–3 mm, conspicuously ribbed. Pappus white, 7–8 mm. Fl. Jun–Oct.

Forests, thickets, slopes, wet places; 1000–1400 m. Fujian, Guizhou, Sichuan, Taiwan, Yunnan [native to tropical America; throughout SE Asia].

The young leaves can be eaten as a vegetable.

2. Erechtites valerianifolius (Link ex Sprengel) Candolle, Prodr. 6: 295. 1838 [*"valerianaefolia"*].

败酱叶菊芹 bai jiang ye ju qin

Senecio valerianifolius Link ex Sprengel, Syst. Veg. 3: 565. 1826 [*"valerianaefolius"*].

Herbs, annual. Stems erect, 50–100 cm tall, simple or branched in upper part, striate, subglabrous. Leaves long petiolate; petiole narrowly winged; blade oblong to elliptic, both surfaces glabrous, pinnately veined, base cuneate, margin irregularly double serrate or pinnatipartite; lobes 12–16, lanceolate, acuminate, serrate to irregularly lobed, or rarely shallowly lobed, apex acute or acuminate; upper leaves similar to median leaves but smaller. Capitula numerous, erect or pendulous, in terminal and upper axillary dense corymbose panicles, ca. 10 × 3 mm, with linear bracteoles. Involucres cylindric-campanulate; phyllaries uniseriate, 12–14(–16), linear, 7–8 × 0.5–0.75 mm, glabrous or sparsely puberulent, 4- or 5-veined, apically acute or acuminate. Florets numerous, yellowish purplish; outer florets uni- or biseriate, corolla filiform, apically 5-denticulate; central florets minutely tubular-funnelform, 7–8 mm, rather longer and broader than outer ones, 5-denticulate, apically glandular thickened. Style branches with conical appendages. Achenes cylindric, 2.5–3.5 mm, glabrous or puberulent, 10–12-ribbed. Pappus reddish, as long as florets. Fl. year-round. $2n = 40$.

Roadsides, field margins; ca. 1700 m. Guangdong, Hainan, Taiwan [native to tropical America; a pantropical weed].

111. GYNURA Cassini in F. Cuvier, Dict. Sci. Nat. 34: 391. 1825, nom. cons.

菊三七属 ju san qi shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, perennial, sometimes subsucculent, rarely subshrubs, glabrous or hispid. Leaves alternate, dentate or pinnately divided, rarely entire, petiolate or sessile. Capitula discoid, homogamous, solitary or few to numerous corymbose. Involucres campanulate or cylindric, with many linear bracteoles at base; phyllaries uniseriate, 9–13, lanceolate, equal, imbricate, with scarious margins. Receptacle flat, areolate or shortly fimbriate. All florets bisexual, fertile; corolla yellow or orange, rarely purplish, tubular, with slender tube and narrowly campanulate limb, lobes 5. Anthers entire or subauriculate at base. Style branches slender, appendages subulate, papillose. Achenes cylindric, 10-ribbed, glabrous or puberulent, truncate at both ends. Pappus white, sericeous.

About 40 species: Africa, Asia, Australia; ten species (one endemic) in China.

Besides the species enumerated below, *Gynura aurantiaca* (Blume) Candolle (Prodr. 6: 300. 1838), a native of Indonesia, is cultivated in gardens as an ornamental.

1a. Roots dilated into tuberiform rhizomes.
  2a. Scapigerous herbs; flowering stem simple, 20–50 cm tall; leaves crowded at base, rosulate, obovate, spatulate, or elliptic, marginally repand-dentate or pinnatifid; petioles basally not auriculate; capitula 1–5, in lax corymb ..... 1. *G. pseudochina*
  2b. Robust herbs, to 150 cm tall, much branched; stem leaves numerous, lyrate-pinnatipartite to pinnatipartite; petioles basally rounded, with pinnatifid auricles; capitula numerous, corymbose-paniculate ..... 2. *G. japonica*
1b. Roots not dilated, not tuberiform.
  3a. Scandent herbs; stems procumbent; leaves ovate or ovate-oblong, apically acute or acuminate, marginally entire or repand-dentate, both surfaces glabrous or sparsely hairy, base of petioles not auriculate; capitula 3–5 in terminal or axillary corymbs ..... 10. *G. procumbens*
  3b. Erect herbs or shrubs.
    4a. Stem procumbent in lower part.
      5a. Plants and phyllaries densely fulvous tomentose; leaves narrowly elliptic, ovate, or rhombic, margin entire or serrate in upper half, basally cuneate-attenuate into petiole; lateral veins 3–6-paired, both surfaces sparsely or densely shortly hairy ..... 3. *G. nepalensis*
      5b. Plants and phyllaries glabrous or subglabrous.
        6a. Leaves sessile or subsessile, oblong-elliptic, obovate, or oblong-lanceolate, basally amplexicaul, with broad auricle, margin irregularly sharply serrate, lateral veins 12–30-paired; capitula 4–15, corymbose-paniculate ..... 5. *G. cusimbua*
        6b. Leaves petiolate, obovate or oblanceolate, basally cuneate, narrow, not auriculate, margin repand-dentate, or mucronulate, lateral veins 7–9-paired; capitula numerous, laxly corymbose ..... 4. *G. bicolor*
    4b. Stem erect or declined at base.
      7a. Leaves simple, elliptic, marginally entire or laxly denticulate, apex obtuse, base of petiole with incised auricle ..... 9. *G. elliptica*
      7b. Leaves marginally repand-dentate or lyrately pinnately divided.
        8a. Leaves usually crowded on lower part of stem, petiolate or subsessile, ovate, elliptic, or oblanceolate, veinlets coalescent into suboblong, parallel-reticulate, conspicuous black lines when dry; capitula 3–5 corymbose-paniculate, divaricate ..... 6. *G. divaricata*

8b. Leaves lax, rarely crowded on stem, elliptic or spatulate, veinlets inconspicuous, not coalescent into black lines when dry; capitula laxly corymbose, not divaricate.
9a. Plants hispid; leaves lyrate-ovate, basally attenuate into long petioles, upper or median leaves 1- or 2-denticulate, apically obtuse, both surfaces adpressed pilose; capitula 3, laxly corymbose; peduncles 5–7 cm ..... 7. *G. formosana*
9b. Plants fulvous pubescent; leaves lyrate-pinnatilobate, 4–12 cm, terminal lobe large, triangular-ovate, apex acuminate, base truncate or cordate, lateral lobes 1- or 2-paired, ovate-oblong, both surfaces fulvous pubescent; capitula 1–3, laxly corymbose; peduncles 1–3 cm ..... 8. *G. barbareifolia*

1. Gynura pseudochina (Linnaeus) Candolle, Prodr. 6: 299. 1838.

狗头七 gou tou qi

Senecio pseudochina Linnaeus, Sp. Pl. 2: 867. 1753; *Cacalia bulbosa* Loureiro; *Gynura bodinieri* H. Léveillé; *G. bulbosa* (Loureiro) Hooker & Arnott; *S. bulbosus* (Loureiro) H. Léveillé (1916), not Schultz Bipontinus (1867); *S. crassipes* H. Léveillé & Vaniot.

Herbs, perennial, scapigerous, 20–50 cm tall, slightly fleshy. Roots globose or sometimes branched, tuberiform, (1–)2–6 cm in diam., fleshy, with many fibrous roots. Stems erect, 1–3, ascending or creeping, green or purplish, striate when dry, sparsely pubescent or glabrous. Leaves often crowded at base of stem, rosulate; petiole 0.5–3 cm, basally broad, slightly fleshy, not auriculate; blade abaxially often purplish, adaxially green, obovate, spatulate, or elliptic, rarely ovate, 5–18 × 2.5–5 cm, both surfaces sparsely shortly pubescent or ± glabrescent, lateral veins 8–20-paired, to lobes or curved before margins, inconspicuous, base gradually attenuate into petiole, margin pinnatifid, rarely dentate; lobes triangular or ovate-oblong, entire or denticulate, apex obtuse or rather acute. Median or upper leaves reduced, or with 1 or 2 leaflets, shortly petiolate or subsessile; leaflets pinnatilobed, lobes small, both surfaces pubescent. Capitula 1–5, 10–15 mm in diam., terminal, laxly corymbose; peduncles 0.5–4 cm, often with 1 or 2 linear or filiform-linear bracteoles, densely or sparsely pubescent. Involucres campanulate, 10–12 × 8–10 mm; bracts of calyculus 8 or 9, unequal, linear; phyllaries uniseriate, 13, green or purplish, linear-lanceolate or lanceolate, 7–12 × ca. 1.5 mm, conspicuously 1–3-ribbed, sparsely shortly pubescent, margin broadly scarious, apically acuminate. Florets yellow to reddish; corolla 10–13 mm, distinctly exceeding involucre, tube 7–9 mm, slender, expanded above; lobes ovate-triangular, apically obtuse. Anthers obtuse at base. Style branch tips conical, papillose. Achenes red-brown, cylindric, 3–4 mm, glabrous or puberulent, 10-ribbed. Pappus hairs numerous, white, 10–12 mm, sericeous, early deciduous. Fl. Apr–Nov. $2n = 20$.

Sandy places on slopes, forest margins, roadsides; 200–2100 m. Guangdong, Guangxi, Guizhou, Hainan, Yunnan [Bhutan, India, Myanmar, Nepal, Sri Lanka, Thailand; Africa; tropical Africa; cultivated in Indonesia (Java)].

2. Gynura japonica (Thunberg) Juel, Acta Horti Berg. 1(3): 86. 1891.

菊三七 ju san qi

Senecio japonicus Thunberg in Murray, Syst. Veg., ed. 14, 756. 1784; *Cacalia pinnatifida* Loureiro; *C. segetum* Loureiro; *Gynura aurita* C. Winkler; *G. flava* Hayata; *G. japonica* var. *flava* (Hayata) Kitamura; *G. pinnatifida* (Loureiro) Candolle; *G. segetum* (Loureiro) Merrill; *G. vaniotii* H. Léveillé; *Kleinia japonica* (Thunberg) Lessing.

Herbs, perennial, high and robust, 60–100 cm or taller. Roots thick, tuberiform, 3–4 cm in diam., with numerous fibrous roots. Stems erect, basally woody, ca. 15 mm in diam., conspicuously canaliculate, crisped-pubescent when young, glabrescent, much branched, branchlets ascending. Basal leaves often withered and shedding by anthesis. Basal and lower leaves smaller, elliptic, simple to lyrate-pinnatilobed, terminal lobe large. Median leaves long or shortly petiolate, large; petiole basally rounded, dentate or pinnatilobate, auriculate, semiamplexicaul; blade abaxially green or becoming purplish, adaxially green, elliptic or oblong-elliptic, 10–30 × 8–15 cm, adpressed pilose or subglabrous, pinnatipartite; terminal lobe large, obovate or oblong to oblong-lanceolate; lateral lobes (4–)6–12-paired, elliptic or oblong to oblong-linear, 1.5–5 × 0.5–2(–2.5) cm, margin unequally coarsely dentate or sharply serrate, incised, rarely entire, apex acute or acuminate. Upper leaves smaller, pinnatilobate, gradually reduced to bractiform leaves upward. Capitula numerous, 1.5–1.8 cm in diam., terminal, corymbose-paniculate; peduncles 1–3(–6) cm, slender, shortly pubescent; bracts 1–3, linear. Involucres narrowly campanulate or campanulate, 10–15 × 8–15 mm; bracts of calyculus 9–11, linear; phyllaries uniseriate, 13, linear-lanceolate, 10–15 × 1–1.5 mm, glabrous or sparsely hairy, margin scarious, apically acuminate. Florets 50–100; corolla yellow or orange, 13–15 mm; tube 10–12 mm, slender, dilated above; lobes ovate, apically acute. Anthers obtuse at base. Style branches with conical papillose appendages. Achenes brownish, cylindric, 4–5 mm, puberulent, 10-ribbed. Pappus white, silky, easily deciduous. Fl. Aug–Oct.

Valleys, grassy slopes, forests, forest margins; 1200–3000 m. Anhui, Fujian, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Nepal, Thailand].

The roots are used in Chinese medicine.

3. Gynura nepalensis Candolle, Prodr. 6: 300. 1838.

尼泊尔菊三七 ni bo er ju san qi

Gynura dielsii H. Léveillé, nom. illeg. superfl.; *G. nudibasis* (H. Léveillé & Vaniot) Lauener & D. K. Ferguson; *Senecio nudibasis* H. Léveillé & Vaniot.

Herbs, perennial. Stems erect or ascending, robust, 30–

45 cm tall, woody at base, ca. 10 mm in diam., corymbosely branched in upper part, densely fulvous tomentose. Stem leaves numerous, absent on lower part of stem. Leaves petiolate, basally not auriculate; blade narrowly elliptic, ovate, or rhombic or oblong-lanceolate, 3–20 × 1–6 cm, lateral veins 3–6(–8)-paired, abaxially pubescent, adaxially gray-white sparsely or densely fulvous pubescent, base cuneately gradually attenuate to petiole, margin entire or serrate in upper half, rarely lobed, apex acute or acuminate. Upper leaves smaller, becoming bractlike, narrowly lanceolate-linear, sessile. Capitula numerous, ca. 10 mm in diam., usually in terminal elongate lax corymbs; peduncles 1–10 cm, with few linear bracts, densely shortly pubescent. Involucres campanulate, 10–13 × ca. 10 mm, with 7 or 8 linear calycular bracts, densely shortly pubescent; phyllaries uniseriate, 13 or 14, linear-lanceolate, ca. 10 × 1.5–2.5 mm, densely fulvous tomentose or subglabrous, sometimes sessile glandular hairy, margin scarious, apically acuminate. Florets yellow; corolla 8–10 mm; tube 4–5 mm, slender; limb dilated, lobes triangular-ovate. Anthers obtuse at base. Style branch tips conical, papillose. Achenes cylindric, 3–4(–6) mm, glabrous or sparsely hairy, 10-ribbed. Pappus hairs numerous, white, silky, easily deciduous. Fl. May–Oct.

On rocks, field margins, by streams; 1100–2100 m. Guizhou, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Thailand].

4. Gynura bicolor (Roxburgh ex Willdenow) Candolle, Prodr. 6: 299. 1838.

红凤菜 hong feng cai

Cacalia bicolor Roxburgh ex Willdenow, Sp. Pl. 3: 1731. 1803.

Herbs, perennial. Stems erect, 50–100 cm tall, glabrous, flaccid, rather woody at base, corymbosely branched in upper part, striate when dry. Leaves petiolate or subsessile; blade abaxially becoming purplish when dry, adaxially green, obovate or oblanceolate, rarely oblong-lanceolate, both surfaces glabrous, lateral veins 7–9-paired, curved, base gradually attenuate into winged petioles or subsessile, ± expanded, but not auriculate, margin irregularly repand-dentate or mucronulate, rarely pinnatifid near base. Upper leaves shortly petiolate or subsessile, lanceolate to linear-lanceolate, small. Capitula numerous, ca. 10 mm in diam., in terminal lax corymbs; peduncles 3–4 cm, slender, with 1 or 2(or 3) filiform bracts. Involucres campanulate, 11–15 × 8–10 mm; bracts of calyculus 7–9, linear; phyllaries 13, linear-lanceolate, 11–15 × 0.9–1.5(–2) mm, glabrous, conspicuously 3-ribbed, margin scarious, apically acute or acuminate. Florets orange to reddish; corolla distinctly exceeding involucres, 13–15 mm; tube 10–12 mm, slender; lobes ovate-triangular. Anthers rounded at base, or slightly acute. Style branch tips subulate, papillose. Achenes brownish, cylindric, ca. 4 mm, glabrous, 10–15-ribbed. Pappus white, silky, easily deciduous. Fl. May–Oct.

Forests on slopes, rocky or wet places by rivers; 600–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan, Zhejiang [Myanmar, Thailand; widely cultivated in gardens].

5. Gynura cusimbua (D. Don) S. Moore, J. Bot. 50: 212. 1912.

木耳菜 mu er cai

Cacalia cusimbua D. Don, Prodr. Fl. Nepal. 179. 1825; *Gynura angulosa* Candolle.

Herbs, perennial, robust. Stems procumbent in lower part, erect above, green or purplish, 150–300 cm tall, 1.5–2 cm in diam., fleshy, woody at base, much corymbosely branched, conspicuously canaliculate, glabrous or ± hairy in upper part. Leaves large, sessile or shortly petiolate; blade abaxially sometimes becoming purplish, adaxially green, obovate, oblong-elliptic, elliptic, or oblong-lanceolate, (5–)10–30 × 4–11 cm, both surfaces glabrous, lateral veins 12–30-paired, base cuneately attenuate into short petiole or sessile with expanded semiamplexicaul broad auricle, margin irregularly sharply serrate, mucronulate, apex acuminate. Upper leaves smaller, oblong-lanceolate or lanceolate, apex long acuminate or caudate-acute. Capitula 10–12 mm in diam., usually 4–15 in terminal corymbose panicles; synflorescence branches unequal; peduncles 1.5–3 cm, slender, with 2 or 3 filiform-linear bracts, shortly pubescent. Involucres narrowly campanulate or cylindric, 12–17 × 8–12 mm; bracts of calyculus 7–9, linear-filiform; phyllaries 13–15, linear or linear-lanceolate, 13–15 × 1–1.5 mm, glabrous or subglabrous, conspicuously 3-ribbed, margin scarious, apically acuminate. Florets ca. 50; corolla orange, 11–13 mm; tube 7–9 mm, slender, dilated in upper part. Achenes brownish, 4–4.5 mm, puberulent, 10-ribbed. Pappus hairs numerous, white, 10–15 mm, silky, easily deciduous. Fl. Sep–Oct.

Forests, slopes, grasslands, roadsides; 1300–3400 m. Sichuan, Xizang, Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, Thailand].

F. G. Davies (Kew Bull. 33: 629–640. 1999) includes *Gynura cusimbua* in her circumscription of *G. bicolor*, stating that they are intergrading in all characters. Intermediates are therefore to be expected.

6. Gynura divaricata (Linnaeus) Candolle, Prodr. 6: 301. 1838.

白子菜 bai zi cai

Senecio divaricatus Linnaeus, Sp. Pl. 2: 866. 1753; *Cacalia incana* Linnaeus; *C. ovalis* Ker Gawler; *Gynura auriculata* Cassini; *G. hemsleyana* H. Léveillé; *G. ovalis* (Ker Gawler) Candolle; *G. ovalis* var. *pinnatifida* Hemsley; *G. panershenia* Z. Y. Zhu.

Herbs, perennial. Stems erect, or ± ascending from base, 30–60 cm tall, woody, striate when dry, simple or with synflorescence branched in upper part, glabrous or shortly pubescent, purplish. Leaves thick, usually crowded in lower part, petiolate or subsessile; petiole 0.5–4 cm, shortly pubescent, with ovate or half-moon-shaped, dentate auricle at base; blade abaxially purplish, adaxially green, ovate, elliptic, or oblanceolate, 2–15 × 1.5–5 cm, both surfaces shortly pubescent, with conspicuous black lines when dry, lateral veins 6–10-paired, veinlets often coalescent into subparallel oblong reticulate veins, base cuneate-attenuate or decurrent into petiole, subtruncate or slightly cordate, margin coarsely dentate, sometimes lyrately lobed, rarely entire, apex obtuse or acute. Upper leaves smaller, bractlike, narrowly lanceolate or linear, pinnatifid, sessile, semiamplexicaul. Capitula 1.5–2 cm in diam., usually (2 or)3–5 terminal laxly corymbose-paniculate, often divaricately branched; peduncles 1–15 cm, densely shortly pubescent; bracts 1–3, linear. Involucres campanulate, 8–10 × 6–8 mm; bracts of calyculus

several, linear or filiform; phyllaries 11–14, narrowly lanceolate, 8–10 × 1–2 mm, sparsely shortly pubescent or subglabrous, 3-veined, margin scarious, apically acuminate, narrowly triangular. Florets orange-yellow, fragrant, slightly exceeding involucres; corolla 11–15 mm, with 9–10 mm tube and narrowly campanulate limb; lobes oblong-ovate, apically reddish, acute. Anthers obtuse or rather hastate at base. Style branches slender; appendages conical, papillose. Achenes brown, cylindric, ca. 5 mm, puberulent, 10-ribbed. Pappus white, silky, 10–12 mm. Fl. Aug–Oct.

Grassy and weedy slopes, wet places by fields, seaside rocks; sea level to 2800 m. Guangdong, Hainan, Sichuan, Yunnan [N Vietnam].

7. Gynura formosana Kitamura, Acta Phytotax. Geobot. 2: 175. 1933.

白凤菜 bai feng cai

Gynura divaricata (Linnaeus) Candolle subsp. *formosana* (Kitamura) F. G. Davies.

Herbs, perennial, subscapigerous. Stems procumbent in lower part, erect above, striate when dry, 25–50 cm tall, terete, hispidulous, branched, branchlets 2 or 3, ascending. Basal leaves withered by anthesis, lower and median leaf petioles with 1 pair of auriculate pseudostipules at base, lower and median part often 1- or 2-denticulate; blade elliptic or spatulate, rarely lyrately pinnatifid, 4–6 × 2–4 cm, fleshy, both surfaces adpressed shortly hairy, lateral veins 6–8-paired, midvein and veinlets inconspicuous, base gradually attenuate into long petiole, margin repand-denticulate, apex obtuse. Upper leaves sessile, small, oblong, pinnatifid, or lanceolate, mucronulate, with pseudostipules at base. Uppermost leaves reduced, linear or linear-lanceolate, 5–20 mm. Capitula 2–5, usually 3 in terminal lax corymbs, 15–18 mm in diam.; peduncles 5–7 cm, slender, puberulent, 1–3-bracteate. Involucres tubular, ca. 11 × 12–15 mm; bracts of calyculus several, linear; phyllaries 12–14, lanceolate, 1–1.5 mm wide, sparsely puberulent, margin scarious, apically acute or acuminate. Florets exceeding involucres; corolla yellow, 14–15 mm, with slender, 10–11 mm tube and dilated limb; lobes ovate-lanceolate. Anthers obtuse at base. Style branches apically with lanceolate appendages, papillose. Achenes cylindric, 4–4.5 mm, puberulent, 10-ribbed. Pappus hairs numerous, white, silky, ca. 10 mm. Fl. and fr. May–Jul.

• Sandy shores; sea level to 500 m. Taiwan.

8. Gynura barbareifolia Gagnepain, Bull. Soc. Bot. France 68: 119. 1921.

山芥菊三七 shan jie ju san qi

Gynura divaricata (Linnaeus) Candolle subsp. *barbareifolia* (Gagnepain) F. G. Davies; *G. maclurei* Merrill.

Herbs, perennial. Stems erect or slightly curved, 30–80 cm tall, simple or branched, canaliculate. Leaves lax, rarely densely crowded; petiole auriculate at base; blade lyrate-pinnately divided, 4–12 cm, base attenuate into a lobed petiole; terminal lobe large, triangular-ovate, 3–7 × 2–5 cm, base truncate or subcordate, rarely cuneate, margin irregularly sharply serrate or lobulate, apex acuminate or rather obtuse; lateral lobes usually 2–4-paired, opposite or alternate, ovate-oblong or oblong, entire or laxly dentate, 5–10 cm, not black when dry, fulvous-black, adpressed shortly pubescent on both surfaces, lateral veins 6–8-paired, inconspicuously reticulate; auricles similar to lateral lobes. Capitula usually 1–3, in terminal lax corymbs; peduncles 1–3 cm, fulvous puberulent; bracts 1–3, linear. Involucres campanulate, 10–15 × 8–12 mm, with several calycular bracts; phyllaries ca. 13, linear-oblong, 9–12 × 1–1.5 mm, densely or sparsely puberulent, inconspicuously 3-veined, margin scarious, apically acuminate. Florets yellow; corolla 11–14 mm, with 9–11 mm slender tube and dilated limb; lobes ovate, apically acuminate, reddish tinged. Anthers obtuse at base. Style branch tips subulate, papillose. Achenes cylindric, 1.5–2.7 mm, 9–11-ribbed, puberulent between ribs. Fl. and fr. Apr–May.

Rocky places and ravines in forests; sea level to 1500 m. Hainan, S Yunnan [N Vietnam].

9. Gynura elliptica Y. Yabe & Hayata, J. Coll. Sci. Imp. Univ. Tokyo 18(8): 25. 1904.

兰屿木耳菜 lan yu mu er cai

Herbs, fleshy. Stems 35–50 cm, slightly procumbent from base, 6–10 mm in diam., canaliculate when dry, branched, glabrous or sparsely pubescent on synflorescence. Stem leaves numerous, thinly papery; lower and median leaf petioles 1–3 cm, incised-rounded auriculate at base; blade elliptic, 4–12 × 2–6 cm, both surfaces shortly pubescent, lateral veins 6–8(–12)-paired, curved, veinlets coalescent, reticulate, base rounded or cuneate, margin entire or laxly crenate, apex obtuse, mucronulate. Upper leaves bractlike, smaller, distinctly auriculate. Capitula 14–17 mm in diam., 2–5 in terminal lax corymbs; peduncles 6–23 mm, shortly pubescent in upper part. Involucres broadly campanulate, 8–9 × 14–17 mm, with many linear calycular bracts; phyllaries ca. 14, lanceolate, 8–12 × 1–1.3 mm, apically subtriangular, sparsely puberulent. Florets ca. 50, exceeding involucres; corolla yellow, 10–12 mm, with slender, 7–9 mm tube and dilated limb; lobes ovate, ca. 2 mm. Anthers obtuse at base. Style branches with lanceolate appendages, papillose. Achenes brownish, cylindric, glabrous or puberulent. Pappus white, silky, ca. 10 mm. Fl. May–Nov.

Valleys, seasides; sea level to 500 m. Taiwan [Philippines].

10. Gynura procumbens (Loureiro) Merrill, Enum. Philipp. Fl. Pl. 3: 618. 1923.

平卧菊三七 ping wo ju san qi

Cacalia procumbens Loureiro, Fl. Cochinch. 2: 485. 1790; *C. sarmentosa* Blume; *Gynura cavaleriei* H. Léveillé; *G. emeiensis* Z. Y. Zhu; *G. sarmentosa* (Blume) Candolle.

Herbs, scandent. Stems procumbent, brownish or purple striate, glabrous or pubescent when young, branched. Leaf petiole 5–15 mm, glabrous; blade abaxially purplish, adaxially green, ovate, ovate-oblong, or elliptic, 3–8 × 1.5–3.5 cm, both surfaces glabrous, rarely sparsely pubescent, lateral veins 5–7-paired, curved, veinlets inconspicuous, base rounded-obtuse or cuneately attenuate into petiole, margin entire or repand-dentate, apex acute or acuminate. Upper stem leaves and leaves on synflorescence branches reduced, lanceolate or linear-lan-

ceolate, sessile or subsessile. Capitula 3–5 in each corymb, in terminal or axillary corymbs; peduncles long, slender, often with 1–3 linear bracts, sparsely shortly pubescent or glabrous. Involucres campanulate or funnelform, 15–17 × 5–10 mm; bracteoles at base 5 or 6, linear; phyllaries (9 or)11–13, becoming purplish, oblong-lanceolate, 15–17 × ca. 1.5 mm, glabrous, 1–3-veined, margin narrowly scarious, apically acuminate. Florets 20–30; corolla orange, 12–15 mm, with slender 8–10 mm tube and dilated limb; lobes ovate-lanceolate, apically acute. Anthers obtuse at base, appendages triangular. Style branch tips conical, papillose. Achenes brown, cylindric, 4–6 mm, glabrous, 10-ribbed. Pappus white, silky. Fl. Mar–Apr. $2n = 20$.

By streams in forests, sandy slopes, climbing on shrubs or trees; 200–900 m. ?Fujian, Guangdong, Guizhou, Hainan, Sichuan, Yunnan [Indonesia, Malaysia, Myanmar, Thailand, Vietnam; Africa].

112. EMILIA Cassini, Bull. Sci. Soc. Philom. Paris 1817: 68. 1817.

一点红属 yi dian hong shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam, Charles Jeffrey

Herbs annual or perennial, with fibrous roots, mostly subglabrous. Stems erect, branched or simple. Leaves mostly radical, alternate, simple, petiolate or sessile. Capitula discoid or radiate, homogamous or heterogamous, in terminal corymbs, sometimes solitary, without calyculus. Involucres cylindric; phyllaries uniseriate, free or basally connate. Receptacle flat, glabrous. Ray florets yellow; disk florets bisexual, yellow, orange, red, purple, pinkish, pale mauve, or white; corolla with funnelform limb and 5, usually narrow, lobes. Anther obtuse or slightly sagittate at base. Style branches truncate to obtuse, often penicillate, or with an appendage of fused papillae. Achenes elliptic-oblong, 5-ribbed, glabrous or hairy between ribs. Pappus of numerous white, slender bristles.

About 100 species: palaeotropical; five species (one introduced) in China.

1a. Style branches ending in a conspicuous appendage; florets orange-red or scarlet, rarely yellow ..... 1. *E. coccinea*
1b. Style branches truncate or subtruncate, or at most with a short conical appendage, without a conspicuous appendage of fused papillae; florets purplish, dull red, pale yellowish, pale orangish, or cream.
2a. Achenes glabrous; lower leaves entire or laxly dentate ..... 5. *E. prenanthoidea*
2b. Achenes pubescent; lower leaves lyrately lobed or strongly dentate.
3a. Florets cream, pallid yellow, or pale orange; corollas distinctly exceeding involucre ..... 4. *E. praetermissa*
3b. Florets purple or dull red, hardly or distinctly exceeding involucre.
4a. Lower leaves lyrate; involucres 3–4 × as long as broad, slightly shorter than or equaling corollas .... 2. *E. sonchifolia*
4b. Lower leaves strongly dentate; involucres 2–3 × as long as broad, ca. 3/4 as long as corollas ..... 3. *E. fosbergii*

1. Emilia coccinea (Sims) G. Don in Sweet, Hort. Brit., ed. 3, 382. 1839.

绒缨菊 rong ying ju

Cacalia coccinea Sims, Bot. Mag. 16: t. 564. 1802; *C. sagittata* Willdenow (1803), not Vahl (1794); *Emilia sagittata* Candolle var. *lutea* L. H. Bailey.

Herbs, annual. Stems erect, 40–70(–100) cm tall, glabrous or hispidulous. Basal and lower leaves shortly petiolate; blade oblong, obovate, or subspatulate, 5–7 × 2–2.5 cm, both surfaces puberulent, veins convex abaxially and conspicuously concave adaxially, base gradually attenuate, winged and semiamplexicaul, margin entire or repand-denticulate, apex obtuse. Median stem leaves sessile, oblong or ovate-oblong, large, basally hastate and amplexicaul. Upper leaves smaller, lanceolate or oblong-lanceolate, basally auriculate and amplexicaul, apically acute. Capitula several in terminal corymb, 10–15 mm; peduncles 10–30 mm, not bracteate. Involucres urceolate or top-shaped, 10–12 × 9–12 mm, without bracts at base; phyllaries distinctly shorter than florets, 10–13, linear-lanceolate, glabrous, margin narrowly scarious, apically acuminate. Florets numerous, ca. 50; corolla scarlet, rarely yellow, tube slender; lobes 5, lanceolate, 1.6–2.2 mm. Achenes cylindric, ca. 3 mm, puberulent, 5-ribbed. Pappus white, ca. 4 mm. Fl. Jul–Nov. $2n = 10, 20$.

Often cultivated as an ornamental plant in gardens in China [native to Africa; cultivated worldwide].

2. Emilia sonchifolia (Linnaeus) Candolle in Wight, Contr. Bot. India, 24. 1834.

一点红 yi dian hong

Herbs, annual; root vertical. Stems erect or ascending, gray-green, 25–40 cm tall, rather curved, usually branching from base, glabrous or sparsely pilose. Leaves thick, lower leaves crowded, abaxially dark green, often becoming purple, lyrate-pinnatilobed, 5–10 × 2.5–6.5 cm; terminal lobe large, broadly ovate-triangular, margin irregularly dentate, apex obtuse or subrounded; lateral lobes usually paired, oblong or oblong-lanceolate, both surfaces crisped-hairy, margin shallowly and bluntly dentate, apex obtuse or acute. Median stem leaves lax, sessile, smaller, ovate-lanceolate or oblong-lanceolate, basally hastately semiamplexicaul, margin entire or irregularly denticulate, apically acute; upper leaves few, linear. Capitula pendulous before anthesis, erect later, usually 2–5, in terminal lax corymbs; peduncles 2.5–5 cm, slender, not bracteate. Involucres cylindric, 6–12 × 1.5–4 mm; phyllaries 8 or 9, yellow-green, oblong-linear or linear, nearly equaling florets, glabrous, margin narrowly scarious, apically acuminate. Florets pink or purplish; corolla ca. 9 mm, with slender tube and dilated limb, deeply 5-lobed. Achenes cylindric, 3–4 mm, puberulent between ribs, 5-ribbed. Pappus of capillary-like bristles, snow white, ca. 8 mm. Fl. Jul–Oct. $2n = 10, 20$.

Weedy slopes, roadsides, field margins, sandy places; sea level to

2100 m. Anhui, Fujian, Guangdong, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [pantropical].

Emilia sonchifolia is used medicinally as an antiphlogistic and for dysentery.

1a. Corollas equaling or exceeding involucre by not more than 2 mm; corolla lobes 0.5–1.5 mm ..... 2a. var. *sonchifolia*

1b. Corollas exceeding involucre by (2.5–)3–4 mm; corolla lobes 1.2–2.2 mm ..... 2b. var. *javanica*

2a. Emilia sonchifolia var. **sonchifolia**

一点红(原变种) yi dian hong (yuan bian zhong)

Cacalia sonchifolia Linnaeus, Sp. Pl. 2: 835. 1753; *Crassocephalum sonchifolium* (Linnaeus) Lessing; *Emilia sinica* Miquel; *Senecio sonchifolius* (Linnaeus) Moench.

Involucres 6–12 × 1.5–3.5 mm. Corollas equaling involucre or exceeding it by not more than 2 mm; corolla lobes 0.5–1.5 mm. $2n = 10$.

Weedy slopes, roadsides, field margins; 800–2100 m. Anhui, Fujian, Guangdong, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [pantropical].

2b. Emilia sonchifolia var. **javanica** (N. L. Burman) Mattfeld, Bot. Jahrb. Syst. 62: 445. 1929.

紫背草 zi bei cao

Hieracium javanicum N. L. Burman, Fl. Indica, 174. 1768; *Emilia flammea* Cassini; *E. javanica* (N. L. Burman) C. B. Robinson; *E. sagittata* Candolle; *E. taiwanensis* S. S. Ying.

Involucres 6–12 × 2–4 mm. Corollas exceeding involucre by (2.5–)3–4 mm; corolla lobes 1.2–2.2 mm. $2n = 20$.

Weedy places, roadsides, field margins, sandy places; sea level to 900 m. Anhui, Fujian, Guangdong, Hainan, Hunan, Taiwan, Zhejiang [Japan; islands of S Pacific from Indonesia to E Polynesia].

3. Emilia fosbergii Nicolson, Phytologia 32: 34. 1975.

纓荣花 ying rong hua

Herbs, annual. Stems erect or ascending, 20–60(–100) cm tall, glabrous or sparsely pilose. Basal and lower stem leaves petiolate; blade ovate, ± dentate, strongly decurrent into petiole; median stem leaves oblong to oblong-lanceolate, base semiamplexicaul-hastate, margin shallowly to deeply dentate, apically acute; upper leaves ovate to lanceolate, dentate or entire, becoming bractiform upward. Capitula in lax compound corymbs. Involucres cylindric to suburceolate, ca. 15 × 5 mm; phyllaries ca. 10. Florets definitely exceeding involucre at anthesis; corolla dull red, with slender tube and cylindric limb; lobes 1–1.5 mm. Achenes ca. 5 mm, pubescent between ribs. Pappus white. $2n = 20$.

Waste places. Taiwan [tropical Pacific islands, Neotropics].

In spite of suggestions in the literature of an African origin, *Emilia fosbergii* does not occur in Africa.

4. Emilia praetermissa Milne-Redhead, Kew Bull. 5: 375. 1951.

黄花紫背草 huang hua zi bei cao

Herbs, annual. Stems erect or ascending, to 140 cm tall, glabrous or pilose. Basal and lower stem leaves petiolate; petiole 1.5–3 cm, in basal leaves unwinged and exauriculate, in lower stem leaves winged and basally auriculate; blade broadly ovate, 4–6 × 4.5–6 cm, ± pilose, base subcordate, margin dentate, apically obtuse; median and upper stem leaves sessile, pandurate to triangular, becoming smaller upward. Capitula up to 7 in lax corymbs, rarely solitary. Involucres cylindric, ca. 10 × 3–4 mm; phyllaries 9–12. Florets distinctly exceeding involucre; corollas cream, yellowish, or pallid orange, ca. 8 mm; lobes ca. 2 mm, tinged purple or orange. Achenes ca. 3 mm, pubescent. Pappus ca. 7 mm. $2n = 20$.

Disturbed places. N Taiwan [W tropical Africa].

Emilia praetermissa is presumably introduced, an allotetraploid of hybrid origin (*Emilia sonchifolia* var. *sonchifolia* × *E. lisowskiana* C. Jeffrey, the latter previously identified as *E. coccinea*).

5. Emilia prenanthoidea Candolle, Prodr. 6: 302. 1838.

小一点红 xiao yi dian hong

Emilia angustifolia Candolle.

Herbs, annual. Stems erect or ascending, 30–90 cm tall, glabrous or sparsely pilose. Basal leaves obovate or obovate-oblong, small, base gradually attenuate into long petiole, margin entire or laxly dentate, apex obtuse. Median leaves sessile, abaxially sometimes purplish, adaxially green, oblong or linear-oblong, 5–9 × 1–3 cm, glabrous or subglabrous, base semiamplexicaul, hastate or auriculate, margin repand-dentate, apex obtuse or acute. Upper leaves linear-lanceolate, small. Capitula arranged in terminal lax corymbs; peduncles 3–10 cm, slender. Involucres cylindric or narrowly campanulate, 6–11 × 2–3 mm; phyllaries 10, oblong, 6–12 × 1–2 mm, shorter than florets, glabrous, margin scarious. Florets red or purple-red; corolla ca. 10 mm, tube slender, limb 5-lobed; lobes lanceolate, 2–3 mm. Style branches apically thickened. Achenes cylindric, ca. 3 mm, glabrous, 5-ribbed. Pappus of capillary-like bristles, soft, white. Fl. and fr. May–Oct.

Roadsides on slopes, lax forests, wet places in forests; 500–2000 m. Fujian, Guangdong, Guangxi, Guizhou, Sichuan, Yunnan, Zhejiang [India, Indonesia, Malaysia, New Guinea, Philippines, Thailand, Vietnam].

113. PERICALLIS D. Don in Sweet, Brit. Fl. Gard. 6: t. 228. 1834.

瓜叶菊属 gua ye ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Shrubs, subshrubs, or perennial herbs, gray-white tomentose or glabrous. Leaves alternate on stem, margin obtusely dentate to

sharply serrate, palmately veined. Capitula numerous, corymbose, rarely solitary, heterogamous, radiate. Involucres not calyculate, campanulate; phyllaries 1-seriate, equal, margin membranous, apically obtuse or acute. Receptacle flat, without paleae. Ray florets radiate, female, fertile, variously colored but not yellow; central florets bisexual; corolla tubular with campanulate limb, white, cream-colored, or pink (never yellow), 5-lobed. Anthers not caudate, obtuse or sagittate at base; endothecial tissue polarized; antheropodium balusterform (basally distinctly enlarged). Style branches linear with separated stigmatic areas, apically truncate, with short sweeping hairs. Achenes terete (not compressed), elliptic-oblong, glabrous or puberulent, ribbed. Pappus of many fine caducous bristles, sometimes absent in ray florets. $x = 30$.

Fifteen species: Macaronesia (Azores, Canary Islands, Madeira), one species widely cultivated including in China.

1. Pericallis hybrida B. Nordenstam, Opera Bot. 44: 21. 1978.

瓜叶菊 gua ye ju

Cineraria hybrida Willdenow, Enum. Pl. 2: 893. 1809, not Bernhardi (1800).

Herbs, perennial. Stems erect, 30–70 cm tall, sparsely to densely white pubescent. Leaf petiole 4–10 cm, basally expanded and amplexicaul; blade abaxially green, adaxially gray-white, reniform to broadly cordate, sometimes upper leaves triangular-cordate, large, 10–15 × 10–20 cm, densely tomentose, palmately veined, concave abaxially, convex adaxially, base deeply cordate, margin irregularly deltoid-lobed or obtusely dentate, apex acute or acuminate. Uppermost leaves subsessile, smaller. Capitula numerous, terminal, broadly corymbose, 3–5 cm in diam.; peduncles 3–6 cm, coarse. Involucres campanulate, 5–10 × 7–15 mm; phyllaries 1-seriate, lanceolate, apically acuminate. Ray florets purple-red, blue, pink, or whitish; lamina spreading, narrowly elliptic-oblong, 2.5–3.5 × 1–1.5 cm, apically 3-denticulate. Disk florets white, cream-colored, or pink (never yellow), ca. 6 mm. Achenes oblong, 1.5–2 mm, angled or ribbed, at first hairy, glabrescent. Pappus of capillary-like bristles, white, 4–5 mm. Fl. and fr. Mar–Jul.

Widely cultivated in gardens and parks throughout China, also indoors [only known in cultivation, of hybrid origin from species native to Macaronesia (Canary Islands, Madeira)].

Pericallis hybrida is a colorful ornamental plant.

114. HAINANECIO Y. Liu & Q. E. Yang, Bot. Stud. 52: 117. 2011.

海南菊属 hai nan ju shu

Chen Yilin (陈艺林 Chen Yi-ling), Liu Ying (刘莹), Yang Qiner (杨亲二); Bertil Nordenstam

Herbs, perennial. Rhizomes thickened. Leaves rosulate, long petiolate; blade ovate to obovate, pinnately veined. Capitula solitary, terminal. Involucres hemispheric, ecalyculate; phyllaries ca. 13, lanceolate, apex acuminate. Ray florets ca. 13; lamina white, elliptic-oblong, apex acuminate, often 2-denticulate. Disk florets many; corolla white. Anthers rounded at base; apical appendage ovoid with abaxial cells obviously enlarged; endothecial cell wall thickenings polar and radial. Antheropodia cylindric. Pollen grains triporate, helianthoid. Style branches truncate. Achenes obovoid. Pappus absent. $x = 29$*.

• One species: China.

The genus has polar and radial endothecial cell wall thickenings, cylindric antheropodia, and a basic chromosome number of $x = 29$, all of which are characteristic of subtribe Tussilagininae. Nevertheless, recent molecular data suggest a position within subtribe Senecioninae and a relationship to the Macaronesian genus *Pericallis*, which shares some unusual characters with *Hainanecio* such as the non-yellow florets and the helianthoid pollen.

1. Hainanecio hainanensis (C. C. Chang & Y. C. Tseng) Y. Liu & Q. E. Yang, Bot. Stud. 52: 118. 2011.

海南菊 hai nan ju

Senecio hainanensis C. C. Chang & Y. C. Tseng, Fl. Hainan. 3: 585. 1974; *Sinosenecio hainanensis* (C. C. Chang & Y. C. Tseng) C. Jeffrey & Y. L. Chen.

Herbs, scapigerous. Rhizomes stout, to 6 mm in diam., rather woody. Stems 1–3, erect, scapiform, 15–30 cm tall, simple, arachnoid-tomentose, with white hairs when young, glabrescent. Leaves several, radical, rosulate, long petiolate; petiole 5–10 cm, stout, sparsely arachnoid-tomentose; blade ovate, ovate-oblong, or obovate, 6–12 × 4–8 cm, both surfaces densely white tomentose when young, ± glabrescent to glabrous or sparsely puberulent, pinnately veined with 6 or 7 lateral veins on each side, midvein prominent abaxially, base rounded to broadly cuneate and sometimes unequal, margin shallowly repand-dentate, with mucronulate teeth, apex rounded. Capitula solitary, terminal, ca. 2 cm in diam.; scapes not bracteate. Involucres campanulate-hemispheric, ca. 6 × 7 mm, not calyculate; receptacle subglabrous; phyllaries ca. 9, lanceolate, 1–1.5 mm wide, herbaceous, puberulent, margin scarious, apically puberulent, acuminate. Ray florets 9 or 10; corolla tube ca. 3 mm; lamina yellow, elliptic-oblong, 8–10 × 3–4 mm, 7-veined, apically 2-denticulate, acuminate. Disk florets numerous; corolla yellow, ca. 3.5 mm, with 1.5–2 mm tube and campanulate limb; lobes oblong-lanceolate, ca. 2 mm, apically acute. Anthers oblong, ca. 1.8 mm, basally obtuse to rounded, appendages ovate. Style branches recurved. Achenes obovoid-elliptic, ca. 3.5 mm, smooth, glabrous. Pappus absent. Fl. Jul–Oct, fr. Aug–Nov. $2n = 58$*.

• Shaded places in woods; 900–1200 m. Hainan (Baoting, Changjiang, Qiongzhong).

8. Tribe **ASTEREAE**

紫菀族 zi wan zu

Chen Yilin (陈艺林 Chen Yi-ling), Chen Yousheng (陈又生); Luc Brouillet, John C. Semple

Herbs, perennial, sometimes annual or biennial, subshrubs, or shrubs, sometimes lianas [or trees]. Leaves usually alternate, simple, margin entire, serrate, dentate, or pinnatisect, rarely pinnately lobed. Capitula radiate, sometimes disciform or rarely discoid. Phyllaries many, 1–5-seriate, imbricate or ± equal, herbaceous, membranous or subleathery, margins ± narrowly scarious. Receptacles flat or convex, sometimes hemispheric or conic, or rarely cup-shaped, alveolate or smooth, epaleate or rarely paleate. Ray florets 1 to numerous, 1(–3)-seriate, female, laminate or finely subulate, lamina yellow, rarely orange or reddish to brownish, or white to pink, blue, or purple, apex sometimes 2- or 3-toothed, sometimes multiseriate, with reduced lamina or elaminate, reduced to tube; disk florets bisexual or functionally male, yellow or rarely white, limb cylindric, funnelform, or campanulate; anther base obtuse, rarely caudate, apical appendage ovate to lanceolate; style branches with 2 adaxial stigmatic lines, apical appendages lanceolate to triangular, abaxially pilose, adaxially glabrous. Achenes cylindric, oblong, obovoid, or oblanceoloid, not blackened, usually ribbed or veined. Pappus 1–4-seriate, of barbed or barbellate, rarely long-barbed, fine or coarse bristles, sometimes of setae or scales (all or outermost series), or absent.

About 225 genera and 3,100 species: worldwide, especially in temperate areas of both hemispheres; 30 genera (three endemic, two introduced) and 237 species (112 endemic, 13 introduced) in China; one additional species (*Conyza stricta*) is of uncertain position.

1a. Capitula disciform or discoid.
2a. Capitula globose to rounded or oblong; involucres patelliform or hemispheric; receptacles globose to hemispheric or obconic, often swollen, or cup- or funnel-shaped peripherally, convex centrally, rarely flat or convex (*Thespis*); pappus absent or coroniform, rarely of 6–13 short, coarse bristles (*Thespis*); herbs annual, rarely perennial.
3a. Marginal floret corolla minutely tubular or absent; pappus of 6–13 short, coarse bristles; receptacles flat or convex; leaves unlobed ..... 120. *Thespis*
3b. Marginal floret corolla with filiform tube and/or lamina present; pappus absent or coroniform; receptacles globose to hemispheric or obconic, often swollen, or cup- or funnel-shaped peripherally, convex centrally; leaves often lyrately lobed or lobed, sometimes unlobed.
4a. Herbs prostrate; involucres patelliform.
5a. Marginal female florets cylindric-linear, funnel-shaped, or ovoid to urceolate, 2- or 3-lobed; disk florets functionally male; synflorescences racemiform or paniculiform, rarely solitary capitula ..... 116. *Dichrocephala*
5b. Marginal female florets tubular, outer 2-lobed, inner 3- or 4-lobed; disk florets bisexual; synflorescences solitary capitula or laxly corymbiform ..... 118. *Grangea*
4b. Herbs erect; involucres hemispheric.
6a. Leaves pinnatifid or pinnatisect; receptacles cup-shaped or funnel-shaped peripherally (female), slightly convex centrally (disk); marginal female floret lamina none (outer) or short, narrowly funnelform (inner), 2-lobed, purple; disk florets 5-lobed; achenes oblong to ± fusiform, not ribbed ..... 117. *Cyathocline*
6b. Leaves sometimes lyrate, sometimes lobed, or not lobed; receptacles convex, hemispheric or globose; ray floret lamina small, rounded, ovate or linear, white to purplish; disk florets 4-lobed; achenes narrowly obovoid, 2-ribbed ..... 119. *Myriactis*
2b. Capitula cup-shaped; involucres hemispheric or campanulate to turbinate or cylindric; receptacles flat or ± convex, or hemispheric-flattened or hemispheric-conic to lenticular-knobby; pappus of bristles (usually numerous, usually long); herbs perennial or annual, sometimes woody vines.
7a. Capitula discoid.
8a. Achenes obovoid; leaves eglandular (or sometimes stipitate glandular); capitula solitary at ends of branches, sometimes forming open paniculate-corymbiform synflorescences; disk floret lobes unequal ..... 139. *Aster*
8b. Achenes oblong or lanceolate; leaves gland-dotted or not; capitula in dense or loose corymbiform synflorescences, rarely solitary; disk floret lobes equal.
9a. Involucres broadly obconic to campanulate or hemispheric, phyllaries 1–3-veined; leaves sometimes 3-veined; rhizomes robust ..... 125. *Galatella*
9b. Involucres shortly cylindric or sometimes obconic, phyllary midvein ± distinct; leaves 1-veined; rhizomes slender ..... 126. *Crinitina*
7b. Capitula disciform.
10a. Woody vines, climbing; achenes angled, 3-ribbed ..... 122. *Microglossa*
10b. Herbs perennial or annual, climbing or erect; achenes compressed, flattened or cylindric, 2–4- or more ribbed or many veined (if 3-ribbed and angled then usually on ray only and disk achenes 2-ribbed).
11a. Capitula solitary or 2–4-fascicled at ends of branches, shortly pedunculate or sessile; disk corolla lobes unequal, outer 2 longer; herbs perennial, climbing or erect ..... 134. *Heteroplexis*

11b. Capitula terminal, solitary or few, or in racemiform, paniculiform, or corymbiform synflorescences, pedunculate; disk corolla lobes equal; herbs perennial or annual, erect.
12a. Herbs annual, eglandular, glabrous (leaf margin ciliate) ..... 144. *Symphyotrichum*
12b. Herbs annual or perennial, glandular (sometimes eglandular), hairy.
13a. Involucres urceolate or subcylindric ..... 141. *Erigeron*
13b. Involucres campanulate to hemispheric-campanulate.
14a. Disk florets functionally male (sterile); phyllaries 2- or 3-seriate ..... 135. *Psychrogeton*
14b. Disk florets bisexual (fertile); phyllaries 3- or 4-seriate.
15a. Phyllaries subequal; disk floret limb shortly funnelform; achenes oblanceolate, flattened ..... 136. *Neobrachyactis*
15b. Phyllaries imbricate (unequal); disk floret limb funnelform; achenes oblong, compressed.
16a. Female florets elaminate; pappus 1-seriate; synflorescences corymbiform, sometimes glomerate, glomerate-paniculiform, or paniculiform ..... 121. *Eschenbachia*
16b. Female florets laminate, lamina short, filiform; pappus ± 2-seriate, outer very short, slender; synflorescences densely compound-corymbiform (see species incertae sedis after *Eschenbachia*) ..... *Conyza stricta*

1b. Capitula radiate.
17a. Ray floret lamina yellow, orange, red, or brownish.
18a. Small shrubs; pappus 3-seriate, outermost of 6 broad scales, inner (absent in disk florets) of flattened bristles, innermost of strongly clavate bristles; leaf blade pinnatilobed; receptacles fimbriate ..... 133. *Formania*
18b. Herbs perennial, sometimes biennial or annual, or subshrubs; pappus 1–3-seriate, outer few short bristles or scales, inner series of bristles, innermost sometimes ± clavate, or only short scales; leaf blade subpinnatifid or unlobed; receptacles naked.
19a. Disk florets functionally male (sterile).
20a. Capitula ± large; phyllaries unequal to equal; herbage sometimes or partly long white lanate or cottony; achenes 8–10-veined; pappus bristles long barbellate ..... 115. *Nannoglottis*
20b. Capitula medium-sized to small; phyllaries imbricate; herbage white tomentose to lanate, sessile to short-stipitate glandular; achenes 2-ribbed; pappus bristles barbellate ..... 135. *Psychrogeton*
19b. Disk florets bisexual (fertile).
21a. Plants resinous; phyllaries looped or hooked; pappus of few deciduous scales or awns ..... 143. *Grindelia*
21b. Plants not resinous; phyllaries ± appressed; pappus 1–3-seriate, outer few short bristles or scales, inner series of bristles.
22a. Capitula numerous in terminal racemiform, paniculiform, or corymbose-paniculiform synflorescences; achenes obconic to cylindric, sometimes ± compressed, 8–10-veined ..... 140. *Solidago*
22b. Capitula solitary; achenes oblong, compressed, 2(–4)-veined ..... 141. *Erigeron*
17b. Ray floret lamina white, pink, purple, or blue.
23a. Pappus absent (that of disk sometimes 1-seriate short scales in *Aster*).
24a. Herbs scapiform, leaves basal, sometimes rosulate.
25a. Phyllaries leaflike; receptacles swollen or conic; involucres hemispheric or broadly campanulate; ray florets 1-seriate; disk florets bisexual (fertile), numerous; achenes not beaked, strigillose ..... 123. *Bellis*
25b. Phyllaries membranous; receptacles flat or convex; involucres campanulate; ray florets 3- or 4-seriate; disk florets functionally male (sterile), few; achenes shortly beaked, apically glandular .... 130. *Lagenophora*
24b. Herbs erect, leaves basal (often withered at anthesis) and cauline.
26a. Herbs biennial (winter annual); ray florets 3; disk florets few, functionally male (sterile); disk achene pappus absent; ray achenes 3-ribbed ..... 137. *Sheareria*
26b. Herbs perennial; ray florets numerous; disk florets numerous, bisexual (fertile); disk achene pappus absent or 1-seriate short scales; achenes 2–5- or more ribbed ..... 139. *Aster*
23b. Pappus present (rarely absent on ray achene only in *Erigeron*).
27a. Pappus 1-seriate, of caducous, barbellate, spiniform bristles; disk florets functionally male (sterile); achenes 3-ribbed, slightly winged ..... 131. *Calotis*
27b. Pappus 1–4-seriate, of persistent (deciduous in *Callistephus*) barbellate bristles; disk florets bisexual (fertile); achenes 2- to many ribbed, not winged.
28a. Outer phyllaries large, leaflike, inner scarious; pappus 3-seriate, outermost of persistent, short scales, inner 2 of deciduous bristles ..... 132. *Callistephus*
28b. Outer phyllaries leaflike (not large) or membranous, inner membranous; pappus 1–4-seriate, outermost of short setae or sometimes scales, inner of persistent (sometimes deciduous) bristles.
29a. Ray florets sterile; achene ribs indistinct; leaf blades often gland-dotted ..... 125. *Galatella*
29b. Ray florets female, fertile; achene ribs distinct; leaf blades eglandular or sessile or stipitate glandular (not gland-dotted).

30a. Subshrubs, strongly branched; leaf margins often revolute; phyllaries leathery ..... 127. *Asterothamnus*
30b. Herbs perennial, biennial, or annual; leaf margins flat (rarely revolute); phyllaries membranous or leaflike.
31a. Pappus conspicuously elongating after anthesis; herbs annual ..... 124. *Tripolium*
31b. Pappus not elongating after anthesis; herbs perennial, sometimes annual or biennial.
32a. Leaves basal, linear; achenes slightly veined, densely sericeous, eglandular; capitula solitary ..... 128. *Arctogeron*
32b. Leaves basal and cauline (sometimes reduced, then basal not linear); achenes ribbed or veined, glabrous or sparsely to densely strigillose, glandular or eglandular; capitula in synflorescences or solitary.
33a. Achenes 7–10-veined; stems ascending, villous, eglandular ..... 142. *Eurybia*
33b. Achenes 2–6-ribbed or -veined; stems usually erect, sometimes prostrate, glabrous or hairy, glandular or eglandular.
34a. Disk corollas ± zygomorphic (1 lobe deeper).
35a. Herbs perennial, caespitose; basal leaves numerous (persistent); receptacle shallowly alveolate, naked ..... 138. *Rhinactinidia*
35b. Herbs perennial, biennial, or annual, not caespitose, or rarely shrubs; basal leaves withered by anthesis; receptacle alveolate, fimbriate ..... 139. *Aster*
34b. Disk corollas actinomorphic.
36a. Capitula small, numerous in dense corymbiform synflorescences; stems densely glandular; disk corolla limb shortly funnelform; achenes ovoid ..... 129. *Turczaninovia*
36b. Capitula small or medium-sized, solitary or few to numerous in corymbiform, racemiform, or paniculiform synflorescences; stems ± glandular or eglandular; disk corolla limb cylindric to funnelform or campanulate; achenes oblong or obovoid to oblanceoloid.
37a. Disk floret limb cylindric to narrowly funnelform; phyllary midvein reddish or orange ..... 141. *Erigeron*
37b. Disk floret limb campanulate to funnelform; phyllary midvein not reddish or orange.
38a. Herbs perennial, sometimes annual, biennial, or shrubs, glandular or eglandular, glabrous or hairy; involucres hemispheric to campanulate, sometimes obconic; capitula solitary or in corymbiform, sometimes paniculiform synflorescences; achenes oblong or obovoid, compressed, 2–4(–7)-ribbed, glandular or eglandular ..... 139. *Aster*
38b. Herbs perennial or annual, eglandular, glabrous (except distally in lines); involucres campanulate or cylindric; capitula in paniculiform synflorescences; achenes oblanceoloid, ± compressed, 2–6-veined, eglandular ..... 144. *Symphyotrichum*

115. NANNOGLOTTIS Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 480. 1882.

毛冠菊属 mao guan ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Stereosanthus Franchet; *Vierhapperia* Handel-Mazzetti.

Herbs, perennial, rarely subshrubs; rhizome woody; herbage sometimes or partly long white lanate or cottony, stipitate glandular. Leaves alternate, basal and lower cauline long or shortly petiolate, blade lanceolate, ovate-lanceolate, oblong, orbicular, or cordate, margin coarsely serrate, mid and upper cauline sessile, often decurrent. Capitula ± large, few to numerous in corymbiform synflorescences, rarely solitary, radiate. Involucre hemispheric or cup-shaped; phyllaries 2–4-seriate, unequal to equal, herbaceous, rarely papery, multiveined, margins of inner narrowly scarious, outer glandular or long hairy. Receptacles flat or slightly convex, ± alveolate, naked. Ray florets outer with lamina yellow, reddish, or brownish, surpassing or ± equaling phyllaries, inner 2- or 3-seriate, rarely few or absent, tubular, elaminate, shorter than styles; disk functionally male, yellow, narrowly funnelform, 5-lobed, lobes lanceolate to linear-lanceolate, often glandular; anther bases obtuse or acute; style branches of ray florets linear-lanceolate, long, of disk ± appressed together, lanceolate, ± short, densely hairy (outer), without receptive papillae. Achenes brown, oblong, sparsely strigose, pale 8–10-veined. Pappus of few short, thin bristles (sometimes absent), and many long, coarse or thin, long-barbellate bristles, those of disk sometimes few, short, thin.

Nine species: Bhutan, China, India, Nepal; nine species (six endemic) in China.

J. Q. Liu et al. (Molec. Phylogen. Evol. 23: 307–325. 2002) produced a molecular phylogeny of *Nannoglottis*, showing it is one of the earliest diverging lineages of Astereae. *Nannoglottis ravida* is the earliest diverging member of the genus and has been segregated under *N.* sect. *Monocephala* T. G. Gao & Y. L. Chen from all other species of the genus.

1a. Subshrubs; capitula solitary; ray florets yellow; leaves abaxially densely cottony ..... 1. *N. ravida*
1b. Perennial herbs; capitula numerous in corymbiform synflorescences; ray florets yellow, brownish, or reddish; leaves abaxially ± densely cottony or arachnoid, or glandular.
2a. Ray florets brownish or reddish, lamina slightly exceeding involucre.
3a. Basal leaves cordate, long winged petiolate ..... 9. *N. yunnanensis*
3b. Basal leaves ovate-lanceolate, attenuate at base.
4a. Mid cauline leaves base abruptly narrowed into short, broadly winged petiole, margin denticulate, abaxially stipitate glandular ..... 8. *N. hieraciophylla*
4b. Mid cauline leaves base attenuate, margin dentate, abaxially stipitate glandular, sparsely arachnoid ..... 7. *N. carpesioides*
2b. Ray florets yellow, lamina distinctly exceeding involucre.
5a. Basal leaves abaxially densely lanate (glands not visible), sometimes arachnoid.
6a. Basal leaves long petiolate, cordate to orbicular or broadly ovate, margin shallowly dentate, teeth obtuse or acute, mid cauline abruptly smaller; phyllaries lanceolate ..... 2. *N. delavayi*
6b. Basal leaves shortly petiolate, ovate to lanceolate, margin irregularly denticulate to dentate, mid cauline developed; phyllaries ovate to lanceolate-ovate ..... 5. *N. latisquama*
5b. Basal leaves abaxially glandular or also arachnoid.
7a. Phyllaries papery, 3- or 4-seriate, unequal, outer shorter than inner ..... 3. *N. gynura*
7b. Phyllaries herbaceous, 2- or 3-seriate, equal or subequal.
8a. Basal leaves attenuate at base, decurrent on stem, usually sessile ..... 4. *N. hookeri*
8b. Basal leaves abruptly narrowed, long petiolate ..... 6. *N. macrocarpa*

1. Nannoglottis ravida (C. Winkler) Y. L. Chen, Kew Bull. 39: 432. 1984.

青海毛冠菊 qing hai mao guan ju

Senecio ravidus C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 4. 1893; *Nannoglottis qinghaiensis* Y. Ling & Y. L. Chen.

Subshrubs; rhizome thickened, woody, multibranched. Stems erect, 12–20 cm tall, pubescent with white cottony hairs and glandular hairs, later glabrescent. Leaves: basal oblanceolate or spatulate-oblong, 4–5 × ca. 1 cm; mid cauline petiole to 5 cm, winged, blade oblong or elliptic, 4–11 × 0.5–2.5 cm, abaxially densely cottony, adaxially green, arachnoid or glabrous, base attenuate, margin repand-dentate or shallowly lobed, apex obtuse or rounded. Capitula solitary. Involucre hemispheric, 13–15 mm in diam.; phyllaries 2- or 3-seriate, linear-lanceolate, 9–11 × 1–1.5 mm, abaxially white cottony and glandular, apex often reflexed, acuminate. Ray florets yellow, lamina linear, ca. 10 × 1 mm; tubular florets fine, ca. 4 mm, apically finely hairy; disk florets yellow, 5–6 mm, lobes glandular. Achenes oblong, appressed hairy, finely ribbed. Pappus of white bristles 5–6 mm. Fl. and fr. Jul–Aug.

• Rocky mountains, shady slopes, thickets, meadows; 3700–4100 m. S Qinghai (Chindu), Xizang.

2. Nannoglottis delavayi (Franchet) Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 98. 1965.

厚毛毛冠菊 hou mao mao guan ju

Stereosanthus delavayi Franchet, J. Bot. (Morot) 10: 385. 1896.

Herbs, perennial; rhizome woody. Stems erect, 35–80 cm tall, arachnoid and sparsely villous, stipitate glandular, densely so above. Leaves: basal and lower cauline petiole long, 6–20 cm, blade cordate to orbicular or broadly ovate, 6–19.5 × 5–16.5 cm, abaxially densely arachnoid-tomentose, adaxially arachnoid or glabrate, short-stipitate glandular, base cordate or abruptly attenuate, margin shallowly dentate, long-stipitate glandular, teeth obtuse or acute, mucronate, apex obtuse, mucronate; mid and upper cauline sessile, ± decurrent, abruptly smaller, decreasing upward, lanceolate, sometimes ± clasping. Capitula 3–18 in corymbiform synflorescences. Involucre hemispheric, 1.5–2 cm in diam.; phyllaries 3- or 4-seriate, lanceolate, subequal, abaxially sometimes sparsely to ± densely arachnoid, densely long-stipitate glandular, papery, margin long-stipitate glandular, sparsely arachnoid, moderately so apically, that of inner sometimes narrowly scarious, apex long acuminate. Ray florets yellow, lamina narrowly oblong, 9–15 × 1–3 mm, distinctly exceeding involucre; inner tubular 1- or 2-seriate, 2–4 mm, truncate, fimbriate; disk florets yellow, lobes ± glandular. Achenes narrowly oblong, 3–4 mm, strigose, 8–10-ribbed. Pappus of yellowish bristles 3–4 mm, some shorter and thinner, those of disk fewer, thinner. Fl. Jun–Sep.

• *Pinus* or *Quercus* forests; 2600–3600 m. SW Sichuan, NW Yunnan.

3. Nannoglottis gynura (C. Winkler) Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 97. 1965.

狭舌毛冠菊 xia she mao guan ju

Senecio gynura C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 157. 1895; *Nannoglottis souliei* (Franchet) Y. Ling & Y. L. Chen; *Stereosanthus gynura* (C. Winkler) Handel-Mazzetti; *S. hieraciifolius* Diels; *S. souliei* Franchet.

Herbs, perennial; rhizome thick, woody. Stems erect, 17–100 cm tall, sparsely (to moderately above) stipitate glandular, sparsely and irregularly arachnoid (more regularly so above), or glabrate. Leaves: basal and lower cauline petiole relatively short, 3–8 cm, narrowly winged, blade obovate or elliptic, 6–20 × 2.5–6 cm, surfaces sparsely to moderately short-stipitate glandular, abaxial midvein sparsely arachnoid, base attenuate, margin irregularly, shallowly dentate to serrate, teeth mucronulate, apex obtuse or acute; mid cauline narrowly elliptic to lanceo-

late, base auriculate-clasping; upper cauline reduced upward, entire. Capitula (5–)10–27 in corymbiform synflorescences. Involucre 2–3.5 cm in diam.; phyllaries 3- or 4-seriate, linear-lanceolate, unequal, outer shorter than inner, papery, surfaces densely short-stipitate glandular, ± arachnoid, margin apically densely arachnoid ciliate, that of inner narrowly to moderately scarious, apex acuminate to caudate, tip often dark. Ray florets yellow, lamina narrowly oblong, 9–13 × 1.8–2.5 mm, distinctly exceeding involucre; inner tubular 2- or 3-seriate, yellow, 2–4 mm, obliquely truncate; disk florets numerous, 4–4.5 mm, lobes glandular (mostly at apex). Achenes brown, narrowly oblong, 4–6 mm, sparsely to moderately strigose, particularly distally, pale 8–10-veined. Pappus of white or whitish bristles 4–5.5 mm, those of disk fewer. Fl. Jul–Aug.

Pinus or *Picea* forests, thickets, gullies, grasslands on slopes; 3400–4000 m. Qinghai, Sichuan, Xizang, Yunnan [Nepal].

4. Nannoglottis hookeri (C. B. Clarke ex J. D. Hooker) Kitamura, Acta Phytotax. Geobot. 31: 50. 1980.

虎克毛冠菊 hu ke mao guan ju

Doronicum hookeri C. B. Clarke ex J. D. Hooker, Fl. Brit. India 3: 332. 1881.

Herbs, perennial; rhizome woody. Stems erect, 10–85 cm tall, simple, often weakly lanate at first, stipitate glandular above. Leaves sessile or lowest winged petiolate, petiole to ca. 10 cm, blade lanceolate to oblanceolate, 7–22 × 1–8 cm, surfaces lanate or glabrescent, stipitate glandular, base attenuate, decurrent on stem, margin denticulate to sharply toothed, apex acute. Capitula 2–7 in corymbiform-cymose synflorescences. Involucre ± hemispheric, 15–20 mm in diam.; phyllaries 2- or 3-seriate, subequal, lanceolate, 10–15 × 1–4 mm, sparsely arachnoid and stipitate glandular, apex acuminate. Ray florets yellow, tube 2.3–4.5 mm, hairy above, lamina 8–13 × 1.7–3.3 mm, distinctly exceeding involucre; inner tubular 1- or 2-seriate, 2–3.5 mm, puberulent above; disk florets yellow, funnelform, 4–4.5 mm, lobes sparsely glandular. Achenes oblong, 4–5 mm, strigose distally. Pappus of white or brownish bristles 4–5 mm. Fl. Jun–Aug.

Pinus forests, sometimes among shrubs; 3400–4100 m. S Xizang (Yadong) [Bhutan, India (Sikkim), Nepal].

5. Nannoglottis latisquama Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 98. 1965.

宽苞毛冠菊 kuan bao mao guan ju

Stereosanthus yunnanensis Franchet, J. Bot. (Morot) 10: 385. 1896.

Herbs, perennial; rhizome thick. Stems solitary, erect, 12–70 cm, simple, ± densely white arachnoid and villous, long-stipitate glandular (notably above), partly glabrescent. Leaves: basal and lowest cauline petiole short, winged, blade ovate to lanceolate, sometimes obovate to oblanceolate, 4–20 × 3–17 cm, abaxially densely lanate to arachnoid, adaxially arachnoid, short-stipitate glandular, base attenuate, decurrent on stem, margin irregularly denticulate to dentate, apex obtuse or rounded, mucronate; mid cauline several, oblong, lanceolate, or ovate, sometimes obovate, apex obtuse or acute; upper cauline gradually reduced, surfaces white arachnoid-lanate or arachnoid, abaxially more densely so, adaxially ± glabrescent. Capitula (1 or)2–14, in corymbiform synflorescences, rarely solitary. Involucre hemispheric, 1.5–3.5 cm; phyllaries 3- or 4-seriate, subequal, herbaceous (inner papery), ovate to lanceolate-ovate, 13–18 × 2–5 mm, sometimes sparsely to densely white arachnoid, densely stipitate glandular, margin villous, long-stipitate glandular, distally moderately arachnoid ciliate, apex long acuminate. Ray florets yellow, oblong, 9–18 × 2–4 mm, distinctly exceeding involucre; inner tubular 2- or 3-seriate, 1.8–3.5 mm, truncate; disk florets yellow, tubular, 4–5.3 mm, lobes glandular. Achenes oblong, 4–4.5 mm, moderately strigose, 10-ribbed (sterile disk ovary glabrous or sparsely strigose distally). Pappus of straw-colored, coarse bristles 4–5 mm, plus some short, thin bristles, those of disk lacking or few and thin. Fl. Apr–Sep.

• *Pinus*, *Abies*, or mixed forests, thickets, grasslands, alpine meadows; 3200–3900 m. S and W Sichuan, NW Yunnan.

6. Nannoglottis macrocarpa Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 99. 1965.

大果毛冠菊 da guo mao guan ju

Herbs, perennial; rhizome ascending, woody. Stems erect, 30–100 cm tall, white lanate and sparsely villous, long-stipitate glandular. Leaves: basal long petiolate, blade ovate to ovate-lanceolate, 6–25 × 3–11 cm, abaxially stipitate glandular, adaxially sparsely arachnoid, very sparsely villous, stipitate glandular, margin coarsely dentate, apex obtuse; cauline sessile, lower ovate or elliptic, 15–20 × 8–18 cm, apex obtuse to acute; mid cauline up to 25, elliptic, 8–10 cm, base decurrent, apex acute; upper cauline ovate to ovate-lanceolate, base cordate, auriculate-clasping, apex acuminate. Capitula 3–20, in corymbiform-cymose synflorescences. Involucre hemispheric, 2–2.5 cm in diam.; phyllaries 2- or 3-seriate, subequal or outer slightly longer, lanceolate to linear-lanceolate, ca. 12 × 2–2.5 mm, herbaceous, abaxially short-stipitate glandular, margin apically lanate-ciliate. Ray florets yellow, lamina 6–8 × 0.6–1.3 mm, distinctly exceeding involucre; inner tubular 1- or 2-seriate, yellow; disk florets yellow, funnelform, 4–4.5 mm, lobes ca. 1.5 mm, short-stipitate glandular outside. Achenes oblong, 6–7 mm, ± densely strigose, 10–12-ribbed. Pappus of white to yellowish, coarse, unequal bristles 4–5 mm. Fl. Jul–Aug.

Forests, grasslands; 3500–3700 m. E Xizang (Bomi, Qamdo) [Nepal].

7. Nannoglottis carpesioides Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 481. 1882.

毛冠菊 mao guan ju

Herbs, perennial; rhizome woody. Stems erect, 60–100 cm tall, sparsely arachnoid-tomentose, long-stipitate glandular, more densely so above. Leaves: basal and lower cauline dense, petiole to 10 cm, winged, blade oblong or obovate-oblanceolate, 10–33 × 6–16 cm, abaxially sparsely arachnoid, stipitate glandular, veins long villous to arachnoid, adaxially stipitate glandular, sparsely arachnoid or not, base attenuate, often decurrent on stem, margin coarsely dentate to serrate, apex acuminate; mid cauline ovate to ovate-lanceolate, abaxially stipitate

glandular, sparsely arachnoid, base attenuate, margin coarsely dentate; upper cauline reduced gradually, finely dentate. Capitula 3–12 in loose racemiform or corymbiform synflorescences. Involucre hemispheric, 1.5–2.5 cm in diam.; phyllaries 2- or 3-seriate, subequal or outer slightly longer, lanceolate to oblong-lanceolate, 9–12 mm, papery, ± densely stipitate glandular, sometimes base sparsely arachnoid, margin stipitate glandular, of inner narrowly scarious, apex acute to acuminate. Ray florets brownish, lamina oblong, 1.9–4 × 1.1–1.7 mm, slightly exceeding involucre, abaxially sparsely stipitate glandular; inner tubular 1- or 2-seriate; disk florets yellowish, tubular, lobes glandular at apex. Achenes oblong, 4.5–5 mm, strigose, 8–10-ribbed. Pappus of dirty white, coarse bristles, those of disk few, short. Fl. Jun–Jul.

• Forests on slopes, meadows, pastures; 2000–3400 m. Gansu, Qinghai, Shaanxi, Yunnan.

8. Nannoglottis hieraciophylla (Handel-Mazzetti) Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 10: 101. 1965 [*"hieraciphylla"*].

玉龙毛冠菊 yu long mao guan ju

Vierhapperia hieraciophylla Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 629. 1937 [*"hieraciphylla"*].

Herbs, perennial; rhizome woody. Stems erect, 38–90 cm tall. Leaves: basal short, winged petiolate, blade ovate or oblong, 12–22 × 3.8–9 cm, abaxially stipitate glandular, base attenuate, margin dentate, villosulous; mid cauline broadly winged, shortly petiolate, blade abaxially stipitate glandular, sparsely villous on midvein, adaxially stipitate glandular, sparsely villosulous, base abruptly narrowed, margin denticulate; upper cauline sessile. Capitula 2–7, in corymbose synflorescences. Phyllaries 2–4-seriate, subequal, linear-lanceolate. Ray florets purplish-reddish, lamina 0.6–4 × 0.4–1.2 mm; inner tubular 1-seriate, filiform, sometimes unstable; disk florets numerous, yellowish, 4–5 mm, lobes glandular at apex. Achenes oblong, pilose, 8–10-ribbed. Pappus of few white bristles 3–4 mm. Fl. Jun–Sep.

• *Picea* forests or thickets; 3400–3800 m. NW Yunnan (Lijiang, Zhongdian).

9. Nannoglottis yunnanensis (Handel-Mazzetti) Handel-Mazzetti, Symb. Sin. 7: 1116. 1936 [*"yuennanensis"*].

云南毛冠菊 yun nan mao guan ju

Nannoglottis carpesioides Maximowicz var. *yunnanensis* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 175. 1920 [*"Yüannanensis"*].

Herbs, perennial; rhizome thick, woody. Stems erect, solitary, 55–200 cm tall, white long villous below, sparsely to moderately (more densely under capitula) white arachnoid, densely long-stipitate glandular above. Leaves: basal long winged petiolate, withered and fallen at anthesis, blade cordate; lower cauline petiole 6–16 cm, broadly winged, blade subcordate, broadly ovate, ovate, or subelliptic, 9–25 × 4.5–18 cm, abaxially arachnoid, sessile glandular or short-stipitate glandular, adaxially scaberulous to glabrate, base broadly cuneate, truncate, or slightly cordate, decurrent on stem, margin irregularly dentate, apex obtuse, rounded, or acute, mucronulate; upper cauline gradually diminished, uppermost sessile, auriculate. Capitula 3–10 in corymbiform-cymose synflorescences. Involucre hemispheric, 1.7–2.5 cm in diam.; phyllaries 2- or 3-seriate, subequal, lanceolate or linear-lanceolate, 8–13 × 1.5–2 mm, abaxially densely short-stipitate glandular, sparsely arachnoid at base, margin arachnoid ciliate (more densely so apically), of inner narrowly scarious, apex acuminate. Ray florets brownish, lamina linear-lanceolate to triangular, 0.5–3 mm, slightly exceeding involucre, gradually reduced inward to inner tubular florets; inner tubular 2–4-seriate, 1–2 mm, obliquely truncate; disk florets numerous, yellowish, 2–5 mm, deeply lobed, lobes sparsely glandular. Achenes straw-colored, narrowly oblong, 3–4 mm, strigose, 8–10-ribbed, (sterile ovary of disk florets glabrous or sparsely strigose apically). Pappus of straw-colored bristles 3–4 mm, those of disk few, unequal. Fl. Jun–Jul.

• *Picea* forests, open pastures; 2900–4000 m. W Sichuan, NW Yunnan (Zhongdian).

116. DICHROCEPHALA L'Héritier ex Candolle, Arch. Bot. (Paris) 2: 517. 1833.

鱼眼草属 yu yan cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual, prostrate. Leaves alternate, lyrate or entire. Capitula small, disciform, orbicular or oblong, in racemiform or paniculiform synflorescences, rarely solitary. Involucre patelliform; phyllaries 2- or 3-seriate, margins narrowly scarious, fimbriate. Receptacle globose or obconic, swollen, alveolate, naked. Florets fertile; marginal female many seriate, white or yellow, without tube, lamina narrowly cylindric, funnel-shaped, campanulate, or ovoid to urceolate, 2- or 3-lobed; disk florets bisexual, yellow or reddish, tube short, limb narrowly campanulate, 4- or 5-lobed; anther base obtuse; style branch tips lanceolate. Achenes obovoid, compressed, glabrous, sometimes basally and apically glandular, green apically, margins strongly 2-ribbed, of female florets sometimes faintly so. Pappus absent, of disk florets ± coroniform, sometimes with 1 or 2 short setae.

Four species: Africa, tropical Asia; three species in China.

1a. Corolla of female florets shortly funnel-shaped or campanulate; phyllaries ± puberulent; receptacle distinctly swollen, obconic, apex acute ..... 1. *D. chrysanthemifolia*

1b. Corolla of female florets cylindric or ovoid to urceolate; phyllaries glabrous; receptacle globose, apex flat.

2a. Female floret corolla narrowly cylindric; leaves lyrately pinnatilobate, base attenuate into winged petiole ... 2. *D. integrifolia*

2b. Female floret corolla ovoid or urceolate; leaves usually pinnate, rarely lyrately pinnatilobate, base expanded, auriculate-clasping, sessile ..... 3. *D. benthamii*

1. Dichrocephala chrysanthemifolia (Blume) Candolle, Arch. Bot. (Paris) 2: 518. 1833.

菊叶鱼眼草 ju ye yu yan cao

Cotula chrysanthemifolia Blume, Bijdr. 918. 1826; *Dichrocephala abyssinica* Schultz Bipontinus ex Hochstetter; *D. grangeifolia* Candolle.

Herbs, annual, branched. Stems and branches rigid, white tomentulose, pubescent, or hispidulous, long-stipitate glandular, branches ascending, spreading or apically oblique. Leaves oblong or obovate, 3–5 × 0.8–2 cm, pinnatifid, pinnatipartite, or pinnatilobate, surfaces ± densely white strigose and puberulent, sparsely glandular, base expanded, auriculate-clasping; lateral lobes 2- or 3-paired, oblong, lanceolate, or triangular-lanceolate, margin 1- or 2-serrulate on one or both sides, or entire; lobes of lower leaves relatively small, of middle large, of upper gradually smaller, uppermost linear, entire or with 1- or 2-paired teeth. Capitula globose or oblong, ca. 7 mm in diam., solitary in upper leaf axil and in subracemiform synflorescences; peduncles ca. 5 cm, densely puberulent or puberulent-tomentose; bracts 1–3, linear or lanceolate. Phyllaries 1- or 2-seriate, slightly unequal, ca. 1.5 mm, margin white scarious, ± puberulent. Receptacles obconic, distinctly swollen, 5–6 mm in fruit, apex acute. Marginal female florets many seriate, purple, corolla shortly funnel-shaped or campanulate, ca. 0.7 mm, deeply 3–5-lobed, lobes sometimes sparsely glandular; disk florets functionally male, few, ca. 1 mm, limb funnelform, 4- or 5-lobed, externally sparsely viscid-glandular, pilose. Achenes straw-colored, oblanceoloid, compressed, apically ± glandular. Pappus absent or of disk florets with 1 or 2 bristles.

Grasslands on slopes, roadsides; ca. 2900 m. Xizang, Yunnan [Bhutan, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, New Guinea, Philippines; Africa, Australia].

If varieties were recognized, the variety present in Asia would be *Dichrocephala chrysanthemifolia* var. *chrysanthemifolia*.

2. Dichrocephala integrifolia (Linnaeus f.) Kuntze, Revis. Gen. Pl. 1: 333. 1891.

鱼眼草 yu yan cao

Hippia integrifolia Linnaeus f., Suppl. Pl. 389. 1782; *Cotula bicolor* Roth; *C. latifolia* Persoon, nom. illeg. superfl.; *Dichrocephala auriculata* (Thunberg) Druce; *D. bicolor* (Roth) Schlechtendal; *D. latifolia* Candolle, nom. illeg. superfl.; *Ethulia auriculata* Thunberg; *Grangea latifolia* Lamarck ex Poiret, nom. illeg. superfl.

Herbs, annual. Stems erect, 12–55 cm tall, robust, rarely slender, simple or branched from base, branches ascending, stems and branches sparsely to moderately white villous or pubescent. Leaves: petiole 1–3.5 cm, narrowly winged, base clasping, blade ovate, elliptic, or lanceolate, surfaces sparsely to moderately strigose, margin coarsely doubly serrate or incised, villous-ciliate, base attenuate; mid cauline 3–12 × 2–4.5 cm, lyrately pinnatilobate, terminal lobe large, lateral lobes 1- or 2-paired; upper or lower often simple and gradually smaller. Capitula globose, 3–5 mm in diam., 5–26 in terminal paniculiform synflorescences; peduncles slender, to 3 cm. Phyllaries 2-seriate, unequal, oblong or oblong-lanceolate, 1–1.5 mm, membranous, margin scarious, fimbriate. Receptacle globose, apex flat. Marginal female florets many seriate, white, sometimes turning purplish, corolla narrowly cylindric, 0.4–0.5 mm, usually 2-lobed; disk florets few, ca. 0.5 mm, tube short, limb narrowly campanulate to funnelform, 4- or 5-lobed, sessile glandular. Achenes straw-colored, obovate, compressed, glabrous, sparsely glandular apically and/or basally. Pappus absent, or of disk florets sometimes with 1 or 2 bristles. Fl. and fr. year-round.

Slopes, shaded valleys, forests on slopes, watersides, meadows on clay, wastelands, roadsides, trailsides; 200–2000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam; tropical Africa, SW Asia (Iran); introduced in SW Asia (Azerbaijan, Georgia, Turkey), Australia, and Pacific islands].

This is a medicinal plant, used for dyspepsia, indigestion, as an antiphlogistic, and as an antiemetic.

3. Dichrocephala benthamii C. B. Clarke, Compos. Ind. 36. 1876.

小鱼眼草 xiao yu yan cao

Dichrocephala amphiloba H. Léveillé & Vaniot; *D. bodinieri* Vaniot.

Herbs, annual, 6.5–35 cm tall. Stems solitary or fascicled, robust, rarely slender, branched, sparsely to densely white villous or pubescent. Leaves sessile, blade ovate, obovate-oblong–spatulate, or oblong, surfaces sparsely villous, sometimes glabrescent or glabrate, veins densely villous-ciliate; mid cauline 3–6 × 1.5–3 cm, pinnate, rarely lyrate-pinnatilobate, sometimes unlobed, lateral lobes 1–3-paired, spatulate or broadly spatulate, base auriculate-clasping, margin coarsely crenate-serrate, densely or sparsely white shortly hairy. Capitula globose, 3–5 mm in diam., few or numerous in lax to dense corymbiform or paniculate-corymbiform synflorescences; peduncles slightly robust, puberulent or glabrate. Phyllaries 2- or 3-seriate, oblong, 1–1.5 mm, margin denticulate. Receptacle globose, apex flat. Marginal female florets many seriate, white, corolla ovoid or urceolate, 0.5–0.7 mm, 2- or 3-lobed; disk florets few, yellow-green, 0.8–0.9 mm, tube very short, limb funnelform, 4- or 5-lobed. Achenes straw-colored, obovoid, compressed, glabrous. Pappus absent, or of disk florets sometimes with 1 or 2 fine bristles. Fl. and fr. year-round.

Grasslands in valleys, riverbanks, fields, wastelands, roadsides; 700–3200 m. Gansu, Guangxi, Guizhou, Hubei, Sichuan, Xizang, Yunnan [Bhutan, Cambodia, India, Laos, Nepal, Vietnam].

117. CYATHOCLINE Cassini, Ann. Sci. Nat. (Paris) 17: 419. 1829.

杯菊属 bei ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual [or perennial]. Leaves alternate, pinnatifid or pinnatisect. Capitula small, globose, disciform, in corymbiform-

paniculiform or nearly racemiform synflorescences. Receptacles cup-shaped or funnel-shaped peripherally (bearing marginal florets), slightly convex centrally (bearing disk florets), non-alveolate, naked. Involucre hemispheric; phyllaries 2- or 3-seriate, subequal, oblong to lanceolate, margin scarious. Marginal florets female, fertile, many seriate, purple, tube filiform, lamina none (outer) to short, narrowly funnelform (inner), 2-lobed; disk florets bisexual, usually functionally male, few, limb funnelform, 5-lobed; anther base truncate, appendages triangular; style branch tips linear-lanceolate, of disk florets simple or cleft. Achenes minute, oblong to ± fusiform, slightly flattened, not ribbed, apex ± coroniform. Pappus absent.

Three species: tropical Asia; one species in China.

1. Cyathocline purpurea (Buchanan-Hamilton ex D. Don) Kuntze, Revis. Gen. Pl. 1: 333. 1891.

杯菊 bei ju

Tanacetum purpureum Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 181. 1825; *Cyathocline lyrata* Cassini; *C. stricta* Candolle; *Dichrocephala minutifolia* Vaniot.

Herbs, annual, 10–36+ cm tall. Stems erect, often branched from base, branches ascending, reddish purple or red tinged, villous, short-stipitate glandular, more densely so upward. Leaves: basal and lower cauline often deciduous by flowering, petiolate; mid cauline sessile, blade ovate or obovate, 2.5–12 cm, reduced distally, pinnatisect or pinnatifid, abaxially sparsely villous particularly along midvein, stipitate glandular, adaxially sparsely villous or glabrate, sparsely glandular, base expanded auriculate-clasping, segments opposite or oblique, interspersed with triangular lobes along rachis, larger and terminal segments ± lobed, margin spinose-serrate, ± stipitate glandular. Capitula small, numerous or few in often dense terminal corymbiform or corymbiform-paniculiform synflorescences; peduncles densely white villous, ± densely stipitate glandular. Involucre hemispheric, ca. 2 mm in diam.; phyllaries 2- or 3-seriate, subequal, membranous, abaxially sparsely white villous or glabrous, sometimes sparsely glandular (mostly distally), margin hyaline, scarious, ± fimbriate, ciliate, apex acuminate, purple. Marginal female florets purple, tube filiform and short, limb narrowly funnelform, 2-lobed; disk florets 7–11, purple or lobes purple, tube cylindric, 0.6–0.8 mm, limb funnelform, ca. 1.6 mm, lobes triangular. Achenes oblong to fusiform. Fl. and fr. nearly year-round.

Forests, grasslands on slopes, ravines, watersides, roadsides, fields; 100–2000 m. Guangdong, Guangxi, Guizhou, Sichuan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

118. GRANGEA Adanson, Fam. Pl. 2: 121. 1763.

田基黄属 tian ji huang shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual [or perennial], often prostrate. Leaves alternate, oblong-obovate to spatulate, lyrate-pinnatifid or serrate-dentate. Capitula disciform, globose, solitary or in laxly corymbiform synflorescences. Involucre patelliform; phyllaries 2- or 3-seriate, slightly unequal, herbaceous, inner series scarious at apex. Receptacle swollen, hemispheric or obconic, naked. Florets yellow. Marginal florets female, 1- to many seriate, corolla tubular, of outer usually 2-lobed, of inner 3- or 4-lobed; disk florets bisexual, fertile, limb narrowly campanulate, 4- or 5-lobed; anther base obtuse, apical appendage lanceolate; style branches truncate, obtuse or with triangular appendage, sometimes simple. Achenes compressed or subcylindric, apex truncate, often ringed. Pappus absent.

Nine species: tropical and subtropical Africa and Asia; one species in China.

1. Grangea maderaspatana (Linnaeus) Poiret, Encycl. Suppl. 2: 825. 1812.

田基黄 tian ji huang

Artemisia maderaspatana Linnaeus, Sp. Pl. 2: 849. 1753; *Cotula sphaeranthus* Link; *Grangea procumbens* Candolle; *G. sphaeranthus* (Link) K. Koch.

Herbs, annual, (5–)10–30 cm tall. Stems slender, usually procumbent, branched, white villous or glabrescent in lower part by anthesis. Leaves usually obovate, oblanceolate, or obspatulate, 3.5–7.5 × 1.5–2.5 cm, surfaces white villous, glandular; basal sessile, blade pandurate or lyrate-lobate, to ca. 10 × 4 cm, base usually auriculate, terminal lobe obovate or suborbicular, margin coarsely dentate, lateral lobes 2–5-paired; upper gradually smaller. Capitula terminal, solitary, rarely paired, 8–10 mm in diam. Involucre hemispheric; phyllaries 2- or 3-seriate, outer series lanceolate-ovate, 4–8 mm, outer surface villous, margin fimbriate, ciliate, apex acute to obtuse, inner series oblanceolate or obovate, clawed, obtuse. Receptacles hemispheric. Florets sparsely glandular; marginal female florets yellow, 2–6-seriate, corolla filiform, ca. 1 mm, shortly 2- or 4-lobed; disk florets shortly cylindric campanulate, ca. 1.5 mm, lobes ovate. Achenes compressed, glabrous, glandular, ± thickly 2-ribbed, apex truncate, with a thickened, toothed ring. Pappus absent. Fl. and fr. Jan–Aug.

Riverbanks, watersides, rice paddies, sandy areas, meadows, open forests, thickets; below 100–1000 m. Guangdong, Guangxi, Hainan, Taiwan, S Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam; tropical Africa].

The leaves are used medicinally as a stomachic, an antitussive, and for regulating menses.

119. MYRIACTIS Lessing, Linnaea 6: 127. 1831.

粘冠草属 nian guan cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual or perennial, herbage villous, long-stipitate glandular. Leaves alternate, basal and/or cauline, winged petiolate or sessile, blade oblanceolate-oblong to spatulate, sometimes lyrate, sometimes lobed, base clasping, margin ± coarsely dentate or serrate. Capitula small, heterogamous, solitary or numerous in lax corymbose-paniculiform synflorescences; peduncle long. Involucre hemispheric; phyllaries 2- or 3-seriate, subequal, papery, margin scarious, hyaline, ± fimbriate. Receptacles convex, hemispheric or globose, not alveolate, naked. Ray florets fertile, 2–5- or more seriate, tube short, lamina white to purplish, small, orbicular, ovate, or linear; disk florets functionally male, limb narrowly funnelform to campanulate, 4-lobed, lobes lanceolate; anther base obtuse; (disk) style branches appressed, without stigmatic lines, appendages lanceolate, abaxially hairy. Achenes narrowly obovoid, compressed, margin 2-ribbed, apex with short viscid collar (of ray florets), glabrous, ± glandular. Pappus absent.

About 12–16 species: tropical Africa and Asia; five species (one endemic) in China.

1a. Ray florets 5- or more seriate, lamina orbicular or ovate.
2a. Leaves simple, sometimes lower lobed or parted, lateral lobes 1- or 2-paired ..... 1. *M. nepalensis*
2b. Leaves lyrate-pinnatipartite or lobed or pinnatisect, or sometimes lower leaves orbicular, simple ..... 2. *M. humilis*
1b. Ray florets (1 or)2- or 3-seriate, lamina linear.
3a. Mid cauline leaves narrowly to broadly ovate ..... 3. *M. wightii*
3b. Mid cauline leaves lanceolate, elliptic, or elliptic-lanceolate to oblanceolate.
4a. Leaves serrate, parted or lobed, but not pinnatipartite ..... 4. *M. wallichii*
4b. Leaves pinnatipartite, sometimes lyrate ..... 5. *M. delavayi*

1. Myriactis nepalensis Lessing, Linnaea 6: 128. 1831.

圆舌粘冠草 yuan she nian guan cao

Dichrocephala leveillei Vaniot.

Herbs, perennial, usually robust, 15–100 cm tall; rhizomes short, procumbent. Stems erect, often branched from middle or base, branches ascending, glabrous or sparsely villous. Leaves: basal and lower cauline winged petiolate, petiole to 10 cm, blade simple, large, ovate-elliptic, sometimes lobed or parted, lateral lobes 1- or 2(or 3)-paired, petiole base sheathing; mid cauline elliptic to ovate, 4–10 × 2.5–4.5 cm, margin coarsely serrate or crenate, base decurrent into broad, winged petioles (lower) or sessile (upper), petiole base or blade base ± auriculate-clasping; upper gradually smaller, sessile, elliptic, oblanceolate, or lanceolate, surfaces sparsely villosulous particularly on veins, more moderately so adaxially, base ± auriculate-clasping. Capitula globose or hemispheric, 0.7–1.5 cm in diam., solitary or numerous in laxly corymbose-paniculiform synflorescences. Phyllaries 2- or 3-seriate, lanceolate, abaxially villosulous. Ray florets 8- or more seriate, lamina orbicular or ovate, 0.6–0.8 mm, apex rounded or emarginate; disk floret limb broadly funnelform, 1.2–1.3 mm, villosulous, 4-lobed. Achenes straw-colored, 1.6–2.1 mm, faces sometimes 1-veined, apical collar viscid, dark. Fl. and fr. Apr–Nov.

Forests, forest margins, thicket margins, slopes, wet areas on grassy-shrubby disturbed slopes, steep moist slopes, meadows, open and moist or humid areas along streamsides, ravines, roadsides; 700–3700 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Pakistan, Vietnam].

2. Myriactis humilis Merrill, Philipp. J. Sci. 1(Suppl. 3): 244. 1906.

台湾粘冠草 tai wan nian guan cao

Myriactis bipinnatisecta Kitamura; *M. formosana* Kitamura; *M. humilis* var. *bipinnatisecta* (Kitamura) S. S. Ying; *M. longipedunculata* Hayata; *M. longipedunculata* var. *bipinnatisecta* (Kitamura) Kitamura; *M. longipedunculata* var. *formosana* (Kitamura) Kitamura.

Herbs, perennial, 10–35 cm tall; rhizomes short, oblique. Stems solitary or to 3, erect, branched, branches ascending, or simple, scapiform, glabrous or ± puberulent. Leaves usually crowded in lower part (basal and lower cauline), petiole 2.5–4 cm, winged, blade elliptic, spatulate, or ovate, 2–3(–7) × 1–2(–4) cm, lyrate-pinnatipartite, pinnatipartite, or lyrate-bipinnatisect, or simple and ± orbicular to spatulate, surfaces sparsely to moderately strigose to glabrate, base auriculate-clasping, lateral lobes 2- or 3-paired, oblong to ovate or obovate, margin entire or 1-serrate on one side, terminal lobe large, broadly ovate to orbicular or oblong, margin coarsely serrate or lobed-serrate; upper cauline few, winged petiolate, blade oblanceolate-oblong or oblanceolate, pinnatipartite, base auriculate-clasping, terminal lobe obtriangular or lanceolate; uppermost sessile, simple, blade narrowly oblong, entire or few toothed. Capitula hemispheric, 6–9 mm in diam., few (usually 3 or 4), solitary at ends of stems and branches or in open paniculate-corymbiform synflorescences; peduncle 1–12 cm. Phyllaries 2-seriate, subequal, oblong or narrowly oblong with narrow scarious margin, outer series pulverous-puberulent. Ray florets 8- or more seriate, tube and abaxial lamina hairy, lamina orbicular, apex emarginate or rounded; disk florets funnelform, 1–1.4 mm, limb base hairy, 4-lobed. Achenes brown, 1.6–2 mm, glabrous. Fl. and fr. May–Oct.

• Moist and humid places on shady slopes, roadsides; 1700–3000 m. Taiwan.

3. Myriactis wightii Candolle in Wight, Contr. Bot. India, 10. 1834.

粘冠草 nian guan cao

Myriactis javanica Candolle; *M. wightii* var. *cordata* Y. Ling & C. Shih.

Herbs, annual, 20–90 cm tall. Stems erect, usually branched from middle, rarely proximally, or simple, subscapose, branches ascending or spreading, densely to sparsely villous or glabrate in lower part. Leaves often with axillary branches or fascicled; lower blade ovate, or sometimes lyrate-pinnatilobate, terminal lobe ovate; mid cauline petiole ± broadly winged, blade broadly to narrowly ovate, 5–8 × 3–6 cm, rarely lyrate-pinnatilobate, terminal lobe same shape as blade, surfaces villous to strigose-villous or villous only along veins, base clasping or auriculate-clasping, margin deeply crenate or serrate or incised-serrate, entire in uppermost leaves or lateral lobes. Capitula few or numerous in terminal, laxly corymbiform or paniculate-corymbiform and lateral, laxly racemiform synflorescences; peduncle 0.4–5 cm. Involucre hemispheric, ca. 1.2 cm in diam. (in fruit); phyllaries 2(or 3)-seriate, subequal, narrowly oblong to lanceolate, 3–4 mm, abaxially sparsely villous to glabrate, apex fimbriate-lacerate. Ray florets 2-seriate, tube ca. 0.4 mm, glandular, lamina linear, 0.8–1 × 0.1–0.2 mm, apex obtuse, sometimes 2-lobed; disk florets tube cylindric, ca. 0.4 mm, limb campanulate, 0.8–1 mm, 5-lobed, glabrous or base of limb barely glandular. Achenes greenish to pale brown, 1.5–2.5 mm. Fl. and fr. Jul–Nov.

Forests on slopes, mixed forests, grasslands, streamsides; 1900–3600 m. Guizhou, Sichuan, Xizang, Yunnan [India, Indonesia, Nepal, Sri Lanka, Vietnam].

Myriactis wightii var. *cordata* (FRPS 74: 355. 1985), defined on the basis of mid cauline leaf bases, does not appear to warrant recognition.

4. Myriactis wallichii Lessing, Linnaea 6: 129. 1831.

狐狸草 hu li cao

Herbs, annual, 15–60 cm tall. Stems erect, often many branched from base or middle, branches ascending, spreading, long, white strigillose, sparsely villosulous, or glabrate. Leaves: petiole narrowly winged, base slightly expanded or auriculate-clasping, blade surfaces sparsely white strigillose, sometimes glabrate, base abruptly attenuate to rounded, margin serrate, repand-dentate, or entire; mid cauline blade narrowly elliptic-lanceolate or narrowly elliptic, 4–4.6 × 2–3 cm, uppermost similar or sublinear. Capitula hemispheric, ca. 1 cm in diam. (in fruit), numerous in laxly corymbiform or subcorymbiform synflorescences, those of lower branches in paniculate-corymbiform or racemiform synflorescences; peduncle short and slender. Phyllaries 2-seriate, subequal, oblong or oblanceolate, 3–4 mm, sometimes sparsely pubescent at base. Ray florets 2- or 3-seriate, white becoming pink, lamina linear; disk florets yellow to yellow-green, limb campanulate. Achenes ca. 3.5 mm, shortly beaked, apically with a viscid secretion. Fl. Aug–Oct.

Grasslands, forests on slopes; 2600–3600 m. Guizhou, Hunan, Sichuan, Xizang, Yunnan [Afghanistan, Bhutan, India, Indonesia, Myanmar, Nepal, Pakistan, Thailand, Vietnam; SW Asia (Caucasus, Iran)].

5. Myriactis delavayi Gagnepain, Bull. Soc. Bot. France 68: 122. 1921.

羽裂粘冠草 yu lie nian guan cao

Herbs, perennial, 18–50 cm tall; rhizomes usually curved. Stems erect, sometimes ascending, branched from middle or sometimes simple, branches ascending, spreading, long, glabrous or sparsely strigillose. Leaves: petiole narrowly winged, base expanded and clasping, blade surfaces glabrate or sparsely strigillose along veins, margin sometimes sparsely strigillose-ciliate; basal and lower cauline blade oblanceolate, lyrate or pinnatipartite; mid cauline blade homomorphic, oblanceolate to narrowly oblanceolate, 4–7 × 1–3.5 cm, pinnatipartite, lateral lobes 1- or 2-paired, terminal lobe large, elliptic or long elliptic to ovate, margin serrate (often entire on lobes), mucronulate; upper blade narrowly oblanceolate or narrowly elliptic to (uppermost) linear, pinnatifid or pinnatilobate, to (uppermost) serrate or entire. Capitula hemispheric, 6–8 mm in diam. (in fruit), few in lax racemiform synflorescences (terminal seeming subcorymbiform). Phyllaries 3-seriate, subequal, lanceolate or oblong to oblanceolate (inner), 3–4 mm, outer externally strigillose. Ray florets 2- or 3-seriate, tube 0.7–0.8 mm, glandular, lamina linear, 1.15–1.25 × 0.3–0.5 mm, apex rounded, entire; disk floret functionally male, tube 0.2–0.3 mm, limb campanulate, 1.1–1.3 mm, upper tube and limb base glandular, 4(or 5)-lobed, lobes lanceolate, 0.75–0.8 mm. Achenes olive to pale brown, oblanceolate, compressed, 1.8–2.5 mm, short collar viscid. Fl. and fr. Aug–Sep.

Grasslands, forests on slopes; 2700–3000 m. Sichuan, Yunnan [Vietnam].

120. THESPIS Candolle, Arch. Bot. (Paris) 2: 517. 1833.

岐伞菊属 qi san ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual, dwarf, glabrous. Stems ascending to spreading, multibranched. Leaves alternate, simple, serrate or entire. Capitula disciform, small, globose, several, fascicled in divaricately branched corymbiform synflorescences, sessile or shortly pedunculate. Involucre hemispheric; phyllaries 2-seriate, herbaceous, subequal, broad, obtuse, margin scarious, 3-veined, usually slightly shorter than disk. Receptacle flat or convex, glabrous, with fine processes. Florets yellow; female fertile, multiseriate, corolla minutely tubular or lacking, glandular; disk florets functionally male, few, sterile, corolla tubular, tube short, limb funnelform, 4-lobed, lobe margins thickened, sometimes glandular; anther base obtuse, auriculate; style branches short, appressed. Achenes slightly compressed, small, minutely glandular or sparsely scabridulous, veined. Pappus of 6–13 short barbellate bristles in 1 series, of disk florets thin or absent.

Three species: SE Asia; one species in China.

1. Thespis divaricata Candolle, Arch. Bot. (Paris) 2: 517. 1833.

岐伞菊 qi san ju

Herbs, annual, 4–23 cm tall; root fusiform. Stems ascending, branched at base, sparsely pilose to glabrate. Leaves winged petiolate, blade obovate-lanceolate to obovate-spatulate, 1–2.5 × 0.5–1.5 cm, surfaces sparsely hispidulous on veins or glabrate, lateral veins 2–4-paired, base attenuate, margin coarsely serrate or entire, apex acuminate. Capitula 2–3 mm in diam., usually 5–10 fascicled. Involucre hemispheric; phyllaries 2-seriate, ovate-oblong, 1.5–2 mm, glabrous, margin entire, 3-veined. Female florets multiseriate, usually without corolla; disk florets few, corolla 1–1.1 mm. Achenes oblong-fusiform, slightly compressed, 0.7–0.8 mm, scabridulous, multiveined. Pappus of 8–13 pinkish bristles 0.44–0.54 mm, slightly shorter than styles in female florets, in disk florets of 6–8 white, smooth bristles ± equaling tube.

Field margins, roadsides; below 100–1000 m. Guangdong, S Yunnan (Xishuangbanna) [Bangladesh, Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

121. ESCHENBACHIA Moench, Methodus, 573. 1794.

白酒草属 bai jiu cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Dimorphanthes Cassini; *Edemias* Rafinesque.

Herbs, annual, biennial, or perennial. Stems erect, simple or branched, hirsute or strigose. Leaves alternate, margin entire, serrulate to coarsely serrate, pinnatipartite, or pinnatilobed. Capitula disciform, few to numerous, in corymbiform, sometimes glomerate, glomerate-paniculiform, or paniculiform synflorescences, rarely cymiform, rarely solitary. Involucre campanulate to hemispheric-campanulate; phyllaries 3- or 4-seriate, imbricate, obovate to ovate-lanceolate, lanceolate, linear-lanceolate, or linear, membranous, green ± widely along midvein, margin and apex scarious. Receptacles hemispheric-flattened, hemispheric-conic to lenticular-knobby, alveolate (central part bearing disk florets distinctly with wider alveolae), fimbriate. Florets fertile. Ray florets female, numerous, white, corolla reduced to filiform tube, elaminate, ca. 1/2 as long as style; disk florets bisexual, few to numerous, yellow or yellowish, limb funnelform, lobes 5; anther base obtuse; style branch tip short. Achenes oblong or lanceolate, compressed, ± strigillose, sometimes glandular, margin 2-ribbed. Pappus white to yellowish white or cinnamon to ± reddish, 1-seriate, sometimes basally connate in a ring, often deciduous, of subequal, fine, barbellulate bristles.

Number of species uncertain: Africa, S Asia; six species (three endemic) in China.

The genus *Conyza* Lessing, nom. cons., to which African and Asian species have been traditionally referred, is an American taxon that is phylogenetically nested within *Erigeron*, where it is treated here (only introduced species are in China). African and Asian species, however, do not belong to the North American clade but to the unrelated subtribe Grangeinae of the Astereae (Brouillet et al. in Funk et al., Syst. Evol. Biogeogr. Compositae, 589–629. 2009), an African group that repeatedly dispersed to S Asia. *Eschenbachia* is typified by *E. globosa* Moench, nom. illeg. superfl., based on *Erigeron aegyptiacus* Linnaeus. *Eschenbachia aegyptiaca* is part of the African subtribe Grangeinae (J. S. Strijk, pers. comm.). Most native Chinese species previously treated under *Conyza* appear assignable to *Eschenbachia* (except for *C. stricta*, species incertae sedis). The description of the genus given here is based solely on the species present in China.

1a. Leaves pinnatilobed or pinnatipartite.
  2a. Mid leaves pinnatilobed, petiole base subclasping; capitula 12–15 mm in diam., in dense corymbiform synflorescences ..... 1. *E. aegyptiaca*
  2b. Mid leaves pinnatipartite, petiole base not clasping; capitula 6–10 mm in diam., in short, narrow, paniculiform synflorescences ..... 2. *E. blinii*
1b. Leaves coarsely serrate or serrulate.
  3a. Annual or biennial herbs, taproot fusiform.
    4a. Stems densely villous, densely short-stipitate viscid glandular; mid cauline leaves shortly petiolate or subsessile, not clasping; capitula 3.1–7.9 mm in diam., in broadly paniculiform synflorescences; ray florets 1/5 or less as long as style ..... 3. *E. leucantha*
    4b. Stems scabrous (below) to villous, eglandular; mid cauline leaves sessile, base subclasping; capitula 7.5–11 mm in diam., in glomerate or dense corymbiform synflorescences; ray florets 1/2 or less as long as style ..... 4. *E. japonica*
  3b. Perennial herbs, rhizome or caudex woody.
    5a. Capitula 4–5 mm in diam.; phyllary margin narrowly scarious; cauline leaves oblong-lanceolate to lanceolate, coarsely serrate; disk floret lobes glandular ..... 5. *E. perennis*
    5b. Capitula 6–7 mm in diam.; phyllary margin ± broadly scarious; cauline leaves linear-oblanceolate to linear, sparsely serrulate or subentire; disk floret lobes hairy at apex ..... 6. *E. muliensis*

1. Eschenbachia aegyptiaca (Linnaeus) Brouillet, **comb. nov.**

埃及白酒草 ai ji bai jiu cao

Basionym: *Erigeron aegyptiacus* Linnaeus, Syst. Nat., ed. 12, 2: 549; Mant. Pl. 1: 112. 1767 [*"aegyptiacum"*]; *Conyza aegyptiaca* (Linnaeus) Aiton; *E. hispidus* Candolle; *Eschenbachia globosa* Moench, nom. illeg. superfl.

Herbs, annual, 20–100 cm tall; taproot woody, fibrous rooted. Stems erect, branched from base or middle, branches ascending, striate, densely white long hirsute, stipitate glandular. Leaves: lower withered at anthesis; mid sessile, blade narrowly oblong to oblanceolate, 4.5–9.5 × 1.4–3 cm, surfaces densely hirsute, densely stipitate glandular, veins slightly prominent, base subclasping, margin pinnatilobed, lobes in 6 or 7 pairs, narrowly oblong, apex obtuse, terminal lobe larger, apiculate; upper oblanceolate, gradually reduced, pinnatilobed; uppermost lanceolate or linear-lanceolate, serrate only at base. Capitula 12–15 mm in diam., 2–4 in dense corymbiform synflorescences; peduncles slender, 1.5–4.5 cm, densely strigose-villous. Involucre hemispheric-campanulate, ca. 8 × 15 mm; phyllaries 3- or 4-seriate, linear, abaxially villous, margin scarious, apex acuminate, slightly reflexed, outer ca. 3 mm. Ray florets reduced to tube, filiform, 2–3.7 mm, ca. 1/2 as long as style, apex puberulent; disk florets 25–33, funnelform, 4.3–4.5 mm, tube ca. 2.7 mm, hairy above, limb 1.5–1.8 mm, lobes 0.5–0.6 mm, apex hairy. Achenes straw-colored, oblong or oblanceolate, compressed, 0.8–1.1 mm, sparsely strigillose, sometimes 1 additional rib on one face. Pappus 1-seriate, basally connate in a ring, sometimes deciduous, dirty white, of 10–16 fragile bristles, 5–6 mm.

Seasides, riverbanks. Fujian, Guangdong, Taiwan [Afghanistan, Bangladesh, India, Japan, Malaysia, Myanmar, Pakistan, Vietnam; Africa, SW Asia (Iran), Australia].

2. Eschenbachia blinii (H. Léveillé) Brouillet, **comb. nov.**

熊胆草 xiong dan cao

Basionym: *Conyza blinii* H. Léveillé, Repert. Spec. Nov. Regni Veg. 8: 452. 1910; *C. dunniana* H. Léveillé; *C. pinnatifida* Franchet (1896) and Dunn (1903), not (Thunberg) Lessing (1832), nor Buchanan-Hamilton ex Roxburgh (1832).

Herbs, annual, 40–90(–100) cm tall; taproot simple or rarely branched, fibrous rooted. Stems erect, simple or branched, branches ascending, striate, white long hirsute, densely long-stipitate glandular, densely leafy. Leaves: surfaces long hirsute and densely long-stipitate glandular, blade pinnatipartite, rarely pinnatilobed, lobes in 3–6 pairs, linear, linear-lanceolate, or linear-oblanceolate, asymmetric, margin entire or sparsely coarsely serrate, apex acute, terminal lobe large, obovate-lanceolate, sparsely serrate; lower leaves petiolate, often withered at anthesis, sometimes marcescent; mid and upper sessile, ovate or ovate-oblong, 4–7.5(–10) × 2.5–3(–4) cm, base attenuate, not clasping. Capitula 6–10 mm in diam., in short, narrow, paniculiform synflorescences; peduncles densely hirsute, stipitate glandular. Involucre hemispheric-campanulate, ca. 6 × 10 mm; phyllaries 3- or 4-seriate, linear-lanceolate, abaxially hispid-villous, ± densely stipitate glandular, apex acuminate, outer ca. 3.5 mm, inner 6–7 mm, apex reddish purple, scarious, slightly reflexed. Florets yellow. Ray florets reduced to tube, filiform, 2–2.5 mm, almost 1/2 as long as style, sparsely puberulent above or glabrous; disk florets 40–50, 4–4.5 mm, tube ± puberulent, limb funnelform, lobes lanceolate. Achenes oblong to oblanceolate, compressed, 0.8–1 mm, strigose. Pappus 1-seriate, basally connate in a ring, sometimes deciduous, white to yellowish white or cinnamon, bristles slightly longer than disk corollas.

• Grasslands on slopes, around boulders in karst formations, open places, roadsides; 1800–2600 m. Guizhou, Sichuan, Yunnan.

3. Eschenbachia leucantha (D. Don) Brouillet, **comb. nov.**

粘毛白酒草 nian mao bai jiu cao

Basionym: *Erigeron leucanthus* D. Don, Prodr. Fl. Nepal. 171. 1825 [*"leucanthum"*]; *Blumea conyzoides* H. Léveillé & Vaniot; *Conyza leucantha* (D. Don) Ludlow & P. H. Raven; *C. viscidula* Wallich ex Candolle; *Vernonia ampla* Vaniot (1903), not O. Hoffmann (1901).

Herbs, annual, 40–200 cm tall, sometimes bushy; taproot fusiform, woody, fibrous rooted. Stems erect, branched, upper branches divaricate, striate, densely villous, densely short-stipitate viscid glandular, densely leafy. Leaves: lower withered and fallen at anthesis; mid cauline shortly petiolate or subsessile, not clasping, blade elliptic-oblong to ovate or lanceolate, 7–14 × 2.5–3.5 cm, surfaces ± densely sessile glandular, abaxially villosulous, adaxially scabrous, lateral veins 4–6-paired, abaxially prominent, base cuneate to attenuate, margin serrate to serrulate, teeth mucronulate, apex acuminate; upper blade lanceolate, reduced upward; uppermost (on synflorescence branches) sessile, 3–5 cm, margin entire or serrulate. Capitula 3.1–7.9 mm in diam., numerous, in broadly glomerate-paniculiform synflorescences; peduncles slender, 3–9 mm, densely long-stipitate glandular and/or villous. Involucre campanulate, 3.1–4 × 3.5–6.2 mm; phyllaries 3- or 4-seriate, outer green, linear-lanceolate, short, abaxially ± densely stipitate glandular and/or villous, margin sometimes narrowly scarious, apex acuminate, inner linear-lanceolate to linear-oblong, green along midvein, margin scarious, sometimes purplish, apex acuminate, often purplish. Ray florets white, reduced to tube, filiform, 0.3–0.65 mm, 1/5 or less as long as pinkish style, lacerate at apex, glabrous; disk florets 6–9, yellow becoming reddish, funnelform, 3.5–4.1 mm, tube ca. 2.2 mm, sparsely hairy above, limb ca. 3.9 mm, lobes lanceolate, ca. 0.6 mm. Achenes straw-colored to pale brown, lanceolate, compressed, 0.4–0.6 mm, sparsely strigillose. Pappus 1-seriate, basally connate in a ring, deciduous, yellowish or cinnamon to pale reddish, bristles 10–15, 3.5–4.5 mm. Fl. Sep–Dec.

Open slopes, ravines, field margins, dry margins of woods, thickets, roadsides, wastelands; 200–1800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Nepal, Thailand, Vietnam; Australia].

4. Eschenbachia japonica (Thunberg) J. Koster, Blumea 7: 290. 1952.

白酒草 bai jiu cao

Erigeron japonicus Thunberg in Murray, Syst. Veg., ed.

14, 754. 1784 [*"japonicum"*]; *Blumea globata* Vaniot; *B. subcapitata* Matsumura & Hayata (1908), not Candolle (1836); *Conyza asteroides* Wallich ex Candolle (1836), not Linnaeus (1753); *C. japonica* (Thunberg) Lessing; *C. multicaulis* Candolle; *C. stricta* Wallich ex Candolle (1836), not Willdenow (1803); *C. veronicifolia* Wallich ex Candolle.

Herbs, annual or biennial, (15–)20–45+ cm tall; taproot simple, fusiform. Stems erect, branched from base or middle, sometimes simple, branches ascending or spreading, striate, white scabrous (below) to villous, more densely so upward, sometimes ± glabrescent below, eglandular. Leaves usually crowded in lower part, basal in rosette, shortly to long petiolate, petiole ± narrowly winged, blade elliptic or obovate to spatulate, 6–7 cm, base attenuate to rounded, apex rounded to obtuse; lower long petiolate, petiole often broadly winged upward, blade oblong or elliptic-oblong or oblanceolate, 3–13 cm, surfaces white villous, lateral veins 4- or 5-paired, abaxially prominent, base cuneate or attenuate, margin ± coarsely serrate, teeth mucronulate, strigose, apex rounded to obtuse or acute; mid dispersed, sessile, blade oblanceolate-oblong or oblong-lanceolate to lanceolate, 3.5–5 × 0.5–1.5 cm, base rounded, subclasping, margin serrate to serrulate, apex obtuse to acute; upper reduced, blade lanceolate or linear-lanceolate, surfaces strigose, eglandular, adaxially scabrous (and sometimes also abaxially), margin entire to sparsely serrulate. Capitula numerous, 7.5–11 mm in diam., usually crowded in glomerate or dense corymbiform synflorescences; peduncles slender, 4–6 mm, densely villous. Involucre campanulate to hemispheric-campanulate, 4–5.5 × 7.5–10 mm; phyllaries 3- or 4-seriate, abaxially villous, outer shorter, obovate to ovate-lanceolate, 2–2.9 mm, apex obtuse, inner lanceolate to linear, 3.8–5 mm, margin ± widely scarious, erose, often ± purplish (notably apically), apex acute or acuminate. Ray florets white becoming purplish, corolla filiform, 1.1–2 mm, 1/2 or less as long as style, apically ciliate; disk florets 15 or 16, pale yellow becoming reddish, 4–4.1 mm, tube ca. 2.25 mm, hairy distally, limb ca. 1.75 mm, lobes lanceolate, ca. 0.5 mm, apically hairy. Achenes straw-colored to pale brown, oblong, 1–1.2 mm, sparsely strigillose. Pappus basally connate in a ring, deciduous, pinkish white or cinnamon to reddish, bristles 10–14, 3.3–4.5 mm. Fl. Mar–Sep.

Forest margins, grassy slopes, dry meadows, exposed slopes, field margins, roadsides, gardens; 400–2500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Japan, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Vietnam].

5. Eschenbachia perennis (Handel-Mazzetti) Brouillet, **comb. nov.**

宿根白酒草 su gen bai jiu cao

Basionym: *Conyza perennis* Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 630. 1937.

Herbs, perennial, 25–40 cm tall, collar surrounded by marcescent leaf bases; rhizomes thick, woody, erect or ascending. Stems solitary, erect, simple, striate, white hirsute, often also strigillose. Leaves: basal rosulate, present at anthesis; basal and lower petiolate, petiole narrowly winged, usually 1/2 as long as blade, densely hirsute and hirsute-ciliate, petiole base clasping or subclasping, blade ovate or elliptic-ovate to lanceolate or oblanceolate, 5–9 × 1.5–2.5 cm, surfaces sparsely hirsute, base attenuate, margin coarsely serrate, hirsute-ciliate, lateral veins 3- or 4-paired, apex acute to obtuse; upper shortly petiolate or sessile, blade oblong-lanceolate to lanceolate, gradually reduced; uppermost base almost rounded, margin entire, apex acuminate. Capitula 4–5 mm in diam., numerous, usually in dense cymiform or partly glomerate synflorescences; peduncles 5–6 mm; bracteole 1, lanceolate, villous to strigillose or glabrate. Involucre campanulate, ca. 4 mm in diam.; phyllaries 3-seriate, lanceolate to linear-lanceolate, outer ca. 1/2 as long as inner, abaxially strigillose, margin narrowly scarious, sometimes erose-fimbriate apically, apex acuminate, inner 2.5–3.5 mm. Ray floret corolla reduced to tube, filiform, 1–1.5 mm, ca. 1/2 as long as style, apex hairy; disk florets ca. 23, ca. 3 mm, lobes lanceolate, glandular. Achenes oblong, ca. 0.7 mm, sparsely pilose to glabrate. Pappus white, almost equaling disk corollas. Fl. Feb–Apr.

• Thickets on sandy ground by riverbanks; ca. 1600 m. SW Guizhou, S Yunnan.

6. Eschenbachia muliensis (Y. L. Chen) Brouillet, **comb. nov.**

木里白酒草 mu li bai jiu cao

Basionym: *Conyza muliensis* Y. L. Chen, Fl. Reipubl. Popularis Sin. 74: 361. 1985.

Herbs, perennial, 3–21 cm tall, sometimes caespitose, collar surrounded by leaf base remains; caudex woody, ascending, branched, taprooted. Stems solitary or 2–4, slender, erect, simple, gray-white long strigose. Leaves: surfaces moderately long strigose, glabrescent, margin often serrulate distally, teeth mucronulate, rarely entire, strigose-ciliate; basal in rosette, present at anthesis, long petiolate, petiole narrowly winged, petiole base widened, clasping, blade oblanceolate to spatulate, 2–5 × 0.3–0.5 cm, base cuneate-attenuate, apex obtuse to acute, mucronate; cauline scattered, lowest petiolate, upper sessile or subsessile, not clasping, lower blade linear-oblanceolate to linear, 2–3.5 × 0.1–0.3 cm, base attenuate, margin sparsely serrulate or subentire, apex acute; upper blade gradually reduced, linear, margin entire or with 1 or 2 inconspicuous teeth. Capitula 6–7 mm in diam., usually 3–6 in corymbiform synflorescences, rarely solitary; peduncles slender, 3–8 mm. Involucre campanulate, ca. 4 × 6–8 mm; phyllaries 3-seriate, narrowly oblong or lanceolate, abaxially sparsely strigose, margin ± broadly scarious, erose-lacerate, apex acuminate or ± obtuse, outer ca. 1/2 as long as inner. Ray floret corolla reduced to tube, filiform, 1–1.2 mm, ca. 1/2 as long as style, apex hairy; disk florets 13–23, yellowish, narrowly funnelform, 2.5–3 mm, tube 1–1.5 mm, lobes lanceolate, ca. 0.5 mm, apex hairy. Achenes oblong, 1–1.2 mm, sparsely strigose, glandular. Pappus dirty to pinkish white, bristles ca. 10, 2.5–3.2 mm. Fl. Jun.

• Sandy riverbanks; ca. 2200 m. SW Sichuan (Muli).

Species incertae sedis

Conyza stricta Willdenow, Sp. Pl. 3: 1922. 1803.

劲直白酒草 jin zhi bai jiu cao

Herbs, annual, woody taprooted, and fibrous rooted. Stems erect, 30–65 cm tall, finely striate, multibranched from base or middle, branches slender, strict, densely grayish scabrous, ± densely sessile or short-stipitate glandular, densely leafy. Basal leaves fallen at anthesis; lower and mid cauline petiole narrowly winged, base subclasping, blade obovate, sometimes oblanceolate, 3–5.5 × 0.5–1.3 cm, surfaces densely grayish scabrous, densely sessile or short-stipitate glandular, lateral veins 3- or 4-paired, abaxially distinct, base cuneate or attenuate, margin coarsely serrate or pinnatilobate, mucronulate, rarely entire, apex obtuse, mucronate, or apiculate; mid upper sessile, linear-oblanceolate, 1.2–2 × 0.2–0.4 cm, 1-veined, margin entire, sometimes 3-fid; uppermost gradually reduced, linear. Capitula (2–)3 mm in diam., numerous, in dense compound-corymbose synflorescences; peduncles 2–4 mm, densely villous-scabrous. Receptacle convex, ± alveolate, not fimbriate. Involucre campanulate, 2–2.5 mm in diam.; phyllaries 3-seriate, linear-lanceolate, margin narrowly scarious, entire, apex acuminate, outer green, ca. 1.6 mm, villous-scabrous, sessile glandular, inner green along midvein, 1.5–4 mm, apex ± reflexed. Florets yellow, fertile. Ray florets female, 1.1–1.7 mm, tube sparsely hairy, lamina white, linear, 0.4–0.46 mm, sometimes 2- or 3-lacerate, ± equaling or sometimes shorter than style; disk florets 4 or 5(–7), bisexual, narrowly funnelform, 1.6–2.1 mm, tube 0.8–1.4 mm, sparsely hairy, limb 0.7–0.9 mm, lobes 0.3–0.5 mm, lanceolate, glandular, sometimes eglandular. Achenes narrowly ovate, 0.3–0.65 mm, sparsely strigose, margin slightly 2-ribbed. Pappus orangish, ± 2-seriate, outer very short, thin, inner of 12–15 barbellate bristles 1–1.9 mm, almost equaling disk corollas. Fl. (Aug–)Sep–Nov.

Grasslands on slopes, field margins; 1100–2600 m. Hainan, Sichuan, S Xizang, Yunnan [Afghanistan, Bhutan, India, Myanmar, Nepal, Pakistan, Thailand, Vietnam; E Africa].

Conyza stricta belongs to the polyphyletic African conyzas. In phylogenies (J. S. Strijk, pers. comm.), it is distinct from the species here placed in *Eschenbachia*, close to the African genus *Nidorella* Cassini. It is yet unclear whether it belongs there or in a new, separate genus. It does not belong in *Conyza* s.s., a synonym of *Erigeron*.

1a. Lower leaf margin coarsely serrate, rarely entire; upper leaves gradually reduced ..... var. *stricta*
1b. Lower leaf margin deeply repand-pinnatilobate, lobes 2-paired, oblong-oblanceolate or cuneate, margin entire, terminal lobe larger; upper leaves and those on branches 3-fid ..... var. *pinnatifida*

Conyza stricta var. **stricta**

劲直白酒草(原变种) jin zhi bai jiu cao (yuan bian zhong)

Stems 30–65 cm tall, branched. Lower leaf margin coarsely serrate, rarely entire; upper leaves gradually reduced, simple. Fl. Sep–Nov.

Grasslands on slopes, field margins; 1100–2300 m. Hainan, Sichuan, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand, Vietnam; E Africa].

Conyza stricta var. **pinnatifida** Kitamura in H. Hara, Fl. E. Himalaya, 337. 1966.

羽裂白酒草 yu lie bai jiu cao

Erigeron pinnatifidus D. Don, Prodr. Fl. Nepal. 172. 1825, not Thunberg (1800); *Conyza absinthifolia* Candolle; *C. mairei* H. Léveillé; *C. pinnatifida* Buchanan-Hamilton ex Roxburgh (Oct–Dec 1832), not (Thunberg) Lessing (Jul–Aug 1832), nor Franchet (1896), nor Dunn (1903); *E. trisulcus* D. Don.

Stems 30–45 cm tall, usually branched from middle or base, rarely simple. Lower leaf margin deeply repand-pinnatilobate, lobes 2-paired, oblong-oblanceolate or cuneate, margin entire, terminal lobe larger; upper leaves and those on branches 3-fid. Fl. Aug–Nov.

Grasslands on slopes; 1800–2600 m. Sichuan, S Xizang, Yunnan [Afghanistan, Bhutan, India, Myanmar, Nepal, Pakistan].

122. MICROGLOSSA Candolle, Prodr. 5: 320. 1836.

小舌菊属 xiao she ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Vines [or subshrubs], woody, climbing [or erect]. Leaves alternate, petiolate, blade ovate, margin entire or crenulate. Capitula disciform, small, numerous, in crowded compound-corymbiform synflorescences. Involucre campanulate; phyllaries multiseriate, imbricate, oblong-lanceolate or linear, scabrid, apex obtuse, outer shorter. Receptacles convex [or flat], alveolate, naked, glabrous. Florets fertile; ray florets numerous, lamina white, filiform, shorter than style; disk florets bisexual, yellow, limb narrowly funnelform, 3–5-lobed; anther base obtuse; style branch tips lanceolate. Achenes obovoid, strigillose, margin angled, 3-ribbed. Pappus reddish to cinnamon, of numerous 1–3-seriate, ± equal, barbellate bristles.

About ten species: Africa, Asia; one species in China.

1. Microglossa pyrifolia (Lamarck) Kuntze, Revis. Gen. Pl. 1: 353. 1891.

小舌菊 xiao she ju

Conyza pyrifolia Lamarck, Encycl. 2: 89. 1786; *C. syringifolia* Meyen & Walpers; *Erigeron pyrifolius* (Lamarck) Bentham; *Microglossa volubilis* Candolle.

Vines, woody, 0.7–3 m tall, climbing. Stems divaricately branched, striate, villosulous, densely minutely stipitate glan-

dular, glabrescent. Leaves abaxially pale green, adaxially green, ovate, 5–10 × 2.5–4 cm, abaxially densely stipitate glandular, veins densely ferruginous villosulous, adaxially scabrid, base attenuate, margin undulate, crenulate, ciliate, veins pronounced, apex acuminate, mucronate. Capitula 5–6 mm in diam., numerous in axillary or terminal, dense compound-corymbiform synflorescences. Involucre campanulate; phyllaries 4- or 5-seriate, membranous, midvein brown, apex obtuse, ± erose, outer ovate-lanceolate, 0.7–2 mm, abaxially sparsely villosulous, stipitate glandular, midvein pronounced, distally enlarged, middle and inner linear-lanceolate, 2–5 mm, margin hyaline, midvein thin, glabrous, middle sometimes ± stipitate glandular, inner eglandular. Receptacles convex. Ray florets numerous, lamina filiform, ca. 1 mm; disk florets yellow, ca. 5 mm, tube and limb base hairy, limb funnelform, ca. 2.5 mm, lobes 5, linear-triangular, ca. 1 mm. Achenes obovoid, slightly compressed, ca. 1 mm, 3- or 4-ribbed, sometimes veined, sparsely strigillose, stipitate glandular apically. Pappus 2- or 3-seriate, of cinnamon to reddish or white, thin bristles, outer 0–2, ca. 1 mm, inner ca. 4 mm, tapering, innermost 4.2–4.5 mm, slightly clavate. Fl. and fr. year-round.

Thickets on slopes, open forests, forest margins, stream banks, wastelands, edges of bamboo plantations; sea level to 1800 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, N Thailand, Vietnam; Africa].

123. BELLIS Linnaeus, Sp. Pl. 2: 886. 1753.

雏菊属 chu ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual or perennial, scapose, caespitose, or stem rarely branched. Leaves rosulate, blade spatulate or oblanceolate, entire or repand-dentate. Capitula radiate, often solitary, heterogamous, pedunculate or scapose. Involucre hemispheric or broadly campanulate; phyllaries 2-seriate, unequal to subequal, leaflike. Receptacle swollen or conic, naked. Ray florets 1-seriate, white, often tinged purplish crimson, apically entire; disk florets numerous, yellow, fertile; style branch tips short, triangular. Achenes obovoid, compressed, 2-ribbed, beakless. Pappus absent or rarely of few, very short, basally connate bristles.

Eight species: Asia, Europe; one species (introduced) in China.

1. Bellis perennis Linnaeus, Sp. Pl. 2: 886. 1753.

雏菊 chu ju

Herbs, perennial or annual, scapose, 10–25 cm tall; scape sparsely villosulous, strigose, sparsely, minutely stipitate glandular distally (near capitulum). Leaves basal, rosulate, petiole long, winged, blade spatulate, 2–6 × 0.9–2.8 cm, base attenuate, margin serrate to crenate, apex obtuse, sometimes retuse, mucronulate. Capitula terminal, solitary. Involucre hemispheric or broadly campanulate, 5–6 mm; phyllaries 2-seriate, subequal, oblanceolate, leaflike, surfaces sparsely villous, margin narrowly scarious, sparsely ciliate, midvein thin, translucent, apex obtuse, scarious, ciliate. Ray florets white or pinkish, lamina ca. 10 × 1 mm; disk florets yellow, ca. 2 mm, limb campanulate, ca. 1.5 mm, sparsely hairy proximally, lobes erect, triangular, ca. 0.5 mm, eglandular. Achenes strigillose. Pappus absent.

Ravines. Sichuan [native to N Africa (Morocco), SW Asia, and Europe; widely introduced and naturalized elsewhere].

An ornamental, this species is widely cultivated in gardens and parks.

124. TRIPOLIUM Nees, Gen. Sp. Aster. 10, 152. 1832.

碱菀属 jian wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual. Stems erect. Leaves alternate, entire or sparsely serrate. Capitula radiate, in corymbiform synflorescences. Involucre cylindric-campanulate; phyllaries 2- or 3-seriate, outer shorter, loosely imbricate, fleshy becoming membranous when dry, 3- or more veined, margins scarious. Receptacle ± flat, alveolate, alveola margin crenulate, naked. Florets fertile. Ray florets female, 1-seriate, lamina bluish white to bluish violet or pinkish; disk florets bisexual, numerous, yellow, narrowly funnelform, 5-lobed; anther base obtuse; style branch tips lanceolate. Achenes monomorphic, narrowly oblong, compressed, glabrous or sparsely strigose, margin 2-ribbed, faces 1-veined. Pappus in 3 or 4+ series, of white to dirty white or pinkish to reddish, thin, barbellate bristles, conspicuously elongating after anthesis, becoming 2 × as long as involucre.

One species: N Africa, Asia, Europe.

1. Tripolium pannonicum (Jacquin) Dobroczajeva in Visjulina, Fl. URSR 11: 63. 1962.

碱菀 jian wan

Aster pannonicus Jacquin, Hort. Bot. Vindob. 1: 3. 1770; *A. macrolophus* H. Léveillé & Vaniot; *A. maritimus* Lamarck; *A. palustris* Lamarck; *A. pappositissimus* H. Léveillé; *A. salinus* Schrader; *A. tripolium* Linnaeus; *A. tripolium* subsp. *pannonicus* (Jacquin) Soó; *Tripolium pannonicum* subsp. *maritimum* Holub, nom. illeg. superfl.; *T. pannonicum* subsp. *tripolium*

(Linnaeus) Greuter; *T. vulgare* Nees, nom. illeg. superfl.

Herbs, annual. Stems hollow, striate, erect, 25–50(–80) cm tall, solitary or several and caespitose, branched sometimes from base, sometimes only above, branches often spreading, glabrous. Leaves fleshy, glabrous, basal withered at anthesis; lower cauline linear or oblong-lanceolate, 5–10 × 0.3–1.2 cm, margin entire or slightly crenulate, apex acute; mid sessile, narrowed; upper reduced. Capitula numerous, in paniculate-corymbiform synflorescences, long pedunculate. Involucre 4–7 mm in diam.; phyllaries green, glabrous, margin often purplish, outer ovate to lanceolate, 2.5–5 mm, apex obtuse to acute, inner narrowly oblong, 7–8 mm. Ray florets 13–25, lamina 10–12 × 1–2 mm, glabrous; disk florets 19–22, 8–9 mm, lobes lanceolate, 1.5–2 mm, glabrous. Achenes compressed, 2.5–3 mm. Fl. and fr. Aug–Dec.

Salt marshes, salt marsh meadows, moist meadows, open sandy areas, littoral areas, riversides; sea level to 2500 m. Gansu, Hebei, Heilongjiang, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Zhejiang [Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Far East, Siberia), Tajikistan, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].

125. GALATELLA Cassini in F. Cuvier, Dict. Sci. Nat. 37: 463, 488. 1825.

乳菀属 ru wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Aster subg. *Galatea* Cassini, Bull. Sci. Soc. Philom. Paris 1818: 165. 1818; *Crinitaria* Cassini.

Herbs, perennial; rhizome robust. Stems erect or ascending, usually branched above, rarely simple. Leaves sessile, blade oblong or lanceolate to linear, often gland-dotted, lower 3-veined, mid and upper 1-veined, margin entire, often recurved. Capitula radiate, sometimes discoid, small or medium-sized, in corymbiform synflorescences, rarely solitary. Involucre obconic or campanulate to almost hemispheric; phyllaries 3–5-seriate, greenish or green along midvein, imbricate, membranous, glabrous or puberulent, 1–3-veined, margin usually scarious, outer lanceolate to lanceolate-ovate, apex acute, innermost oblong to oblong-lanceolate, margin more widely scarious, rounded or ± obtuse, apex sometimes acute. Receptacles slightly convex, alveolate, fimbriate. Ray florets sterile, without style, 5–20 in 1 series, rarely absent, lamina pinkish or bluish violet; disk florets bisexual, fertile, 5–60(–100), yellow, sometimes becoming pinkish violet, usually 1.5–2 × involucre length, limb funnelform, lobes 5, lanceolate or oblong-lanceolate; anther base obtuse, apical appendage lanceolate; style branch tip lanceolate or triangular. Achenes lanceolate or oblong, ± flattened, strigose, ribbed. Pappus 2(or 3)-seriate, of whitish, sometimes purplish tinged, unequal, ± stiff, barbellate bristles longer than achene, apex acute to ± clavate.

About 40–50 species: C and S Europe to NE Asia; 11 species in China.

The genus *Crinitaria*, often considered distinct (see *Crinitina* below), is typified by *Chrysocoma biflora* Linnaeus, a species that belongs to *Galatella* (Soják, Zprávy Krajsk. Vlastiv. Muz. Olomouci 215: 1–2. 1982).

1a. Leaves not gland-dotted, lower 3-veined, mid and upper 1-veined, or all 1-veined; plants glabrous, glabrate, or sparsely to ± densely arachnoid.
2a. Ray florets absent; leaves linear, 1-veined, upper setiform; phyllaries abaxially shortly arachnoid (partly glabrescent) ..... 11. *G. scoparia*
2b. Ray florets present; leaves lanceolate to oblanceolate or linear-lanceolate, usually 3-veined, upper (sometimes some mid) linear; phyllaries abaxially glabrate or glabrous.
3a. Lower and mid leaves lanceolate to oblanceolate or linear-lanceolate ..... 9. *G. hauptii*
3b. Lower and mid leaves linear-lanceolate.
4a. Involucre subhemispheric; ray florets 15–20, light bluish violet; pappus brownish to pinkish ..... 8. *G. tianschanica*
4b. Involucre broadly obconic; ray florets 10–15, pinkish violet; pappus yellowish ..... 10. *G. angustissima*
1b. Leaves gland-dotted on both surfaces or adaxially, sometimes inconspicuously so, lower and mid 3-veined, or mid and upper 1-veined; plants shortly papilliform hairy or glabrate.
5a. Ray florets absent (rarely 1–4).
6a. Leaves oblong-lanceolate or lanceolate to linear-lanceolate, lower and mid 3-veined; capitula numerous in corymbiform synflorescences ..... 6. *G. biflora*
6b. Leaves linear or linear-lanceolate, lower 3-veined, mid 1-veined; capitula solitary or 2 or 3 in corymbiform synflorescences ..... 7. *G. regelii*
5b. Ray florets 4–20, rarely absent.
7a. Ray florets 4–10, disk florets 10–15.
8a. Capitula numerous, usually in dense synflorescences; phyllaries 3-veined, rarely 1-veined, abaxially glabrate ..... 4. *G. punctata*
8b. Capitula few, in loose synflorescences; phyllaries usually 1-veined, rarely partly 3-veined, abaxially ± shortly arachnoid ..... 5. *G. fastigiiformis*
7b. Ray florets 8–15, disk florets 24–50.

9a. Leaf apex acuminate to long acuminate; plants 20–100 cm tall ..... 3. *G. dahurica*
9b. Leaf apex shortly acuminate; plants 20–60 cm tall.
10a. Pappus white, entirely or partly tinged pinkish violet; involucre broadly obconic or subhemispheric, 6–8 × 9–12 mm; phyllaries abaxially glabrate ..... 1. *G. chromopappa*
10b. Pappus yellowish; involucre campanulate to hemispheric, 4–5 × 7–8 mm; phyllaries abaxially usually shortly arachnoid ..... 2. *G. altaica*

1. Galatella chromopappa Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7. 124. 1948.

紫缨乳菀 zi ying ru wan

Herbs, perennial, 25–60 cm tall, shortly papilliform hairy. Stems solitary or numerous, ascending or sometimes erect, sparsely shortly arachnoid, ± scabrous (base of hairs), sparsely sessile glandular. Leaves crowded, lower withered at anthesis, mid sessile, lanceolate or linear-lanceolate, (2–)3–4 × 0.3–0.4 cm, surfaces (rarely only adaxial) gland-dotted, shortly papilliform hairy, ± shortly arachnoid (glabrescent), 3-veined, lateral veins sometimes distinct only near base, base cuneate, margin flat, scabrous, apex shortly acuminate, rarely long acuminate; upper (in synflorescence) reduced, linear-lanceolate or linear, ca. 1 × 0.1–0.15 cm, 1-veined. Capitula 3–6 in dense or slightly loose corymbiform synflorescences, rarely solitary, 12–18 mm in diam. Involucre broadly obconic to subhemispheric, 6–8 × 9–12 mm; phyllaries 3- or 4-seriate, membranous, greenish, sometimes pinkish violet at apex, margin scarious, erose-fimbriate, shortly arachnoid ciliate, abaxial surface glabrate or sparsely shortly arachnoid, 3-veined (outer 1-veined), rarely partly 1-veined, outer ovate-lanceolate, apex acute, inner larger, oblong or lanceolate-oblong, apex obtuse or acute. Ray florets 8–12, pinkish (or ?bluish) violet, lamina 12–16 mm; disk florets 35–60, pale yellow becoming pinkish, 7–8 mm, limb narrowly funnelform, lobes lanceolate to oblong-lanceolate. Achenes oblong, 4–5 mm, densely white strigose. Pappus white, entirely or partly tinged pinkish violet, 7–8 mm. Fl. Jul–Sep.

Mountain steppes, grasslands on slopes; ca. 2000 m. W Xinjiang [Kazakhstan, Russia, Uzbekistan].

Koroljuk (in Krasnoborov, Fl. Siberia 13: 39–43. 2007) does not mention *Galatella chromopappa* for Siberia (Russia). Its status may need to be assessed.

2. Galatella altaica Tzvelev, Fl. URSS 25: 582. 1959.

阿尔泰乳菀 a er tai ru wan

Galatella bipunctata Novopokrovsky, p.p.

Herbs, perennial, 20–60 cm tall, abundantly shortly papilliform hairy, ± scabrous, sparsely shortly arachnoid, at least often in upper part. Stems solitary or several, erect or ascending. Leaves dense, spreading or ascending, sessile, oblong or lanceolate-oblong to linear-lanceolate, 4–6 × 0.5–0.8 cm, surfaces (rarely only adaxial) gland-dotted, scabrous and/or arachnoid, 3-veined, base cuneate, apex shortly acuminate; upper (in synflorescences) reduced. Capitula 7–10, in corymbiform synflorescences, rarely solitary, 13–20 mm in diam. Involucre broadly campanulate to hemispheric, 4–5 × 7–8 mm; phyllaries 3- or 4-seriate, yellow-green, 1-veined or inconspicuously 3-veined, abaxially ± shortly arachnoid to glabrate, margin narrowly scarious, erose, shortly arachnoid ciliate, outer ovate-lanceolate, apex acute, innermost larger, oblong, margin narrowly scarious, apex rounded to obtuse or acute. Ray florets 8–15, pinkish violet, lamina 15–18 mm; disk florets 25–50, pale yellow, 6–7 mm, limb funnelform, lobes oblong-lanceolate. Achenes oblong, 2.5–3 mm, densely strigose. Pappus yellowish, 6–7 mm. Fl. Jul–Sep.

Forest margins, stony slopes; ca. 1800 m. N Xinjiang [Mongolia, Russia; C Asia].

3. Galatella dahurica Candolle, Prodr. 5: 256. 1836.

兴安乳菀 xing an ru wan

Aster dahuricus (Candolle) Bentham ex Baker; *A. dahuricus* subsp. *yamatsutanus* (Kitagawa) Kitagawa; *A. yamatsutanus* Kitagawa; *Galatella macrosciadia* Gandoger; *G. songorica* Novopokrovsky; *G. songorica* var. *angustifolia* Novopokrovsky; *G. songorica* var. *discoidea* Y. Ling & Y. L. Chen; *G. songorica* var. *latifolia* Y. Ling & Y. L. Chen; *G. tarbagatensis* Novopokrovsky.

Herbs, perennial, 20–100 cm tall, densely shortly papilliform hairy, glabrate in lower part; rhizome long, slender, or thick. Stems solitary or several, erect or ascending, purplish at base, branched upward, branches slender, ascending, sometimes sparsely sessile glandular. Leaves dense, lower often withered at anthesis, mid sessile, blade oblong or oblong-lanceolate to linear-lanceolate or linear, (3–)4–5.5(–7) × 0.1–1.4 cm, both surfaces or only adaxially gland-dotted, 1- or 3-veined, base attenuate, margin scabrous, apex acuminate to long acuminate; upper blade linear-lanceolate to linear, ± reduced upward, 3-veined (lateral 2 sometimes faint), sometimes 1-veined. Capitula numerous, in dense to lax corymbiform synflorescences, rarely solitary, (3–)10–15 × (5–)15–25 mm; peduncles slender; bracts 1 or 2, linear, densely papillose. Involucre broadly campanulate or broadly obconic to subhemispheric, 3–6 × 5–10 mm; phyllaries 3- or 4-seriate, yellow-green, imbricate, abaxially papillose to glabrate or glabrous, membranous, margin fimbriate, villous-ciliate, back sometimes rounded, outer short, green area wide, lanceolate to ovate-lanceolate, 1-veined, margin leafy textured, apex acute, innermost larger, oblong to oblong-lanceolate, usually 3-veined, margin scarious, apex rounded to obtuse or sometimes acute, sometimes pinkish tinged. Ray florets 10–20, pinkish or pale violet, tube ca. 2 mm, lamina 10–16 × 1.5–3 mm, glabrous; disk florets 20–40(–80), pale yellow, sometimes becoming purplish tinged, 6–8 mm, limb funnelform, lobes lanceolate. Achenes lanceolate or oblong, 2–4 mm, ± densely strigose. Pappus whitish or dirty white to yellowish, 5–8 mm. Fl. Jul–Sep.

Meadows, grasslands on slopes, dry mountain slopes, stony slopes, forest margins, roadsides; 500–3900 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia (Far East, Siberia), Uzbekistan].

Y. Ling and Y. L. Chen (FRPS 74: 269. 1985) regarded *Galatella songorica* as distinct from *G. macrosciadia* based on the more numerous capitula with smaller, differently shaped phyllaries, and on distribution. Such differences may be the result of phenotypic plasticity, a trade-off between the number and size of capitula in different ecological conditions, such as higher elevations. On the other hand, Koroljuk (in Krasnoborov, Fl. Siberia 13: 39–43. 2007) reduced *G. songorica* and *G. macrosciadia* to synonyms of *G. dahurica*. Measurements among these taxa overlap significantly, and we are recognizing a single entity, as does Koroljuk.

Y. Ling and Y. L. Chen (loc. cit.: 269, 360–361) recognized four, mostly rare, varieties in *Galatella songorica*: *G. songorica* var. *songorica*, *G. songorica* var. *discoidea*, *G. songorica* var. *angustifolia*, and *G. songorica* var. *latifolia*. The type of *G. songorica* var. *discoidea* is a specimen with immature, unopened capitula, and it is impossible to determine whether or not they are discoid; the distinguishing features are all based on the capitula, and the variety does not appear to warrant recognition. *Galatella songorica* var. *angustifolia* and *G. songorica* var. *latifolia* are both based on leaf width, a plastic character. The type (and single specimen seen) of *G. songorica* var. *latifolia* is from moister places, and this may be responsible for the slightly greater width of leaves. Both of these varieties appear to represent extremes of leaf variation and hardly appear to warrant recognition, at least until more material is collected and a morphometric study is done.

4. Galatella punctata (Waldstein & Kitaibel) Nees, Gen. Sp. Aster. 161. 1832.

乳菀 ru wan

Aster punctatus Waldstein & Kitaibel, Descr. Icon. Pl. Hung. 2: t. 109. 1805; *Galatea punctata* (Waldstein & Kitaibel) Cassini ex Lessing; *Galatella acutisquama* Novopokrovsky; *G. acutisquamoides* Novopokrovsky; *G. densiflora* (Avé-Lallemant) Novopokrovsky; *G. ledebouriana* Novopokrovsky; *G. punctata* var. *densiflora* Avé-Lallemant; *G. rossica* Novopokrovsky var. *densiflora* (Avé-Lallemant) Novopokrovsky.

Herbs, perennial, 28–80 cm tall, papilliform hairy, sparsely scabridulous, thinly shortly arachnoid; rhizome thick. Stems numerous, rarely solitary, erect. Leaves dense, sessile, blade lanceolate-oblong or linear-lanceolate to linear, adaxially or rarely both surfaces gland-dotted, base cuneate, 3-veined, apex long acuminate, mucronate; lower withered after anthesis; mid blade 4–6(–8) × 0.3–0.6 cm; upper reduced, blade linear, 5–10 mm. Capitula numerous, in dense, rarely slightly loose, corymbiform synflorescences, 7–12 × 8–12 mm. Involucre broadly obconic to campanulate, 3–5 × 4–6 mm; phyllaries 3- or 4-seriate, pale green, abaxially glabrate, margin narrowly to ± broadly scarious, erose-fimbriate, 3-veined, rarely partly 1-veined, outer small, ovate-lanceolate, apex acute, inner larger, oblong, apex obtuse or acuminate. Ray florets 5–10, pinkish violet, lamina 10–12 × ca. 2 mm; disk florets 10–15, pale yellow, sometimes pinkish violet tinged, 5–6 mm, limb funnelform, lobes long, oblong-lanceolate. Achenes oblong, 3.5–4 mm, densely white strigose. Pappus brownish, 5–6 mm. Fl. Jul–Sep.

Grasslands on slopes, flood meadows; ca. 1700 m. N Xinjiang [Kazakhstan, Russia (Siberia); SW Asia, Europe].

5. Galatella fastigiiformis Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 128. 1948.

扫枝乳菀 sao zhi ru wan

Herbs, perennial, 25–100 cm tall, shortly papilliform hairy; rhizome thick. Stems solitary or several, erect. Leaves lax or dense, sessile, blade linear-lanceolate or linear, adaxial surface or rarely both surfaces gland-dotted, or indistinctly gland-dotted abaxially, 3-veined, lateral often inconspicuous, base cuneate, apex long, rarely shortly, acuminate; mid 4–5.5 × 0.35–4 cm; upper (in synflorescences) reduced, linear, 1.5–2 × 0.1–0.2 cm. Capitula few, rarely 2 or 3, in relatively loose corymbiform synflorescences, 7–10 × 7–12 mm; peduncles ascending or curved. Involucre obconic, 3–5 × 5–6 mm; phyllaries 3- or 4-seriate, light yellowish green, membranous, usually 1- or rarely partly 3-veined, margin scarious, erose-fimbriate, shortly arachnoid ciliate, outer ovate-lanceolate, abaxially ± shortly arachnoid, apex acute, inner larger, oblong-lanceolate, glabrous or glabrate, apex obtuse or acute. Ray florets 4–8, pale pinkish violet, lamina ca. 10 × 1.5 mm; disk florets 11–15, pale yellow, 5–6.5 mm, limb narrowly funnelform, lobes oblong-lanceolate. Achenes oblong to lanceolate, 3.5–4 mm, white long strigose, 3-veined. Pappus whitish to yellowish, slightly longer than disk corollas. Fl. and fr. Jul–Sep.

Grasslands on slopes, salt marsh meadows. N Xinjiang (Shawan) [Kazakhstan, Russia, Uzbekistan].

6. Galatella biflora (Linnaeus) Nees, Gen. Sp. Aster. 159. 1832.

盘花乳菀 pan hua ru wan

Chrysocoma biflora Linnaeus, Sp. Pl. 2: 841. 1753; *Crinitaria biflora* (Linnaeus) Cassini; *Galatella dracunculoides* Nees var. *discoidea* Candolle.

Herbs, perennial, caespitose, 45–100 cm tall, shortly papilliform hairy, scabridulous or glabrate; rhizome short. Stems numerous, rarely solitary, erect. Leaves dense, lower fallen after anthesis, mid sessile, usually dingy green, blade oblong-lanceolate or lanceolate to linear-lanceolate, 5.5–6 × 0.4–0.5 cm, surfaces gland-dotted or abaxially eglandular, scabridulous or glabrate, 3-veined, base gradually cuneate, apex long acuminate; upper reduced, linear-lanceolate. Capitula numerous, in usually dense, rarely slightly loose, corymbiform synflorescences, 8–11 × 10–12 mm. Involucre obconic, 3–5 × 4–7 mm; phyllaries 3- or 4-seriate, yellowish green, membranous, abaxially glabrate or ± scabridulous, 3-veined, rarely partly 1-veined, margin scarious, erose-fimbriate, outer small, ovate-lanceolate, apex acute, innermost larger, oblong, apex obtuse or acute. Ray florets usually absent, rarely 1–3(or 4); disk florets 8–25, pale yellow, 6–7 mm, limb funnelform, lobes long, oblong-lanceolate. Achenes oblong, 3.5–4 mm, densely white silky. Pappus whitish, 5–6 mm. Fl. and fr. Jul–Sep.

Grasslands on slopes; ca. 1700 m. W Xinjiang [Kazakhstan, Russia].

7. Galatella regelii Tzvelev, Fl. URSS 25: 153. 1959.

昭苏乳菀 zhao su ru wan

Linosyris punctata Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 613. 1877, not Candolle (1836); *Galatella chromopappa* Novopokrovsky f. *discoidea* Novopokrovsky.

Herbs, perennial, 25–45 cm tall, shortly papilliform hairy, scabridulous. Stems numerous, ascending, sparsely sessile glandular. Leaves dense, lower withered and fallen after anthesis, sometimes 3-veined, mid sessile, dingy green, blade linear or linear-lanceolate, 3–4 × ca. 0.2 cm, both surfaces or adaxial surface gland-dotted, 1-veined, base cuneate, apex shortly acuminate, mucronate; upper reduced, linear. Capitula solitary or 2 or 3 in loose corymbiform synflorescences, 8–11 × 12–14 mm, with florets. Involucre broadly obconic, 4–5 × 5–8 mm; phyllaries 3-seriate, greenish, abaxially glabrous or glabrate, 1-veined, or partly 3-veined, margin scarious, erose-laciniate, outer short, lanceolate, apex acute, innermost oblong, apex obtuse or rounded-acuminate, sometimes purplish. Ray florets absent; disk florets 20–30, pale yellow, 5–6.7 mm, limb funnelform, lobes oblong-lanceolate, long. Achenes oblong, 3–3.5 mm, densely white hairy. Pappus whitish, 5–6 mm. Fl. Jul–Sep.

Forest margins, grasslands on slopes; 1200–1800 m. W Xinjiang [Kazakhstan, Russia].

8. Galatella tianschanica Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 130. 1948.

天山乳菀 tian shan ru wan

Herbs, perennial, 25–60 cm tall, sparsely to ± densely arachnoid, glabrescent. Stems numerous, rarely solitary, ascending, often arched. Leaves usually dense, concentrated mainly on lower half of stem and often oriented to one side, sessile, lower pale green, blade linear-lanceolate, 2.5–3 × 0.25–0.3 cm, slightly fleshy, not gland-dotted, 1-veined, base cuneate, apex shortly acuminate; upper few, reduced, linear, margin often revolute. Capitula solitary or 2–4 in loose corymbiform synflorescences, 8–10 × 15–20 mm. Involucre subhemispheric, 4–5 × 8–10 mm; phyllaries 3-seriate, greenish, abaxially glabrous or glabrate, membranous, inconspicuously 3- or partly 1-veined, margin scarious, erose-fimbriate, outer lanceolate to ovate, apex acute, inner longer, oblong, apex rounded or obtuse. Ray florets 15–20, light bluish violet, lamina oblong, ca. 10 × 3–3.5 mm; disk florets 35–50, pale yellow, 6–7 mm, limb narrowly funnelform, lobes oblong-lanceolate. Achenes oblong-lanceolate, 3–4 mm, densely white strigose. Pappus brownish to pinkish, 5–6 mm. Fl. Jul–Sep.

Salt marshes, rare; ca. 1200 m. W Xinjiang (Aksu) [Kazakhstan].

9. Galatella hauptii (Ledebour) Lindley ex Candolle, Prodr. 5: 256. 1836.

鳞苞乳菀 lin bao ru wan

Aster hauptii Ledebour, Fl. Altaic. 4: 100. 1833, based on *A. fastigiatus* Ledebour, Icon. Pl. 2: t. 161. 1830, not Fischer (1812); *Galatella hauptii* var. *grandiflora* Avé-Lallemant; *G. squamosa* Candolle.

Herbs, perennial, (10–)20–50 cm tall, glabrous or glabrate, sparsely shortly arachnoid, or sparsely scabrous; rhizomes robust. Stems several or solitary, erect or often ascending. Leaves dense, sessile, green, not gland-dotted, glabrate or sometimes sparsely shortly arachnoid, base cuneate, apex shortly acuminate, mucronate; lower and some mid withered at anthesis; mid blade lanceolate to oblanceolate or linear-lanceolate, 3–7 × 0.3–0.5 cm, 1–3-veined; upper usually linear, 1-veined; uppermost reduced. Capitula few in loose corymbiform synflorescences, rarely solitary, 8–15 mm; branch bracts several, linear, peduncles with scalelike bracteoles. Involucre broadly obconic, 6–10 × 3–5 mm; phyllaries 4- or 5-seriate, pale green, sometimes apically pinkish purple, abaxially glabrous or glabrate, membranous, margin narrowly to ± broadly scarious, erose-fimbriate, shortly arachnoid ciliate, 1-veined, outer short, ovate-lanceolate, apex acute, inner long, oblong, apex rounded or obtuse, sometimes acute. Ray florets 10–15, lamina pinkish violet, oblong, 13–15 × 2–3 mm; disk florets 45–50, pale yellow, often becoming pinkish purple tinged, 6–7 mm, limb narrowly funnelform, lobes oblong-lanceolate. Achenes oblong, 5–5.5 mm, white strigose. Pappus whitish, 5–7 mm. Fl. Jul–Sep.

Mountain slopes, grasslands, stony slopes; 1100–1800 m. N Xinjiang [Kazakhstan, Mongolia, Russia].

10. Galatella angustissima (Tausch) Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 136. 1948.

窄叶乳菀 zhai ye ru wan

Aster angustissimus Tausch, Flora 11: 487. 1828; *Galatella hauptii* (Ledebour) Lindley ex Candolle var. *tenuifolia* (Lindley ex Candolle) Avé-Lallemant; *G. tenuifolia* Lindley ex Candolle.

Herbs, perennial, 10–50 cm tall, sparsely shortly arachnoid, rapidly glabrescent (glabrous or glabrate), upper part sparsely shortly arachnoid. Stems solitary or several, erect or ascending. Leaves dense, sessile, green, not gland-dotted, base attenuate or cuneate, margin revolute, scabridulous, apex acuminate or sometimes obtuse (lower), mucronate; lower linear-lanceolate, to 0.4 cm wide, 3-veined; mid and upper usually linear, 2–4 × 0.1–0.2(–0.3) cm, 1-veined; uppermost (on synflorescence branches) numerous, reduced, bractlike. Capitula numerous, in lax corymbiform synflorescences, 8–18 × 10–15 mm. Involucre broadly obconic, 5–7 × 8–12 mm; phyllaries 4- or 5-seriate, greenish, often pinkish at tip, abaxially glabrate, membranous, margin narrowly scarious, erose, shortly arachnoid ciliate, sometimes keeled or rounded, thickened, 1-veined, outer ovate-lanceolate, apex acute, inner longer, oblong-lanceolate, apex rounded or obtuse. Ray florets 10–15, pinkish violet, lamina oblong, 13–15 × 2–3 mm; disk florets 10–35, pale yellow, 6–7 mm, limb funnelform, lobes lanceolate. Achenes oblong, 3.5–5 mm, white strigose, 3-ribbed. Pappus yellowish, 5–7 mm. Fl. Jul–Sep.

Dry grasslands, steppes, stony slopes; 900–2000 m. N Xinjiang [Kazakhstan, Mongolia, Russia (Siberia)].

11. Galatella scoparia (Karelin & Kirilov) Novopokrovsky, Izv. Rossiisk. Akad. Nauk 12: 2274, 2279, 2283. 1918.

卷缘乳菀 juan yuan ru wan

Linosyris scoparia Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 378. 1842; *Aster scoparius* (Karelin & Kirilov) Kuntze (1891), not Nees (1818), nor Candolle (1836).

Herbs, perennial, 25–45 cm tall, ± sparsely to densely shortly arachnoid-tomentose, partly glabrescent; rhizome

woody. Stems numerous, rarely solitary, erect or ascending. Leaves sessile, grayish green, linear, 2–4 × 0.1–0.2 mm, not gland-dotted, subleathery, 1-veined, base tapered, margin strongly revolute, apex acute, arched, mucronate; lowest caducous, blades linear, sometimes 3-veined (lateral veins inconspicuous); upper (in synflorescences) reduced, almost setiform. Capitula 3–5 in loose, often irregularly corymbiform synflorescences, 12–17 × ca. 17 mm. Involucre broadly obconic, 10–15 × 10–18 mm; phyllaries 4–6-seriate, light green, grayish, subleathery, abaxially shortly arachnoid, partly glabrescent, margin narrowly scarious, erose-fimbriate, shortly arachnoid ciliate, 1-veined, outer small, ovate or ovate-lanceolate, apex acute, inner larger, oblong, apex usually rounded to obtuse. Disk florets 14–20, pale yellow, 6.5–8 mm, limb narrowly funnelform, lobes oblong-lanceolate. Achenes oblong, 4–6 mm, densely white strigose. Pappus brownish, 6–7 mm. Fl. Jul–Sep.

Dry steppes, slopes, gravel. N Xinjiang [Kazakhstan, Russia].

126. CRINITINA Soják, Zprávy Krajsk. Vlastiv. Muz. Olomouci 215: 1. 1982.

麻菀属 ma wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Linosyris Cassini (1825), not Ludwig (1757).

Herbs, perennial; rhizomes slender and long, nodose. Stems several or solitary, erect or ascending, usually branched above. Leaves alternate, sessile, oblong to narrowly linear, gland-dotted or not, sometimes obscurely so, 1-veined, margin entire. Capitula discoid, numerous, in dense or loose, corymbiform synflorescences, rarely solitary. Involucre shortly cylindric or obconic; phyllaries 3- to multiseriate, imbricate, greenish, glabrate or glabrescent, subleathery or membranous, margin usually narrowly scarious, midvein ± distinct, outer either much shorter or almost equaling length of inner but narrower, ovate, inner oblong, apex obtuse or ± acute. Receptacles slightly convex, irregularly alveolate. Disk florets fertile, bisexual, yellow, 5–40, usually exceeding involucre in length, lobes 5, lanceolate; anther base obtuse, apical appendage lanceolate; style branch tips ovate-lanceolate. Achenes oblong, abaxially ± flattened, long strigose, margin 1- or 2-ribbed. Pappus 2-seriate, of whitish or brownish, barbellate bristles, exceeding achenes.

About five species: mostly in steppe and forest-steppe zones of Europe and Asia; two species in China.

Current phylogenetic data are insufficient to determine whether *Crinitina* is sister to *Galatella*, paraphyletic to it, or derived from within it (in the latter two cases, it could be merged under *Galatella* as is sometimes done).

1a. Plants sparsely arachnoid, glabrescent; leaves linear to linear-oblanceolate or oblong-linear, gland-dotted ..... 1. *C. tatarica*
1b. Plants gray tomentose; leaves oblong to linear-oblong, obscurely gland-dotted ..... 2. *C. villosa*

1. Crinitina tatarica (Lessing) Soják, Zprávy Krajsk. Vlastiv. Muz. Olomouci 215: 2. 1982.

新疆麻菀 xin jiang ma wan

Chrysocoma tatarica Lessing, Linnaea 9: 186. 1834; *Crinitaria tatarica* (Lessing) Soják; *Linosyris tatarica* (Lessing) C. A. Meyer.

Herbs, perennial, ± caespitose, 10–35 cm tall, sparsely arachnoid, glabrescent. Stems several, erect or ascending. Leaves linear to linear-oblanceolate or oblong-linear, 1–3 × 0.15–0.4 cm, both surfaces or only adaxially gland-dotted, scabrous, subleathery, 1-veined, base gradually attenuate to cuneate, apex obtuse, sometimes mucronate; upper reduced. Capitula numerous, in dense corymbiform synflorescences (bracts grading into phyllaries), 8–10 mm. Involucre shortly cylindric or obconic, 3.5–5 mm; phyllaries 3- or 4-seriate, yellowish green, abaxially sparsely arachnoid to glabrate, thinly leathery, margin arachnoid, outer short, ovate, 1–3-veined, apex obtuse or acute, inner larger, oblong, 3–5-veined, margin broadly scarious, erose, apex obtuse. Disk florets 5–10, pale yellow, tubular, 5–6 mm. Achenes oblong, 3–4 mm, densely strigose. Pappus brownish, 5–6 mm. Fl. Jul–Sep.

Salt marshes, steppes, dry stony slopes; 700–1200 m. N Xinjiang [Kazakhstan, Russia (W Siberia): Europe].

2. Crinitina villosa (Linnaeus) Soják, Zprávy Krajsk. Vlastiv. Muz. Olomouci 215: 2. 1982.

灰毛麻菀 hui mao ma wan

Chrysocoma villosa Linnaeus, Sp. Pl. 2: 841. 1753; *Crinitaria villosa* (Linnaeus) Cassini; *Galatella villosa* (Linnaeus) H. G. Reichenbach; *Linosyris villosa* (Linnaeus) Candolle.

Herbs, perennial, often densely caespitose, 15–35 cm tall, gray tomentose. Stems usually numerous, erect, simple. Leaves oblong to linear-oblong or oblanceolate, obscurely gland-dotted, base gradually attenuate, apex acute to obtuse, mucronate; upper very reduced. Capitula numerous, in dense corymbiform synflorescences, 8–12 mm. Involucre shortly cylindric or obconic, 6–9 mm; phyllaries sparsely grayish tomentose, glabrescent, subleathery, margin arachnoid ciliate, outer short, ovate, 1–3-veined, apex obtuse or acute, inner oblong, obtuse, larger, 3–5-veined. Disk florets 5–10, yellow, funnel-shaped, ca. 6.5 mm. Achenes 3–4 mm, densely strigose. Pappus whitish, sometimes brownish tinged, 6–9 mm. Fl. Jul–Sep.

Salt marshes, steppes, stony slopes. N Xinjiang [Kazakhstan, Russia (European part, W Siberia); SW Asia, E Europe (Ukraine)].

127. ASTEROTHAMNUS Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 331. 1950.

紫菀木属 zi wan mu shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Subshrubs; rhizome woody. Stems numerous, erect or ascending, strongly branched, white to gray tomentose or arachnoid or villosulous to villous or villosulous-tomentose. Leaves sessile, small, crowded, subleathery, margin often revolute, 1-veined. Capitula radiate or sometimes discoid, solitary at ends of stems or branches or 3–5 in corymbiform synflorescences. Involucre broadly campanulate or subhemispheric; phyllaries 3- or 4-seriate, imbricate, usually unequal, often apically purple tinged, leathery, margin broad, scarious, erose, whitish, midvein distinct, brownish or reddish, apex acute. Receptacles ± flat, alveolate, irregularly denticulate. Florets fertile. Ray florets female, blue, light violet, or whitish pink; disk florets bisexual, yellow, turning pink, limb funnelform to narrowly campanulate, 5-lobed, lobes lanceolate; anther base obtuse, appendage lanceolate; style branch tips triangular. Achenes oblanceoloid, ± compressed, 2- or 3-ribbed, ± densely strigose. Pappus white, yellowish, reddish, or dirty white, barbellate, equaling disk corollas, in 3 or 4 series, outermost few, short, thin, outer and inner long, acute, innermost few, ± slightly clavate.

About seven species: C Asia; five species in China.

1a. Leaves 1–2 mm wide, linear or linear-oblong.
  2a. Stems branched throughout, densely white or cinnamon villosulous; leaves linear, 10–15(–20) × 1–1.5 mm; capitula usually radiate, sometimes discoid, peduncles slender; phyllary apex greenish or white, rarely purplish ..... 2. *A. fruticosus*
  2b. Stems branched in lower part only, gray-white tomentulose; leaves linear-oblong to linear, (8–)12–15 × 1.5–2 mm; capitula radiate, peduncles rather thick; phyllary apex purplish red ..... 3. *A. centraliasiaticus*
1b. Leaves 2–4 mm wide, oblong to oblong-lanceolate or oblong-oblanceolate.
  3a. Leaves oblong-oblanceolate, 6–8 × 2–3(–4) mm, apex shortly acuminate; bark at stem base reddish brown ..... 1. *A. alyssoides*
  3b. Leaves oblong or oblong-lanceolate to oblong-oblanceolate, 10–25 × 2–4 mm, apex obtuse to ± acute, mucronate; bark at stem base yellow-brown.
    4a. Leaves 10–12(–20) mm; phyllaries densely gray-white cottony, apex shortly acuminate to ± obtuse .... 4. *A. molliusculus*
    4b. Leaves 15–25 mm; phyllaries gray-white tomentulose, apex acuminate ..... 5. *A. poliifolius*

1. Asterothamnus alyssoides (Turczaninow) Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 336. 1950.

紫菀木 zi wan mu

Aster alyssoides Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 198. 1832; *Kalimeris alyssoides* Candolle.

Low subshrubs, 8–15(–20) cm, white arachnoid-tomentulose. Stems branched from base, branches slender and short, lower part woody, bark reddish brown, herbaceous above, white arachnoid-tomentose, glabrescent. Leaves oblong-oblanceolate, 6–8 × 2–3(–4) mm, surfaces white arachnoid-tomentose, adaxially apically ± glabrescent, 1-veined, base attenuate, margin often revolute, apex shortly acuminate. Capitula radiate, solitary at ends of stems or in corymbiform synflorescences. Involucre campanulate, 6–7 × 12–13 mm; phyllaries 3-seriate, arachnoid-tomentose, margin broadly scarious, erose fimbriate, apex acute to obtuse, outer short, ovate-lanceolate, mid and inner oblong to oblong-oblanceolate. Ray florets 6–9, lamina spreading, bluish, ca. 8 × 1 mm; disk florets ca. 12, yellow, 5–6 mm, limb funnel-shaped. Achenes ca. 3 mm, densely long strigose. Pappus white, ca. 5 mm.

Sandy and dry lands. Nei Mongol [S Mongolia].

2. Asterothamnus fruticosus (C. Winkler) Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 337. 1950.

灌木紫菀木 guan mu zi wan mu

Kalimeris fruticosa C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 419. 1886.

Subshrubs, densely leaved. Stems branched throughout, lower part woody, bark tan-colored to gray, upper part herbaceous, gray-green, densely white or cinnamon villosulous, ± glabrescent near base, distally sometimes ± densely stipitate glandular. Leaves linear, 10–15(–20) × 1–1.5 mm, reduced in size distally, surfaces arachnoid-tomentulose, densely so abaxially, sometimes adaxially glabrate, margin strongly revolute. Capitula usually radiate or sometimes discoid, in loose corymbiform synflorescences or solitary at ends of branches, 8–10 mm; peduncles slender, straight or ± curved; bracts small, linear, upper phyllary-like. Involucre campanulate, 5–7 × 8–10 mm; phyllaries 3- or 4-seriate, imbricate, glabrate or sparsely to moderately villous (particularly at base) to arachnoid, ± stipitate glandular, membranous, outer and mid smaller, ovate-lanceolate, inner oblong, margin broadly scarious, glandular and sparsely villous-ciliate or eciliate, apex acuminate, green or white, rarely ± purplish red. Ray florets 7–10, purplish to lavender, tube 2–3.1 mm, tube and lamina base hairy, lamina spreading, 6–10 × 0.8–1.3 mm; disk florets 15–18, 4–5 mm, tube 2–2.2 mm, hairy, limb funnelform, 2.5–3.5 mm. Achenes (2–)3.5–4 mm, sericeous, glandular (not visible at maturity). Pappus yellowish white. Fl. and fr. Jun–Sep.

Gritty-stony foothills, stony riverbeds, sandy or rocky shrubby-grassy deserts; 1000–1600 m. Gansu, Xinjiang [Kazakhstan, Russia].

3. Asterothamnus centraliasiaticus Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 338. 1950 [*"centrali-asiaticus"*].

中亚紫菀木 zhong ya zi wan mu

Aster alyssoides Turczaninow var. *achnolepis* Handel-Mazzetti.

Subshrubs 20–40 cm; rhizome thick. Stems numerous, erect or ascending, many branched in lower part, finely striate, woody at base, bark reddish brown, gray-white tomentulose, ± glabrescent, upper part herbaceous, gray-white villous, ± glabrescent, glandular distally. Leaves crowded, ascending or erect, linear-oblong to linear, (8–)12–15 × 1.5–2 mm, abaxially densely gray-white villous, adaxially gray-green, moderately to sparsely villous, base attenuate, margin revolute, apex acute. Capitula radiate, 8–10 × ca. 10 mm, in loose corymbiform synflorescences or solitary at ends of branches; peduncles rather thick, straight or curved; bracts small, linear. Involucre broadly campanulate, 6–7 × ca. 9 mm; phyllaries 3- or 4-seriate, imbricate, white villous to arachnoid, glandular at least distally, margin broadly scarious, erose, apex acuminate to acute or ± obtuse, usually purplish red, outer short, ovate or lanceolate, inner oblong. Ray florets 7–13, tube ca. 2.9 mm, glabrous, lamina pale purple to pale lilac, 10–12 × 1.2–2.7 mm; disk florets 11–19(–26), yellow turning reddish, ca. 5 mm, tube 1.8–2.5 mm, tube and limb base sparsely hairy, limb narrowly campanulate to funnelform, ca. 2.7 mm. Achenes straw-colored, 3–3.5 mm, white strigose. Pappus white or pale cinnamon. Fl. and fr. Jul–Sep.

Meadows, gritty-stony foothills, stony riverbeds, open sand dunes, deserts, grasslands; 1300–3400 m. Gansu, Nei Mongol, Ningxia, Qinghai, SE Xinjiang [S Mongolia].

Three varieties have been recognized, but morphological differences appear to be tenuous or the result of phenotypic plasticity. A thorough study is needed before recognition of these varieties is warranted. The varieties are *Asterothamnus centraliasiaticus* var. *centraliasiaticus*, *A. centraliasiaticus* var. *procerior* Novopokrovsky (Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 340. 1950), and *A. centraliasiaticus* var. *potaninii* (Novopokrovsky) Y. Ling & Y. L. Chen (Fl. Reipubl. Popularis Sin. 74: 263. 1985; *Asterothamnus potaninii* Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 341. 1950, *"Potanini"*). The main distinguishing characters given in descriptions were number of capitula in synflorescences (loose corymbiform in var. *centraliasiaticus* vs. 2 or 3 capitula in loose synflorescences in var. *procerior* and var. *potaninii*) and the degree of vestiture (gray-white tomentulose and glabrescent in var. *centraliasiaticus* vs. permanently, densely gray-white tomentose in var. *procerior*; var. *potaninii* not mentioned). The typical variety is reported throughout the range of the species; *A. centraliasiaticus* var. *procerior* is reported from W Gansu, N Qinghai, and SE Xinjiang; and *A. centraliasiaticus* var. *potaninii* is reported from E Gansu and Ningxia.

4. Asterothamnus molliusculus Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 342. 1950.

软叶紫菀木 ruan ye zi wan mu

Subshrubs, (25–)30–40 cm tall. Stems erect or ascending, many branched, woody in lower part, bark yellow-brown, densely gray-white tomentose, ± glabrescent, current-year branches slender, spreading, ascending or ± curved, gray-white arachnoid-lanate. Leaves oblong or oblong-lanceolate, 10–12(–20) × ca. 3 mm, abaxially white arachnoid-lanate, adaxially shortly arachnoid, ± soft, base cuneate, margin revolute, apex obtuse to ± acute, mucronate. Capitula radiate, large, usually 1–3 in corymbiform synflorescences at ends of branches; peduncle short. Involucre broadly campanulate, ca. 8 × 8 mm; phyllaries 3- or 4-seriate, densely gray-white cottony, margin broadly scarious, erose, ciliate, apex shortly acuminate or ± obtuse, outer shorter, oblong or lanceolate, inner oblong. Ray florets 8, lamina spreading, (whitish pink or pale purple?) yellowish when dry, oblong, ca. 10 × 2.5–3 mm; disk florets 12, yellow, ca. 5 mm, limb narrowly campanulate. Achenes ca. 3.5 mm, moderately to densely strigose. Pappus whitish. Fl. Aug.

Meadows. Nei Mongol [Mongolia].

5. Asterothamnus poliifolius Novopokrovsky, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 13: 343. 1950.

毛叶紫菀木 mao ye zi wan mu

Subshrubs. Stems erect or ascending, many branched, woody in lower part, bark yellow-brown, herbaceous in upper part, ± densely arachnoid-tomentose, ± glabrescent. Leaves oblong or oblong-lanceolate to oblong-oblanceolate, 15–25 × 2–4 mm, surfaces gray-white arachnoid-tomentose, adaxially ± glabrescent, midvein conspicuous, margin revolute, apex acute or ± obtuse, mucronate. Capitula radiate, large, in corymbiform synflorescences; peduncle short. Involucre broadly campanulate, 6–7 × 8–9 mm; phyllaries 3-seriate, gray-white tomentulose, margin broadly scarious, apex acuminate, purplish at middle and apex, outer short, ovate or ovate-lanceolate, inner lanceolate or oblong. Ray florets 6 or 7, lamina spreading, pale purple, oblong, ca. 8 × 3 mm; disk florets 12–15, yellow becoming ± pale purple, ca. 5 mm, limb funnel-shaped. Achenes 4–4.6 mm, densely strigose. Pappus white or yellowish brown. Fl. Sep. $2n = 18$.

Grasslands; 1000–1900 m. Xinjiang [Mongolia, Russia (Tuva)].

128. ARCTOGERON Candolle, Prodr. 5: 260. 1836.

莎菀属 suo wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial, mat-forming, scapiform; caudex branched; taproot thick. Leaves linear, base marcescent. Capitula radiate, solitary on scapes. Involucre campanulate; phyllaries 3- or 4-seriate, imbricate, narrowly lanceolate, membranous, acuminate, abaxially rounded, 1-veined, green along vein, often purplish apically, white toward margin, margins scarious, hyaline, erose. Receptacle flat, ± alveolate. Florets fertile. Ray florets white or pinkish white, twice as long as involucre, lamina ovate-oblong; disk florets

bisexual, yellow, cylindric-campanulate, 5-lobed, lobes triangular; anther base obtuse, apical appendage lanceolate; style branch tips lanceolate. Achenes oblong, slightly compressed, densely silvery sericeous, slightly veined. Pappus 3- or 4-seriate, of white to yellowish white barbellate bristles, some outer shorter and thinner.

One species: NE China, Mongolia, Russia (Far East).

1. Arctogeron gramineum (Linnaeus) Candolle, Prodr. 5: 261. 1836.

莎菀 suo wan

Erigeron gramineus Linnaeus, Sp. Pl. 2: 864. 1753; *Aster gramineus* (Linnaeus) Komarov.

Herbs, perennial; caudex branches ascending, thickly covered with marcescent leaf bases. Flowering scapes 2–5(or 6), 0.5–1 cm (to 7+ cm in fruit). Leaves erect, linear, 1–10 cm × 0.4–0.6 mm, surfaces glabrous (or sometimes ± arachnoid-pubescent?), rigid, 1-veined, base sheathing, margin recurved, roughly scabrous-ciliate. Capitula solitary on scapes, 1–2 cm in diam. Phyllaries densely villous, inner slightly longer, sometimes pinkish tipped. Ray florets lamina ca. 6 × 2 mm, pale; disk florets 3–6 mm, tube 1–2.5 mm, limb 2–3.5 mm, lobes ca. 0.5 mm. Achenes ca. 3 mm. Pappus inner bristles equaling disk corollas.

Dry mountain slopes or stony slopes. Heilongjiang, Nei Mongol [Kazakhstan, Mongolia, Russia (Far East)].

129. TURCZANINOVIA Candolle, Prodr. 5: 257. 1836.

女菀属 nü wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial; rootstock short and thick. Leaves alternate, linear-lanceolate. Capitula radiate, small, numerous, in dense corymbiform synflorescences. Involucre cylindric-campanulate; phyllaries 3- or 4-seriate, imbricate, shorter than disk florets, membranous, midvein green, margin scarious, apex obtuse to acute. Receptacle alveolate, margin lacerate. Ray florets female, 1-seriate, usually 7–10, white, lamina elliptic; disk florets several, bisexual, partly sterile, corolla yellow, limb shortly campanulate, lobes 5, lanceolate; anther base obtuse; style branch tips lanceolate or sometimes style undeveloped. Achenes dark brownish black or reddish, ovoid, weakly compressed, densely strigose, margins finely 2-ribbed. Pappus 2-seriate, of numerous dirty white, barbellate bristles, thin, subequal.

One species: China, Japan, Korea, Mongolia, Russia (Far East).

1. Turczaninovia fastigiata (Fischer) Candolle, Prodr. 5: 258. 1836.

女菀 nü wan

Aster fastigiatus Fischer, Mém. Soc. Imp. Naturalistes Moscou 3: 74. 1812; *A. flabellum* Vaniot; *A. micranthus* Vaniot & H. Léveillé; *A. micranthus* var. *achilleiformis* H. Léveillé; *Kalimeris japonica* Schultz Bipontinus.

Herbs, perennial. Stems erect, 30–80(–100) cm tall, glabrous below, sparsely strigose to densely strigose-tomentose upward. Lower leaves withered at anthesis, shortly petiolate, blade linear-lanceolate, 3–12 × 0.3–1.5 cm, abaxially gray-green, densely strigose-tomentulose, densely glandular, 3-veined, veins prominent, adaxially glabrous, base cuneate, margin entire, revolute, scabrous, apex acuminate; mid and upper gradually reduced upward, lanceolate or linear-lanceolate. Capitula small, 5–7 mm, numerous in terminal, dense, corymbiform synflorescences; peduncles slender; bracts 2 or 3, sometimes grading into phyllaries. Involucre cylindric-campanulate or campanulate; phyllaries: outer series oblong, 1–1.5 mm, ± densely puberulent, apex obtuse, inner oblanceolate-oblong, green at apex and along midrib. Ray florets tube 1–2 mm, lamina narrowly oblong to narrowly elliptic, 2–3.5 × 1–1.5 mm; disk florets 3–4 mm, tube 1–1.5 mm, limb 1–3 mm, lobes recurved. Achenes straw-colored to reddish, oblong, ca. 1 mm, densely strigose, glabrescent. Pappus 2–3 mm, equaling or shorter than disk corolla. Fl. and fr. Aug–Oct.

Dry slopes, moist grassy meadows on riverbanks, roadsides; near sea level to 500 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Mongolia, Russia (Far East)].

130. LAGENOPHORA Cassini, Bull. Sci. Soc. Philom. Paris 1816: 199. 1816 ["*Lagenifera*"], nom. cons.

瓶头草属 ping tou cao shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual [or perennial], scapiform. Leaves basal [or rarely cauline]. Capitula small, radiate or disciform, solitary, usually pedunculate or on scape, scape bracteate (bracts reduced). Involucre campanulate; phyllaries 2–4-seriate, unequal, membranous, 1-veined (midvein orangish). Receptacles flat or convex, not alveolate, naked. Ray florets female, 1–4-seriate, white to purple; disk florets few, usually sterile, functionally male, yellow, limb campanulate, 4- or 5-lobed; anther base obtuse; style branch tip lanceolate

or triangular. Achenes obovate to oblanceolate, flattened, ± glandular apically, margin 2-ribbed, apex rimmed, shortly beaked or not. Pappus absent.

Eighteen species: SE Asia, Australia, New Zealand, South America; one species in China.

1. Lagenophora stipitata (Labillardière) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 4: 630. 1917.

瓶头草 ping tou cao

Bellis stipitata Labillardière, Nov. Holl. Pl. 2: 55. 1806; *Lagenophora billardierei* Cassini.

Herbs, annual, 3.5–12 cm tall. Leaves rosulate, persistent, petiole short, blade obovate to broadly spatulate, 1.2–3 × 0.7–1.3 cm, surfaces sparsely to moderately villosulous, base attenuate, margin repand-dentate, teeth mucronulate, villosulous, apex rounded to obtuse; scape bracts (leaves) 1 or 2, linear, 1–1.5 × 3–5 mm. Capitula 4–7(–9) mm in diam., solitary. Involucre campanulate, ca. 2.5 × 3–5 mm; phyllaries 3- or 4-seriate, margin narrowly scarious, hyaline, entire, apex acute to obtuse, purple tinged, outer oblanceolate, ca. 1 mm, mid oblanceolate or narrowly elliptic, ca. 2 mm, inner linear-lanceolate. Ray florets 3- or 4-seriate, purplish, lamina linear, 1.5–2.5 × ca. 0.5 mm, enrolled by anthesis; disk florets 1.2–1.5 mm, tube 0.3–0.5 mm, limb shortly funnelform, 0.5–1 mm, 4- or 5-lobed, lobes deltate to triangular. Achenes asymmetrically oblanceolate, flattened, 2.5–3.5 mm, apex and beak glandular. Fl. and fr. Sep.

Forest margins, grasslands on slopes; 1700–1800 m. Fujian, Guangdong, Guangxi, Taiwan [India, Indonesia, Vietnam; Australia].

131. CALOTIS R. Brown, Bot. Reg. 6: t. 504. 1820.

刺冠菊属 ci guan ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, annual or perennial, or rarely subshrubs. Leaves alternate, entire or ± dissected. Capitula small, radiate or disciform, solitary or in open corymbiform synflorescences, pedunculate or sessile. Involucre hemispheric or broadly campanulate; phyllaries 3-seriate, unequal or subequal, margins scarious. Receptacle convex, not alveolate, naked. Ray florets female, 1- to many seriate, white, pink, violet, or purple; disk florets usually functionally male, limb funnelform, 5-lobed; anthers obtuse, entire; style branches linear, appendages short, obtuse. Achenes of ray florets obovoid to oblong, sometimes compressed, glabrous or strigillose, often winged. Pappus of (1 or)2 to many awns, spreading, spiniform, shortly barbellate, elongating after flowering, sometimes with 2 to many scales, rarely of barbellate bristles or absent.

About 28–30 species: mainly in Australia, few species in SE Asia; one species (endemic) in China.

1. Calotis caespitosa C. C. Chang, Sunyatsenia 3: 280. 1937.

刺冠菊 ci guan ju

Herbs, annual, 10–15 cm tall; taproot ± woody. Stems erect or ascending, ramified; branches slender, glabrous. Leaves cauline, sessile, blade linear-oblanceolate, 5–25 × 0.5–1.5 mm, gradually reduced distally, surfaces glabrous, base cuneate, margin entire, apex obtuse to acute, tip knobby. Capitula terminal, solitary. Involucre hemispheric, 1–1.5 mm; phyllaries 3-seriate, subequal, linear-lanceolate, 1–1.5 mm, surfaces glabrous, eglandular, midvein prominent, translucent, margin sparsely ciliate. Ray florets 20–38, 1-seriate, lamina white, 0.9–1.5 × 0.3–0.4 mm, glabrous, eglandular; disk florets yellow, 1.3–1.4 mm, limb 0.8–0.9 mm, lobes erect, triangular, 0.3–0.5 mm, glabrous, eglandular. Achenes (ray) obovoid, ± trigonous, 0.8–1 mm, distally strigillose, ribs 3, 2 marginal slightly winged. Pappus of caducous, spiniform, barbellate bristles. Fl. and fr. Sep–Nov.

• Dry sandy and grassy areas by sea beaches; near sea level. Hainan.

132. CALLISTEPHUS Cassini in F. Cuvier, Dict. Sci. Nat. 37: 491. 1825, nom. cons.

翠菊属 cui ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Callistemma Cassini.

Herbs, annual or biennial. Leaves alternate, cauline, margin serrate or lobed. Capitula large, radiate, solitary, terminal on stem and at branch ends. Involucre hemispheric; phyllaries 2- or 3-seriate, imbricate, outer series large, leaflike, inner shorter, scarious. Receptacles flat or subconvex, alveolate, short paleae sometimes present. Ray florets 1- or 2-seriate, lamina usually red-purple, entire or shallowly 2-toothed at apex; disk florets bisexual, numerous, yellow, limb campanulate, shallowly 5-lobed; anther base obtuse, entire; style branches flattened, appendages triangular-lanceolate. Achenes oblanceoloid, slightly compressed, strigillose, sparsely, minutely stipitate glandular, 2-ribbed, 1 vein per side. Pappus 3-seriate, outer of persistent, short scales, inner 2 of deciduous, long, barbellate bristles.

One species: China, Japan, Korea, also widely cultivated.

1. Callistephus chinensis (Linnaeus) Nees, Gen. Sp. Aster. 222. 1832.

翠菊 cui ju

Aster chinensis Linnaeus, Sp. Pl. 2: 877. 1753; *Callistemma chinense* (Linnaeus) Skeels; *C. hortense* Cassini; *Diplopappus chinensis* (Linnaeus) Lessing.

Herbs, 20–100 cm tall. Stems erect, single, simple or sparingly branched, branches ascending, sometimes reddish, sparsely to moderately villous, sometimes sparsely to moderately minutely stipitate glandular. Leaves: lower withered by anthesis or persistent, gradually reduced distally; lower petiolate (to 1.2 cm), blade spatulate, ca. 0.9 cm; mid narrowly winged petiolate (2–4 cm, margin villosulous), blade ovate to lanceolate or oblanceolate, 2.5–6.5 × 2–4 cm, strigillose, abaxially sparsely pilosulose, midvein sparsely villosulous, adaxially glabrous, eglandular, base cuneate or attenuate-rounded, margin irregularly, coarsely serrate, teeth mucronulate, sometimes entire (distalmost), apex acuminate, mucronulate. Involucre 10–15+ mm; phyllaries subequal, oblanceolate, apex obtuse, outer series 10–30 × 2–6 mm, glabrous, midvein ciliate proximally, margin white ciliate, apex mucronulate, inner series 10–30 × 2–6 mm, glabrous, eglandular, scarious, multiveined, veins translucent, proximally prominent, margin hyaline, erose, purple-tinged, apex erose. Ray florets 16–40+, lamina red, pink, blue, purple, violet, lilac, or white, 15–35 × 2–8 mm, tube sparsely strigillose, sparsely, minutely stipitate glandular apically; disk florets yellow, 4.5–5 mm, tube and limb base sparsely strigillose, limb 3.6–4 mm, lobes spreading, narrowly triangular, 1.2–1.3 mm, sparsely minutely stipitate glandular. Achenes mottled purple, grayish with age, 3–3.5 mm. Pappus: outer scales, reddish, ca. 0.1 mm, inner bristles white, ca. 4 mm, acute, innermost bristles 4.5–4.8 mm, weakly clavate. Fl. and fr. May–Oct.

Grasslands on slopes, stream banks, shady places or open forests, roadsides; 300–2700 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [Japan, Korea].

An ornamental plant, this species is widely cultivated worldwide.

133. FORMANIA W. W. Smith & J. Small, Trans. & Proc. Bot. Soc. Edinburgh 28: 91. 1922.

复芒菊属 fu mang ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Small shrubs. Leaves alternate, petiolate, leathery, pinnatilobed. Capitula radiate, terminal, in corymbiform synflorescences, pedunculate. Involucre cylindric; phyllaries 4-seriate, unequal, oblong or lanceolate-oblong, scarious, green distally. Receptacles flat, fimbrillate. Ray florets female, 1-seriate, lamina pale yellow; disk florets bisexual, yellow, limb funnelform, 5-lobed; anther base sagittate with short, acute auricles at base, apical appendage long acute; style branch tip lanceolate. Achenes obovoid, strigillose, sparsely stipitate glandular, 3-ribbed. Pappus 3-seriate, outermost of 6 broad scales 1.5–2 mm, inner of 0 (disk) or 1 (ray) series of ± flattened, barbellate bristles ca. 3 mm, innermost of 3–5 strongly clavate bristles 3.8–4.2 mm (equaling base of disk corolla lobes).

• One species: China.

1. Formania mekongensis W. W. Smith & J. Small, Trans. & Proc. Bot. Soc. Edinburgh 28: 92. 1922.

复芒菊 fu mang ju

Shrubs, 30–100 cm tall. Branchlets gray-brown, villosulous, minutely stipitate glandular when young. Leaves narrowly winged petiolate (to 0.5–0.8 cm), blade ovate to obovate, 3–5-lobed, 1.2–2 × 0.5–2 cm, surfaces glabrous, minutely stipitate glandular in pits, viscid, base attenuate, margin irregularly serrate, teeth spinulose, remotely scabridulous. Capitula 2–12, ca. 7 mm; peduncle 1–10 mm, glabrous, densely stipitate glandular; bracts sometimes present. Involucre 5–6 mm; phyllaries: base hardened, surfaces glabrous, stipitate glandular, resinous, outer lanceolate-oblong, 1.5–2 × ca. 1 mm, distally leaflike, margin narrowly scarious, sparsely ciliate, apex acute, inner oblong, 3–5.5 × 1.2–1.5 mm, margin broadly scarious, hyaline, white ciliate, apex obtuse, tip reddish. Ray florets ca. 10, lamina 2.5–3 × ca. 0.7 mm; disk florets ca. 8, 4–4.2 mm, limb ca. 3 mm, lobes spreading, triangular, ca. 0.8 mm. Achenes (immature) ca. 2 mm.

• Dry rocky slopes, rock walls; ca. 3000 m. W Sichuan (Batang), NW Yunnan.

134. HETEROPLEXIS C. C. Chang, Sunyatsenia 3: 266. 1937.

异裂菊属 yi lie ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial, climbing or erect. Leaves alternate, cauline, shortly petiolate, margin entire or serrulate, pinnately veined. Capitula disciform, solitary or 2–4-fascicled at ends of branches, shortly pedunculate or sessile. Involucre cylindric or cylindric-campanulate; phyllaries numerous, 5- or 6-seriate, imbricate, ovate to ovate-oblong. Receptacles flat, alveolate, glabrous. Florets fertile. Ray florets female, 1-seriate, 4–7, lamina fine, apex 3-toothed; disk florets bisexual, 4–6, yellow, limb narrowly campanulate, lobes 5, unequal, outer 2 longer; stamens 5, exserted; anther base obtuse; style branch tip triangular. Achenes oblong or oblong-obovoid, sparsely strigillose; achenes of ray florets slightly compressed, angled adaxially, slightly convex abaxially, 1-ribbed on both sides; achenes of disk florets 2-ribbed on both sides. Pappus 1-seriate, of yellowish white, subequal, barbellate bristles.

• Three species: China.

One of us (Brouillet) has not seen specimens of this genus.

1a. Stems and branches densely gray puberulent, eglandular; leaves lanceolate to oblong-lanceolate, adaxially scabrous, abaxially densely white villous ..... 3. *H. sericophylla*
1b. Stems and branches gray hairy and glandular; leaves lanceolate-elliptic or oblong-lanceolate or lanceolate, both surfaces scabrous, abaxially glandular.
2a. Involucre 5–5.6 × 3–4 mm; ray florets ca. 7, disk florets ca. 3; abaxial leaf surface glandular ..... 1. *H. vernonioides*
2b. Involucre ca. 4 × 2–3 mm; ray and disk florets 4; both leaf surfaces densely glandular ..... 2. *H. microcephala*

1. Heteroplexis vernonioides C. C. Chang, Sunyatsenia 3: 267. 1937.

异裂菊 yi lie ju

Herbs climbing. Stems olive, corymbosely branched above, branches spreading, lower to 16 cm, striate, gray puberulent, glandular. Leaves: petiole 3–5 mm, blade abaxially pale green, adaxially green, lanceolate-elliptic, 8–9 × 2–2.5 cm, surfaces scabrous, abaxially glandular, distal half hard papery, lateral veins distinct, connected toward margin, base cuneate, margin all or above middle sparsely serrulate, densely scabrous, apex acute; upper blade oblong, elliptic-oblong, or narrowly ovate, ca. 2 × 0.9 cm, base cuneate, margin entire, apex acute or slightly obtuse; uppermost subsessile, small. Capitula solitary or 2- or 3-fascicled; peduncles absent or to 6 mm; bracts ovate-lanceolate. Involucre 5–5.6 × 3–4 mm; phyllaries 5- or 6-seriate, outer ovate, obtuse, abaxial surface and margin sparsely pubescent, often glandular. Ray florets ca. 7; disk florets ca. 3, yellow, 4.5–5 mm, lobes incurved, outer 2 ca. 1.6 mm, inner ca. 1 mm. Achenes ca. 1.5 mm. Pappus ca. 4.3 mm. Fl. Oct.

● Limestone rocky sides in valleys. Guangxi (Jinxian).

2. Heteroplexis microcephala Y. L. Chen, Guihaia 5: 339. 1985.

小花异裂菊 xiao hua yi lie ju

Herbs, perennial, erect, 50–70 cm tall. Stems with short or long branches above, striate, densely gray appressed hispidulous, glandular. Leaves: petiole 2–3 mm, blade abaxially pale, adaxially dark green, thickly papery; mid cauline oblong-lanceolate or lanceolate, 5–10 × 1.5–2 cm, surfaces sparsely scabrous, densely glandular, lateral veins 5- or 6-paired, distinct abaxially, base cuneate, margin entire or rarely denticulate, apex acuminate, mucronulate; upper and on branches subsessile, small, ovate-lanceolate. Capitula solitary in leaf axils or 2–4 in racemose-corymbiform synflorescences; peduncles 4–8 mm, densely shortly appressed hairy; bracts 1 or 2(or 3), linear-lanceolate. Involucre cylindric or subcylindric, ca. 4 × 2–3 mm; phyllaries 4- or 5-seriate, scarious, outer ovate, 1–1.5 mm, slightly acute, inner oblong, 4–5 mm, obtuse, inconspicuously 1-veined, apex and margin puberulent. Ray florets 4, tube 2–2.5 mm, lamina fine, ca. 0.5 mm wide, shorter than style; disk florets 4, tube ca. 1.5 mm, glabrous, lobes linear-lanceolate, outer ca. 2 mm, inner 1–1.5 mm, apex puberulent. Achenes oblong, ca. 1 mm. Pappus ca. 4 mm. Fl. Jul–Dec.

● Limestone rocky slopes; ca. 300 m. Guangxi (Yangzhou).

3. Heteroplexis sericophylla Y. L. Chen, Fl. Reipubl. Popularis Sin. 74: 361. 1985.

绢叶异裂菊 juan ye yi lie ju

Herbs, erect. Stems gray-brown, simple or branched, striate, densely gray puberulent, eglandular. Leaves: petiole 2–3 mm, blade hard papery; mid cauline lanceolate to oblong-lanceolate, 11–14 × 2–2.5 cm, abaxially gray-green, densely white villous, adaxially green, strigose, lateral veins indistinct, base cuneate, margin entire or above middle ± sparsely serrulate, teeth mucronate, apex acuminate or long acuminate; upper subsessile, narrowly lanceolate, 6.5–10 × 1–1.8 cm, margin entire, apex acuminate; uppermost reduced, linear-lanceolate. Capitula solitary or 2- or 3-fascicled in leaf axils of short branches and in corymbiform synflorescences, shortly pedunculate or sessile; bracts linear-lanceolate. Involucre cylindric-campanulate, 3–4 × ca. 3 mm; phyllaries 5-seriate, obtuse, outer ovate, 1.5–1.8 mm, inner oblong, ca. 4 mm, white villous, margin ciliate, 1-veined. Ray florets 6 or 7, 1-seriate, lamina fine, ca. 0.5 mm; disk florets 5 or 6, 3.7–4 mm, lobes lanceolate, apex white puberulent. Achenes oblong, ca. 1.3 mm, 2-ribbed on both sides. Pappus ca. 3.5 mm. Fl. Sep–Oct.

● Open forests on hills; ca. 400 m. Guangxi.

135. PSYCHROGETON Boissier, Fl. Orient. 3: 156. 1875.

寒蓬属 han peng shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial, annual, or biennial; rhizome usually thickly woody, sometimes thin and ± woody, stem base sheathed in marcescent leaf remains, rarely biennial or annual. Stems usually short, rarely tall, ± scapiform, sometimes branched, leafy. Leaves alternate, basal petiolate or subpetiolate, blade green or grayish, lanceolate, oblanceolate, obovate, or spatulate, white tomentose to lanate, often sessile or short-stipitate glandular, margin entire, coarsely serrate, or sometimes subpinnatifid, cauline leaves few, reduced, entire or dentate. Capitula solitary or few, terminal, rarely in racemiform or corymbiform synflorescences. Involucre campanulate; phyllaries 2- or 3-seriate, imbricate or ± equal, membranous, outer green distally, inner green along midvein, margin scarious. Ray florets fertile, many, white, yellow, or reddish, reduced to tube and elaminate or laminate, exceeding or shorter than style, entire or 2- or 3-lobed; disk florets functionally male, few or numerous, concolorous with ray florets, 5-lobed; anther base obtuse, appendages lanceolate; ray floret style linear, disk floret style lanceolate, branches fused. Achenes of ray florets obovoid or

narrowly oblong to oblanceoloid, compressed, ± strigose, marginally 2-ribbed, of disk florets linear, sterile. Pappus 1- or 2-seriate, outer of few short, thin bristles, inner of long, unequal, barbellate bristles, acute or slightly clavate, equaling disk florets.

About 20 species: C and SW Asia; two species in China.

1a. Perennial herbs; stems 3–19 cm tall, simple, sparsely to densely lanate; capitula solitary, 1.5–2.4 cm in diam.; female florets laminate, golden yellow ..... 1. *P. poncinsii*
1b. Annual or biennial herbs; stems to 55 cm tall, branched, densely villous-pilose; capitula numerous, 0.7–1 cm in diam., in corymbose-paniculiform synflorescences; female florets filiform, white ..... 2. *P. nigromontanus*

1. Psychrogeton poncinsii (Franchet) Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 427. 1973.

藏寒蓬 zang han peng

Aster poncinsii Franchet, Bull. Mus. Hist. Nat. (Paris) 2: 345. 1896; *Erigeron poncinsii* (Franchet) Botschantzev; *Psychrogeton andkyaloides* (Candolle) Novopokrovsky ex Kraschenninikov var. *poncinsii* (Franchet) Grierson.

Herbs, perennial, 3–19 cm tall; rhizome thickly woody, branched. Stems scapiform, erect or ascending, simple, densely to sparsely lanate, partly glabrescent, sessile or short-stipitate glandular. Leaves: surfaces sparsely or densely lanate to tomentose, short-stipitate or sessile glandular; basal petiolate, blade oblanceolate to obovate or spatulate, 1–6 × 0.3–1.5 cm, margin remotely coarsely serrate or slightly repand, rarely entire, apex acute to obtuse; cauline 3–5, sessile or shortly petiolate, blade oblanceolate to linear. Capitula 1.5–2.4 cm in diam., solitary. Phyllaries 2- or 3-seriate, linear-lanceolate to linear-oblanceolate, outer partly green or gray-green, abaxially densely to sparsely white tomentose or lanate, apex acute to acuminate, inner 6.5–8 × ca. 1 mm. Ray florets 4.4–5.4 mm, longer than pappus, tube 2.9–3.6 mm, sparsely hairy, lamina golden yellow, becoming reddish or purplish after anthesis, narrowly obovate to oblanceolate, 1.3–3.5 × 0.7–1.2 mm, apex 3-denticulate; disk florets narrowly funnelform, appressed hairy, tube 1.7–1.8 mm, limb 3–3.5 mm, lobes 0.3–0.5 mm. Achenes (ray florets) brown, ribs straw-colored, narrowly oblong to oblanceoloid, 3.6–3.8 mm, ± densely strigose. Pappus 2-seriate, yellowish white, 2.6–4.6 mm.

Valleys; 3000–4600 m. Xinjiang, W Xizang [Afghanistan, India, Pakistan, Russia, Tajikistan; SW Asia (Iran)].

2. Psychrogeton nigromontanus (Boissier & Buhse) Grierson, Notes Roy. Bot. Gard. Edinburgh 27: 144. 1967.

黑山寒蓬 hei shan han peng

Erigeron nigromontanus Boissier & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 114. 1860; *Brachyactis iliensis* Ruprecht; *Conyza iliensis* Trautvetter; *E. kazachstanicus* Sergievskaya.

Herbs, annual or biennial, 1–55 cm tall or more; taproots vertical or ascending. Stems erect, branched above, densely leafy, grayish, densely villous-pilose, short-stipitate glandular. Leaves densely villous-pilose, short-stipitate glandular, basal withered at anthesis, petiolate, petiole base clasping, blade spatulate to oblong; lower cauline long petiolate, blade obovate to oblanceolate, ca. 8 × 2.5 cm, base attenuate, margin entire or remotely serrulate, apex acute; mid cauline blade oblanceolate to lanceolate, ca. 3 × 0.75 cm, margin entire or remotely 1- or 2-serrulate per side; upper on branches reduced. Capitula 0.7–1 cm wide, usually numerous, in corymbose-paniculiform synflorescences; peduncles thin, 0.5–1 cm. Involucre campanulate; phyllaries subequal, 2- or 3-seriate, green along midvein, lanceolate to linear-lanceolate, ca. 4 × 0.5 mm, abaxially densely villous-pilose, short-stipitate glandular, margin scarious, apex acuminate. Female florets numerous, filiform, 1.75–2 mm, hairy, lamina ± obliquely cut; disk florets 6–12, ca. 3.5 mm, funnelform, lobes lanceolate, apex hairy. Achenes tan, oblanceoloid, ca. 2 × 0.5 mm, strigose. Pappus 1-seriate, sometimes also short outer series present, very short, of 20–24 barbellate bristles, 3–4.5 mm. Fl. Jul–Sep.

Subalpine meadows; 1200–1500 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan; SW Asia (Caucasus, Iran, Iraq, Turkey)].

136. NEOBRACHYACTIS Brouillet, gen. nov.

短星菊属 duan xing ju shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Type: *Neobrachyactis roylei* (Candolle) Brouillet.

Herbae annuae vel perennes, stipitato-glandulosae; caules erecti vel ascendentes, simplices vel ramosi. Folia alterna, basalia et caulina, ad marginem serrata vel interdum integra. Capitula disciformia vel radiata, in synflorescentias racemo-paniculiformes disposita, raro ad foliorum superiorum axillas solitaria vel aggregata; involucrum hemisphaericum vel campanulatum; phyllaria 2- ad 4-seriata, subaequalia, lineari-lanceolata vel lineari-oblonga, membranacea vel exteriora foliacea, ad marginem scariosa, glandulosa; receptaculum planum, infirme alveolatum, nudum. Flosculi omnes fertiles; flosculi radii feminei, numerosi, biseriati, tubulosi vel breviter laminati, albi vel caerulescentes; flosculi disci bisexuales, minus numerosi, lutei vel incolorati, limbo breviter infundibuliformi, superne 5-lobo, lobis ovatis, antheris ad basin obtusatae, appendice apicali lanceolata, styli ramorum appendicibus triangulo-lanceolata. Achaenia oblanceolata, compressa, strigosa, ad marginem 2-costata; pappus biseriatus, setis exterioribus paucibus, brevibus, gracilibus, interioribus numerosis, luteis usque cinnamomeis, barbellatis, ad apicem acutis interdum leniter clavatis.

Herbs, annual or perennial. Stems erect to ascending or sometimes procumbent, often branching from base, stipitate glandular. Leaves basal and cauline, blade obovate to oblong-obovate or oblong-lanceolate, margin serrate or sometimes entire, ± densely glandular. Capitula radiate or disciform, in racemose-paniculiform synflorescences, rarely solitary or crowded in upper leaf axils. Involucre hemispheric or campanulate; phyllaries 2–4-seriate, subequal, membranous, outer leaflike, linear-oblong or linear-lanceolate, stipitate glandular, margins villous-ciliate, outer green except white margin, margin of inner narrowly scarious, erose, ± ciliate. Receptacles flat, weakly alveolate, glabrous. Florets fertile. Ray florets numerous, 2-seriate, white or bluish, reduced to tube or shortly laminate, tube shorter than style, apex ciliate, lamina, if present, filiform, exceeding style; disk florets bisexual, less numerous, yellow or uncolored, shorter than to ± equaling pappus, limb shortly funnelform, 5-lobed, lobes ovate, short; anther base obtuse, apical appendage lanceolate; style branch tips triangular-lanceolate. Achenes oblanceolate, flattened, long strigose, marginally 2-ribbed. Pappus 2-seriate, outer of few short, thin bristles, inner of numerous yellowish to cinnamon, barbellate bristles, apex acute or sometimes slightly clavate.

Three species: C, N, and S Asia; three species in China.

The genus *Neobrachyactis* is distinct from *Brachyactis* s.s., the type of which, *B. ciliata* (Ledebour) Ledebour (*Erigeron ciliatus* Ledebour), belongs to the North American genus *Symphyotrichum*. The notably glandular herbage and the compressed, 2-ribbed achenes clearly distinguish the species of *Neobrachyactis* from *S. ciliatum*.

1a. Perennial herbs; upper leaves sessile, subclasping at base, shortly decurrent on stems; capitula solitary or 3 or 4 crowded at ends of stems and branches; phyllaries longer than disk florets; ray florets longer than disk florets, lamina bluish, exceeding style ..... 1. *N. anomala*

1b. Annual herbs; upper leaves sessile or shortly petiolate, not decurrent; capitula ± numerous, in racemiform or racemose-paniculiform synflorescences; phyllaries shorter than disk florets; ray florets shorter than disk florets, lamina white, shorter than style, or tube apex obliquely lobed, elaminate.

2a. Stems moderately to densely stipitate glandular and sparsely villous; capitula 1–1.2 cm in diam., numerous, in racemiform or racemose-paniculiform synflorescences; phyllaries green, ca. 1/3 shorter than disk florets, outer shorter than inner, ± villous and densely short-stipitate glandular ..... 2. *N. roylei*

2b. Stems densely brown glandular; capitula 1.5–2 cm in diam., few, in racemiform synflorescences; phyllaries dark brown, slightly shorter than disk florets, outer often longer than inner, densely brown glandular ..... 3. *N. pubescens*

1. Neobrachyactis anomala (Candolle) Brouillet, **comb. nov.**

香短星菊 xiang duan xing ju

Basionym: *Erigeron anomalus* Candolle, Prodr. 5: 293. 1836 [*"anomalum"*]; *Aster menthodorus* (Bentham) Govaerts; *Brachyactis anomala* (Candolle) Kitamura; *B. indica* C. B. Clarke; *B. menthodora* Bentham.

Herbs, perennial, 60–95 cm tall, with sweet menthol odor. Stems erect, rigid, tinged pinkish violet, shortly branched, long-stipitate glandular. Leaves crowded, surfaces densely stipitate glandular, veins sparsely villous; basal and lower cauline long petiolate, basal fallen at anthesis, obovate or oblong-lanceolate, 1.5–5 × 0.5–1.5 cm, margin serrate, apex acute or arcuate; upper sessile, gradually reduced, base subclasping, decurrent, ± rounded. Capitula radiate, solitary or 3 or 4 crowded at ends of stems or branches, 1–1.5 cm in diam.; peduncles 5–10 mm. Involucre hemispheric-campanulate; phyllaries 2- or 3-seriate, membranous, outer often 1 or 2, leaflike, green along midvein, inner linear or linear-lanceolate, 6–7 mm, sparsely villous, sparsely stipitate glandular, margin narrowly scarious, apex acute or acuminate, pinkish violet, equaling or longer than disk florets. Florets fertile. Ray florets numerous, ± 2-seriate, 5–6 mm, lamina bluish, longer than style, narrow, apex 3-toothed; disk florets ca. 5 mm, tube and limb base often hairy, limb funnelform, lobes lanceolate, glabrous. Achenes brown, oblanceolate, compressed, 3–3.5 mm, sparsely strigose. Pappus pinkish to brownish, 2-seriate, outer bristles short, inner unequal, longer than achene, barbellate. Fl. and fr. May–Sep.

Alpine thicket margins, grasslands on slopes; 3300–4000 m. S Xizang (Nyalam to Yadong) [Bhutan, India, Nepal].

2. Neobrachyactis roylei (Candolle) Brouillet, **comb. nov.**

西疆短星菊 xi jiang duan xing ju

Basionym: *Conyza roylei* Candolle, Prodr. 5: 381. 1836; *Brachyactis roylei* (Candolle) Wendelbo; *B. umbrosa* (Karelin & Kirilov) Bentham; *C. umbrosa* Karelin & Kirilov; *Erigeron umbrosus* (Karelin & Kirilov) Boissier.

Herbs, annual, 3–35 cm tall. Stems erect or ascending, sometimes procumbent, green or tinged pinkish, branched from base or upper part, densely leafy, densely stipitate glandular, densely hirsute-villous. Leaves: surfaces ± densely stipitate glandular, hirsute-villous; basal withered and fallen at anthesis, long petiolate, blade obovate or obovate-oblong, 0.5–4 × 0.3–1.5 cm, base cuneate to attenuate, margin coarsely serrate, apex obtuse or arched; cauline shortly petiolate, blade obovate, base attenuate to cuneate; upper reduced, margin coarsely serrate or subentire. Capitula numerous, in racemiform or racemose-paniculiform synflorescences, 1–1.2 cm in diam. Involucre campanulate; phyllaries 3- or 4-seriate, membranous, linear-lanceolate, shorter than or equaling disk florets, abaxially densely stipitate glandular, sparsely villous, margin narrowly scarious, outer shorter than inner, 5–7 × 0.6–1 mm. Ray florets numerous, reduced to tube, white, 2.2–2.6 mm, sparsely hairy above, apex oblique, ciliate, or sometimes laminate; disk florets yellow, 3.5–3.6 mm, tube 2.4–2.8 mm, limb shortly funnelform, upper tube and limb hairy, lobes ovate, 0.25–0.4 mm. Achenes lanceolate, compressed, 1.8–2.2 mm, strigose. Pappus yellowish to cinnamon, 2-seriate, 3.6–3.9 mm, inner ± equaling disk corolla. Fl. and fr. Jul–Sep.

Among rocks and shrubs; 1800–4300 m. N Xinjiang, N and W Xizang [Afghanistan, India, Kazakhstan, Nepal, Pakistan, Russia, Uzbekistan; SW Asia (Iran)].

3. Neobrachyactis pubescens (Candolle) Brouillet, **comb. nov.**

腺毛短星菊 xian mao duan xing ju

Basionym: *Conyza pubescens* Candolle, Prodr. 5: 381. 1836; *Brachyactis pubescens* (Candolle) Aitchison & C. B. Clarke; *B. robusta* Bentham.

Herbs, annual, 4–20 cm tall. Stems erect or ascending, branched, densely leafy, densely brownish yellow stipitate glandular. Leaves: surfaces densely glandular, basal withered and fallen at anthesis, shortly petiolate, blade obovate or oblong-obovate, 1–4 × 0.5–1.5 cm, base cuneate, margin sparsely roughly serrate, apex obtuse or arched; upper subsessile, reduced, margin almost entire or sparsely serrate. Capitula few, in racemiform synflorescences, 1.5–2 cm in diam.; peduncles thick, 1–1.8 cm. Involucre hemispheric; phyllaries 2- or 3-seriate, dark brownish, oblong or oblong-lanceolate, slightly shorter than disk florets, abaxially densely brown glandular, apex acute or acuminate, outer often longer than inner, 5–7 × 1–1.2 mm. Ray florets numerous, white, finely tubular, together with style 4–4.5 mm, apex obliquely lobed or finely laminate, upper tube puberulent; disk florets uncolored, 4–4.5 mm, lobes short, upper tube and lobe apex puberulent. Achenes oblong, ca. 2 mm, compressed, strigillose. Pappus dirty white, 2-seriate, outer bristles short, inner ± equaling disk corolla. Fl. and fr. Jul–Oct.

Mountain slopes; ca. 5200 m. W Xizang [Afghanistan, India, Nepal, Pakistan].

137. SHEARERIA S. Moore, J. Bot. 13: 227. 1875.

虾须草属 xia xu cao shu

Chen Yousheng (陈又生); Luc Brouillet

Herbs, biennial (or winter annual). Stems erect to ascending. Leaves basal 1st year, cauline 2nd year, alternate, margin entire. Capitula radiate, small, terminal or axillary. Involucre campanulate; phyllaries 2-seriate, unequal, ovate, outer 2 oblong, smaller. Receptacles flat, epaleate. Ray florets female, white or pinkish, lamina elliptic-oblong, entire or 3-toothed; disk florets functionally male (ovary sterile), yellow, limb campanulate, (4 or)5(or 6)-lobed; anther base obtuse; style undivided, lanceolate. Achenes oblanceoloid to obovoid, 3-ribbed. Pappus absent.

• One species: China.

1. Sheareria nana S. Moore, J. Bot. 13: 227. 1875.

虾须草 xia xu cao

Sheareria leshanensis Z. Y. Zhu; *S. polii* Franchet.

Herbs, biennial (or winter annual), 10–100 cm tall, taprooted. Stems ramified. Leaves shortly petiolate (lower) or sessile, blade lanceolate to oblanceolate, 4–50 × 1.3–6 mm, surfaces glabrous, eglandular or sometimes sparsely minutely stipitate glandular on abaxial base of petiole, margin sparsely ciliate, apex acute to obtuse, mucronulate; upper smaller, bractlike. Capitula 2–2.2 mm; peduncles 3–5 mm. Phyllaries 4 or 5, green, surfaces glabrous or sparsely strigillose, eglandular, margin scarious, ciliate, apex obtuse. Ray florets 3 or 4, tube ca. 1 mm, minutely stipitate glandular, lamina white or pinkish tipped, ca. 2 × 1–1.2 mm, becoming coiled; disk florets functionally male, 2 or 3, yellow, 1.5–2 mm, tube 0.5–0.6 mm, limb ca. 1.2 mm, lobes spreading to recurved, triangular, ca. 0.4 mm, tube, limb, and lobe base glabrous, minutely stipitate glandular. Achenes brown, 3.5–4 mm, 3-ribbed, ribs narrow, minutely stipitate glandular. Fl. Apr–Nov, fr. Oct–Nov.

• Fields, moist grasslands, sandy stream banks; sea level to 700 m. Anhui, Guangdong, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang.

Fruit of ray florets develop while disk florets are opening.

138. RHINACTINIDIA Novopokrovsky, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 114, 134. 1948.

岩菀属 yan wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Rhinactina Lessing, Linnaea 6: 119. 1831, not Willdenow (1807); *Borkonstia* Ignatov, nom. illeg. superfl.; *Krylovia* Schischkin, nom. illeg. superfl.

Herbs, perennial, caespitose; rhizomes thick, woody, caudices many branched, clad with marcescent petiole bases. Stems erect, branched or simple, densely curved-strigose. Leaves: basal numerous, petiolate, blade obovate, oblanceolate, or oblong-obovate, 3-veined, margin entire or sparsely serrate, base attenuate, cauline shortly petiolate or sessile, obovate-oblong or oblanceolate, rarely linear, densely curved-strigose, sessile glandular. Capitula radiate, solitary at ends of branches or several in racemiform synflorescences. Involucre broadly campanulate or subhemispheric; phyllaries 3- or 4-seriate, imbricate, green distally, becoming yellow-brown, oblong or lanceolate, sparsely strigose, subleathery, back rounded, margin scarious, sometimes ciliate, apex obtuse or ± acute, outer shorter. Receptacles slightly convex, irregularly, shallowly alveolate, naked. Florets numerous, fertile. Ray florets pale purple, 2 × longer than disk florets; disk florets bisexual, numerous, yellow or purplish, ± zygomorphic, upper tube and limb base hairy, limb

campanulate, lobes 5, lanceolate, 1 inner longer; anther appendage triangular to lanceolate, base acuminate; style appendages triangular. Achenes brown, oblanceolate, 2-ribbed, strigose, 1-ringed at base. Pappus 3-seriate, of white or dirty white, barbellate bristles, outer short, inner acute, innermost tip ± clavate, nearly equaling disk corollas.

Four species: C and N Asia; two species in China.

1a. Basal leaves spatulate to obovate or oblanceolate, 2.5–4.5 cm, apex obtuse or rounded; capitula several at ends of stems and branches; plants to 25 cm tall ..... 1. *R. limoniifolia*

1b. Basal leaves oblong-obovate, less than ca. 2.5 cm, apex acute or somewhat acute; capitula solitary at ends of stems; plants less than ca. 10 cm tall ..... 2. *R. eremophila*

1. Rhinactinidia limoniifolia (Lessing) Novopokrovsky ex Botschantzev, Novosti Sist. Vyssh. Rast. 23: 179. 1986.

岩菀 yan wan

Rhinactina limoniifolia Lessing, Linnaea 6: 119. 1831; *Aster limoniifolius* (Lessing) B. Fedtschenko (1915), not Greene (1900); *A. obovatus* C. A. Meyer (1833), not (Nuttall) Elliott (1823); *Borkonstia limoniifolia* (Lessing) Ignatov; *Krylovia limoniifolia* (Lessing) Schischkin.

Herbs, perennial, subscapiform. Stems several, ascending, simple, 3–20(–25) cm, ± densely strigose. Leaves: basal many, rosulate, petiole equaling blade or shorter, base expanded, blade spatulate to obovate or oblanceolate, 2.5–4.5 × 1–2 cm, surfaces strigose, usually 1-veined, rarely inconspicuously 3-veined, base attenuate, clasping, margin entire or sparsely serrulate, apex acute or ± obtuse, rarely rounded; cauline few, shortly petiolate or sessile, blade narrowly oblong or oblanceolate to lanceolate-linear, base cuneate, apex acute to obtuse. Capitula solitary at ends of stems or branches, 1.5–2 cm in diam. Involucre subhemispheric to broadly campanulate, 5–6(–7) × 8–10 mm; phyllaries 3-seriate, ± leathery, margin narrowly scarious, erose to fimbriate, sometimes ciliate, apex acuminate, sometimes acute, outer shorter, green, lanceolate, sparsely scabrous, mid and inner oblong, scabrous or glabrous in lower half. Ray florets lamina light violet, (10–)13–15 × ca. 2 mm; disk florets yellow, 4.5–6 mm, lobes lanceolate. Achenes ca. 4 mm, densely strigose. Fl. and fr. Jun–Aug.

Rocky or grassy slopes; 1200–3500 m. NW and W Xizang [Kazakhstan, Mongolia, Russia (W Siberia), Uzbekistan].

2. Rhinactinidia eremophila (Bunge) Novopokrovsky ex Botschantzev, Novosti Sist. Vyssh. Rast. 23: 180. 1986.

沙生岩菀 sha sheng yan wan

Aster eremophilus Bunge, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 2: 599. 1835; *A. uniflorus* (Bunge ex Candolle) B. Fedtschenko (1915), not Moench (1794), nor Michaux (1803), nor (Hooker) Kuntze (1891), nor (Linnaeus) E. H. L. Krause (1905); *Borkonstia eremophila* (Bunge) Ignatov; *Krylovia eremophila* (Bunge) Schischkin; *Rhinactina uniflora* Bunge ex Candolle.

Herbs, perennial, scapiform. Stems several, simple, 3–8(–10) cm, ± densely strigose. Leaves: basal many, rosulate, petiole equal to blade or shorter, base expanded, clasping, blade oblong-obovate to oblanceolate, 1.5–4 × 0.3–0.8 cm, surfaces densely strigose, usually 1-veined, rarely inconspicuously 3-veined, base attenuate, margin entire or sparsely serrulate, apex acute or ± obtuse, rarely rounded; cauline few, sessile, reduced, narrowly oblong or linear, base cuneate, apex obtuse. Capitula solitary at ends of stems, 1.5–2 cm in diam. Involucre subhemispheric, 5–6 × ca. 10 mm; phyllaries 3-seriate, leathery, margin narrowly scarious, erose, sometimes ciliate, apex acuminate, outer shorter, lanceolate, ± densely strigose, mid and inner oblong, strigose or almost glabrous in lower half. Ray florets lamina light violet, 13–15 × ca. 2 mm; disk florets yellow, 4.5–5.5 mm, lobes lanceolate. Achenes ca. 4 mm, densely strigose. Fl. Jun–Jul.

Steppes and dry pebbly slopes; 1800–2700 m. C and N Xinjiang [Kazakhstan, Mongolia, Russia (Altai, W Siberia)].

139. ASTER Linnaeus, Sp. Pl. 2: 872. 1753.

紫菀属 zi wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet, John C. Semple

Herbs, perennial, rarely annual or biennial, subshrubs or shrubs, generally rhizomatous, sometimes somewhat woody. Stems erect, sometimes decumbent to ascending, or procumbent. Leaves alternate, rarely opposite, sessile or petiolate, obovate to elliptic-ovate, ovate, or lanceolate, margin entire, serrate, or coarsely dentate, sometimes pinnatifid. Capitula solitary or in corymbiform or sometimes paniculiform synflorescences, radiate, rarely discoid. Involucres hemispheric, campanulate, or obconic; phyllaries 2–5-seriate, imbricate or equal, linear-lanceolate, herbaceous or membranous, margin scarious (at least inner), apex sometimes purplish. Receptacles flat or convex to conic, alveolate, sometimes lacerate, epaleate. Ray florets female, fertile or rarely sterile, 1- or 2-seriate, rarely absent, white, pink, purple, or blue, apex inconspicuously 2- or 3-denticulate; disk florets numerous, bisexual, fertile, yellow or purple-brown, limb campanulate, 5-lobed, lobes equal or unequal (1 lobe deeper and corolla zygomorphic). Anther base obtuse; style branch tip lanceolate or triangular. Achenes oblong, obovoid, or oblanceoloid, compressed or subconvex, rarely 3- or 4-angled, margin 2(–6)-ribbed, glabrous or strigose, eglandular or glandular. Pappus 1–4-seriate, persistent or rarely caducous, sometimes absent, white, brownish, or reddish, outer series of short slender bristles or scales, inner series of numerous subequal, barbellate or barbellulate bristles, apex acute or sometimes innermost clavate, sometimes of free short bristles or scales or connate scales and inner bristles absent, sometimes ray pappus absent and disk present.

About 152 species: Asia, Europe, North America; 123 species (82 endemic) in China.

The circumscription of *Aster* adopted here corresponds to that used in recent Asian floras (Ito & Soejima in Iwatsuki et al., Fl. Japan 3b: 59–73. 1995; Soejima & C. I Peng, Fl. Taiwan, ed. 2, 4: 848–868. 1998), which excludes North American segregates such as *Doellingeria* Nees, s.s., *Eurybia*, and *Symphyotrichum* (Nesom, Phytologia 77: 141–297. 1994; Semple & Chmielewski, Fl. N. Amer. 20: 43–46. 2006; Brouillet, Fl. N. Amer. 20: 365–382. 2006; Brouillet et al., Fl. N. Amer. 20: 465–539. 2006), while including genera such as the Asian members of *Doellingeria* (sensu Nesom, loc. cit.) (*A.* sect. *Teretiachaenium*), *Kalimeris* (*A.* sect. *Asteromoea*), *Heteropappus* (*A.* sect. *Pseudocalimeris*), and *Miyamayomena* and *Rhynchospermum* (both included within *A.* sect. *Aster*). Such delimitation is supported by recent molecular phylogenetic analyses of tribe Astereae, summarized in Brouillet et al. (in Funk et al., Syst. Evol. Biogeogr. Compositae, 589–629. 2009). Other genera that might probably be considered part of *Aster* are *Sheareria*, which Gao et al. (Taxon 58: 769–780. 2009) placed close to *Kalimeris* and *Heteropappus* but those were placed within the *Aster* complex as described here in a more recent analysis of Iranian Astereae involving more members of the genus (F. Jafari, pers. comm.), and *Rhinactinidia*, a possible sister of *A.* sect. *Pseudocalimeris* (F. Jafari, pers. comm.). This last relationship would be supported by the fact that these two groups share unequal disk corolla lobes, a rare feature in the tribe. Other genera may be involved here, but this is still unclear. The current concept excludes African *Aster* species, which belong to a distinct, African clade (Brouillet et al., loc. cit. 2009)

An alternate classification that would retain all segregate genera as distinct would recognize *Heteropappus*, *Kalimeris*, *Rhinactinidia* (though one could defend including them in *Heteropappus*), *Sheareria*, and *Aster* s.s. (still including *Miyamayomena* and *Rhynchospermum*) and would impose the creation of new genera for *A.* sect. *Teretiachaenium* and *A.* sect. *Ageratoides* (unless one prefers a strongly paraphyletic, not to say polyphyletic, *Aster*).

Nesom (loc. cit.) underlined the distinction of the shrubby species of *Aster* ser. *Albescentes* Y. Ling, noting their isolation among Old World asters. He concluded that the segregation of the series at generic rank would be justifiable. Two of us (Brouillet and Semple) agree with this hypothesis, but, currently, phylogenetic data are insufficient to place this group within the phylogeny of the tribe Astereae. Therefore, we treat it here as an incertae sedis group within *Aster* for the time being. One of us (Chen) considers that *A.* ser. *Albescentes* should be recognized as a section; however, the combination at that rank is not formally proposed here because not all the present authors agree.

Aster filipes J. Q. Fu (Bull. Bot. Res., Harbin 3(1): 118. 1983), described from Gansu, and *A. langaoensis* J. Q. Fu (loc. cit.), described from Shaanxi, could not be treated here because no material was seen by the present authors.

1a. Shrubs, many branched; leaves cauline, margins revolute or flat; phyllaries keeled ..... 1. Incertae sedis group
1b. Herbs perennial, rarely annual or biennial, sometimes subshrubs (rarely becoming shrubs), simple or ± branched; leaves basal (withered or present at anthesis) and cauline (sometimes reduced), margins flat; phyllaries usually not keeled.
2a. Ray florets 5–9, white; achenes obovoid, terete or slightly compressed ..... 2. *A.* sect. *Teretiachaenium*
2b. Ray florets 10–40, white, pink, blue, or purple; achenes obovoid, oblong, or oblanceoloid, compressed or flattened, sometimes 3- or 4-angled.
3a. Leaves 3-veined basally or below middle, margins coarsely serrate to serrate, sometimes serrulate; capitula campanulate; pappus of numerous bristles, outer series of short bristles ..... 3. *A.* sect. *Ageratoides*
3b. Leaves usually 1-veined, margins entire, serrate, or dentate, sometimes pinnatifid or pinnatilobate; capitula hemispheric, campanulate, obconic, or cylindric; pappus of few to many bristles, inner bristles sometimes absent, outer series of short bristles or scales, sometimes pappus absent.
4a. Pappus 1-seriate, of few (outer) short bristles or scales, persistent or deciduous, sometimes absent; achenes compressed or sometimes triangular; leaf margins entire, dentate, or serrate, or pinnatifid or pinnatilobate ..... 4. *A.* sect. *Asteromoea*
4b. Pappus 1–4-seriate, usually of few to numerous long bristles and outer short bristles or scales, rarely deciduous or absent; achenes compressed; leaf margins entire, crenate, or serrate.
5a. Disk corolla lobes unequal (1 lobe more deeply cut); herbs perennial, biennial, or annual; synflorescences corymbose-paniculiform or solitary at ends of branches; achenes compressed or flattened; ray pappus of few short bristles or scales, sometimes absent, disk pappus present, of long bristles and outer short bristles or scales ..... 5. *A.* sect. *Pseudocalimeris*
5b. Disk corolla lobes equal; herbs perennial; synflorescences corymbiform or solitary at ends of stems, rarely solitary at ends of branches; achenes ± compressed, sometimes 3- or 4-angled; ray and disk pappus present, sometimes absent in both or deciduous, outer series of short bristles, rarely of scales.
6a. Basal leaves usually withered at anthesis, cauline leaves developed; capitula corymbiform, numerous, rarely few, rarely solitary at ends of branches or in axils, rarely terminal; phyllaries unequal, sometimes subequal, membranous, upper part sometimes leaflike; herbs erect, sometimes branched, sometimes subshrubs ..... 6. *A.* sect. *Aster*
6b. Basal leaves persistent at anthesis, usually in rosette, cauline reduced; capitula solitary, terminal, or 2 or 3 in corymbiform synflorescences; phyllaries subequal, leaflike or upper part leaflike; herbs usually scapiform ..... 7. *A.* sect. *Alpigeni*

1. Incertae sedis group

Shrubs, erect, procumbent or ascending, many branched. Leaves cauline; blade ovate, ovate-lanceolate, elliptic, or oblong-lanceolate to oblanceolate, 1- or 3-veined, margin revolute or flat, entire or minutely to coarsely serrate. Capitula radiate, terminal or axillary on short branches, in corymbiform synflorescences or solitary at ends of stems or branches. Involucres campanulate; phyllaries 3–5-seriate, unequal, membranous or subleathery, tip sometimes leaflike, keeled, margin narrowly scarious. Receptacles flat or convex. Ray florets 1-seriate, 10–30, white, pink, or purple; disk floret limb narrowly campanulate, lobes equal. Achenes obovoid, oblong, or cylindric, ± compressed, 2–8-veined or -ribbed. Pappus of ray and disk florets 3-seriate, of numerous persistent, free bristles, innermost series clavate, outermost series of short bristles or scales.

Eight species: Asia; eight species (seven endemic) in China.

1a. Capitula on short axillary branches.
2a. Capitula 3–10, in corymbiform synflorescences; leaves ovate to elliptic-lanceolate, triplinerved ..... 2. *A. nitidus*
2b. Capitula solitary at ends of second-year axillary branches; leaves oblanceolate, pinnately veined ..... 1. *A. hersileoides*
1b. Capitula terminal at ends of stems and lateral branches.
3a. Leaves linear ..... 8. *A. lavandulifolius*
3b. Leaves ovate, ovate-lanceolate, elliptic, oblong, oblong-lanceolate, or oblanceolate.
4a. Capitula in corymbiform synflorescences or solitary at ends of lateral branches.
5a. Leaves adaxially arachnoid or glabrate, abaxially white tomentose, margin entire or 1- or 2-serrate-spinose; capitula 1–3 on branches ..... 6. *A. hypoleucus*
5b. Leaves adaxially verruculose, abaxially with white arachnoid hairs, margin entire; capitula 3–20 in corymbiform synflorescences ..... 7. *A. polius*
4b. Capitula in terminal compound corymbiform synflorescences.
6a. Pappus straw-colored, sometimes purplish; leaf margin entire or remotely serrulate to coarsely serrate, adaxial surface eglandular or rarely sparsely glandular ..... 3. *A. albescens*
6b. Pappus dirty white; leaf margin entire, adaxial surface ± glandular.
7a. Leaves (4–)6–9 cm, both surfaces sparsely strigillose, glabrate, or glabrous, abaxially glossy between minor veins ..... 4. *A. fulgidulus*
7b. Leaves 1–4 cm, adaxially moderately scabridulous, abaxially gray-white arachnoid-tomentose or cottony ..... 5. *A. argyropholis*

1. Aster hersileoides C. K. Schneider in Sargent, Pl. Wilson. 3: 460. 1917.

横斜紫菀 heng xie zi wan

Shrubs, 60–120 cm tall. Stems many branched; old branches erect, procumbent or ascending, bark gray-brown, branched, striate; second-year branches yellow-brown, leaf scars and axillary buds prominent; current-year branches densely leafy, purple-red, slender, young branches hairy in decurrent lines below leaves. Leaves sessile, green, oblanceolate, 1–3 × 0.2–0.7 cm, thin, glabrous except midvein hairy, more densely so adaxially, midvein abaxially prominent, venation pinnate, base attenuate, margin entire, flat, strigose-ciliate, apex obtuse or rounded to acute, mucronulate. Capitula at ends of second-year axillary branches, solitary, 2.5–3 cm in diam.; peduncles slender, 4–5.5 cm, distally hairy, subtended by small leaves; bracts scattered, linear. Involucres campanulate, 5–6 mm; phyllaries 3-seriate, unequal, distally green, linear-lanceolate, midvein distally swollen and translucent, apex acuminate; outer series of phyllaries 2–3 × ca. 0.6 mm, margin narrowly scarious, glabrous or sparsely hairy; inner 2 series of phyllaries subequal, 4–5.5 × ca. 1 mm, margin scarious, erose, ciliate, sometimes tips purplish, midvein translucent, dark bordered. Ray florets 25–30, green-purple, lamina 9–10 × 2–2.5 mm, glabrous, eglandular; disk florets yellow, ca. 5 mm, limb narrowly campanulate, ca. 3.5 mm, proximally sparsely hairy, eglandular, lobes spreading to recurved, triangular, ca. 1 mm. Achenes obovoid, 2–3 mm, densely strigillose, 2–4-veined, veins concolorous. Pappus 3-seriate, white; outer bristles slender, 0.5–1 mm; inner bristles unequal, 3.5–4 mm, acute or innermost ± clavate. Fl. and fr. Apr–Jul.

• Dry slopes on hills, rocky walls; 1300–2800 m. W Sichuan (Maowen).

2. Aster nitidus C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 47. 1935.

亮叶紫菀 liang ye zi wan

Shrubs, 50–150 cm tall. Stems many branched; old branches ascending, bark reddish- to gray-brown, branched, striate; second- and third-year branches purple-brown or ferruginous, leaf scars and axillary buds prominent; current-year branches densely leafy, reddish, moderately strigose. Leaves gradually smaller distally, shortly petiolate (petiole 1.5–3 mm); blade dark green, shiny (more so adaxially), ovate to elliptic-lanceolate, 2.5–7 × 0.5–1.6 cm, subleathery, glabrous except adaxial veins hispidulous proximally, midvein abaxially prominent, triplinerved, base cuneate, margin revolute, entire, strigose-ciliate, apex acute, mucronulate. Capitula at ends of second-year axillary branches, 3–10 in corymbiform synflorescences, 2.5–3 cm in diam.; peduncles slender, 2.5–4 cm, with small basal leaves and scattered, linear bracts, strigose (dark crosswalls), distally denser. Involucres campanulate, 6–7 × 7–8 mm; phyllaries 3-seriate, unequal, linear-lanceolate, midvein

distally not swollen, translucent, apex acuminate; outer phyllaries 4–5 × ca. 0.5 mm, distally green, sparsely hairy proximally, margin narrowly scarious; inner phyllaries subequal, 5–6 × ca. 1 mm, margin scarious, erose, distally green, sometimes tips purplish, midvein translucent, dark bordered. Ray florets 23–30, purple, tube sparsely hairy, lamina ca. 13 × 1–2 mm, glabrous, eglandular; disk florets yellow, 5–6 mm, tube apex and proximal limb sparsely hairy, limb narrowly campanulate, 3.5–4 mm, proximally hairy, eglandular, lobes spreading to recurved, triangular, ca. 1.5 mm. Achenes obovoid, 2–3 mm, sparsely strigillose, darkly 4-veined. Pappus 3-seriate, dirty white; outer slender bristles 0.5–1 mm; inner bristles unequal, 3.5–4 mm, acute or sometimes innermost ± clavate. Fl. Feb–May.

• Forests on hills, streamside rocks; 500–1100 m. Guizhou, Sichuan.

3. Aster albescens (Candolle) Wallich ex Handel-Mazzetti, Acta Horti Gothob. 12: 205. 1938.

小舌紫菀 xiao she zi wan

Amphirhapis albescens Candolle, Prodr. 5: 343. 1836; *Microglossa albescens* (Candolle) C. B. Clarke.

Shrubs, 30–400 cm tall. Stems many branched, erect; old branches brownish, ascending; current-year branches yellow-brown, densely or laxly leafy, sometimes villosulous to tomentulose, and sometimes sparsely, minutely stipitate glandular. Leaves reduced distally, sessile; blade narrowly to broadly lanceolate, ovate, elliptic, or oblong-lanceolate, (2–)3–17(–20) × (0.5–)1–3(–12.5) cm, abaxially glabrous or sparsely to densely appressed villosulous to tomentulose, eglandular or sometimes sparsely to densely minutely stipitate glandular, adaxially glabrous or scabridulous to scabrous, eglandular or rarely sparsely minutely stipitate glandular, veins (both surfaces) sparsely to moderately villosulous and usually sparsely minutely stipitate glandular, subpapery, midvein and pinnate lateral veins abaxially prominent, base cuneate or attenuate, margin flat to revolute, entire or remotely serrulate to coarsely serrate, teeth mucronulate, apex acute to acuminate, mucronulate. Capitula 5–50 (per branch) in terminal compound corymbiform synflorescences, ca. 0.7 cm in diam.; peduncles slender, 5–10 mm, bracts subulate, moderately villosulous to densely tomentulose (hairs white or light brown), sparsely to moderately minutely stipitate glandular. Involucres campanulate, 4–7 × 4–7 mm; phyllaries 4- or 5-seriate, unequal; outer phyllaries distally green, sometimes tip purplish, ovate to lanceolate, 1–2.5 mm, abaxially glabrous or sparsely villosulous to tomentulose, sometimes minutely stipitate glandular, margin narrowly scarious, erose, distally ciliate; inner phyllaries distally or only tip reddish purple, lanceolate to linear-lanceolate, 3–5 × 0.5–1 mm, margin broadly scarious, erose, distally ciliate, midvein distally swollen, translucent, apex acute. Ray florets 10–25, white, pink, or purple, tube hairy above, lamina 2–7 × 0.5–1.2 mm, glabrous, eglandular; disk florets yellow, sometimes becoming purplish, 4–6 mm, limb narrowly campanulate, 2.5–3.5 mm, base sparsely to moderately hairy, lobes spreading to reflexed, triangular, 1–2 mm, glabrous, eglandular or glandular. Achenes obovoid, 2–2.7 mm, sparsely to moderately strigillose, 4–8-veined. Pappus 3-seriate, straw-colored, sometimes purplish; outer bristles slender, 0.2–1 mm; inner bristles 2–4.5 mm, acute; innermost bristles 3–6 mm, clavate. Fl. Jun–Sep, fr. Aug–Oct.

Margins of deciduous or coniferous forests and thickets, open or grazed meadows, shrublands, seepage or damp areas, streamsides, ditch or field margins, disturbed areas and cut or disturbed forests, hills to alpine regions; 500–4100 m. Gansu, Guizhou, Hubei, S Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, N India, Kashmir, Myanmar, Nepal].

Leaf shape, size, and indumentum are variable in this species; thus, many ± distinct varieties were described, some of which do not appear to warrant recognition. Some varieties are said to be closer to or intermediate between other species. A biosystematic and molecular phylogenetic study of this complex is required. Although not formally recognized here, the varieties are listed below with their main features and comments.

Aster albescens var. **albescens**

小舌紫菀(原变种) xiao she zi wan (yuan bian zhong)

Aster cabulicus Lindley; *A. ferrugineus* Edgeworth (1846), not H. L. Wendland (1819); *A. ignoratus* Kunth & C. D. Bouché; *Homostylium cabulicum* (Lindley) Nees; *Microglossa cabulica* (Lindley) C. B. Clarke; *M. griffithii* C. B. Clarke; *M. salicifolia* Diels.

Leaf blade narrowly to broadly lanceolate, 5–12 × 1–12.5 cm, abaxially gray-white appressed tomentulose, margin flat, entire. Outer phyllaries ovate, abaxial surface sparsely hairy or glabrate.

500–3000 m. Gansu, Guizhou, W Hubei, S Sichuan, E and N Xizang, NW Yunnan [S and W Himalayan region].

This variety is common.

Aster albescens var. **discolor** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985.

白背小舌紫菀 bai bei xiao she zi wan

Leaves elliptic-lanceolate, 2–3.5 × 0.5–1 cm, abaxially white appressed tomentose, adaxially glabrous. Outer phyllaries ovate, puberulent or glabrate.

• About 2400 m. Sichuan (Songpan).

This variety is similar to *Aster argyropholis*. It may be intermediate between *A. argyropholis* and *A. polius*.

Aster albescens var. **glabratus** (Diels) Boufford & Y. S. Chen, Harvard Pap. Bot. 14: 43. 2009.

无毛小舌紫菀 wu mao xiao she zi wan

Aster harrowianus Diels var. *glabratus* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 184. 1912; *A. albescens* var. *levissimus* Handel-Mazzetti.

Leaves narrowly to broadly lanceolate, 5–12 cm, both surfaces glabrous, sometimes young leaves abaxially sparsely tomentose on midvein only. Outer phyllaries ovate to lanceolate, glabrous.

• 800–3000 m. Hubei, W Sichuan, N Yunnan.

The leaves are similar in shape to those of *Aster albescens* var. *albescens* but are often shorter and narrower.

Aster albescens var. **glandulosus** Handel-Mazzetti, J. Bot. 76: 284. 1938.

腺点小舌紫菀 xian dian xiao she zi wan

Leaves ovate or ovate to oblong-lanceolate, 4–10 × 1–2.5 cm, abaxially brown hairy on veins, densely glandular.

1900–3900 m. SW and W Sichuan, E and S Xizang, NW Yunnan [India].

Aster albescens var. **gracilior** (Handel-Mazzetti) Handel-Mazzetti, Acta Horti Gothob. 12: 206. 1938.

狭叶小舌紫菀 xia ye xiao she zi wan

Aster limprichtii Diels var. *gracilior* Handel-Mazzetti, Symb. Sin. 7: 1093. 1936; *A. harrowianus* Diels.

Leaves elliptic-lanceolate, 7–20 × 1–5 cm, abaxially densely white or gray-white tomentose or cottony, base attenuate, apex acuminate. Outer phyllaries oblong or lanceolate.

• Gansu, S Shaanxi, S and W Sichuan, NW Yunnan.

Aster albescens var. **limprichtii** (Diels) Handel-Mazzetti, Acta Horti Gothob. 12: 206. 1938.

椭叶小舌紫菀 tuo ye xiao she zi wan

Aster limprichtii Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 503. 1922.

Leaves elliptic or oblong, 3–7 × 1–3 cm, abaxially densely white or gray-white tomentose or cottony, base broadly cuneate or rounded. Outer phyllaries ovate, sparsely tomentose.

• 2400–3100 m. W Gansu, NW and W Sichuan.

Aster albescens var. **megaphyllus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985.

大叶小舌紫菀 da ye xiao she zi wan

Stems yellow-brown pilose and white arachnoid. Leaves elliptic or ovate-lanceolate, 10–15 × 5–7 cm, abaxially arachnoid pilose, reticulate veins prominent, adaxially sparsely pilose, midvein white villous, base rounded or broadly cuneate, margin subentire, apex acute or subrounded. Outer phyllaries ovate, sparsely puberulent.

• Sichuan (Maowen).

Aster albescens var. **pilosus** Handel-Mazzetti, Acta Horti Gothob. 12: 207. 1938.

长毛小舌紫菀 chang mao xiao she zi wan

Leaves oblong-lanceolate, 4–9 × 1–2 cm, abaxially on midvein or totally white pilose, adaxially sparsely hispidulous, flat. Outer phyllaries sparsely hairy. Achenes densely pilose.

• Common; 2800–4000 m. W Sichuan, E Xizang, NW Yunnan.

Aster albescens var. **rugosus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985.

糙毛小舌紫菀 cao mao xiao she zi wan

Leaves oblong-lanceolate, adaxially hispidulous, reticulate veins prominent, areoles of reticulate veins with foamy process.

• W Sichuan, NW Yunnan.

Aster albescens var. **salignus** (Franchet) Handel-Mazzetti, Acta Horti Gothob. 12: 207. 1938.

柳叶小舌紫菀 liu ye xiao she zi wan

Inula cuspidata C. B. Clarke var. *saligna* Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 37. 1887; *Aster harrowianus* Diels var. *glabratus* Diels, p.p.

Leaves elliptic-lanceolate, 7–17 × 1.5–4.5 cm, abaxially brown pubescent on veins or sometimes totally, glandular, base attenuate, apex acuminate. Outer phyllaries narrowly lanceolate, puberulent.

1900–3900 m. Sichuan, NW and W Yunnan [N India].

4. Aster fulgidulus Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 110. 1964.

辉叶紫菀 hui ye zi wan

Shrubs, 1.2–2 m tall. Stems brown strigose-villous, stipitate glandular. Leaves: (basal leaves not seen); cauline leaves: petiole ca. 5 mm; blade ovate, (4–)6–9 × (2–)2.5–4.5 cm, abaxially sparsely strigillose, glossy between minor veins, sparsely minutely glandular, adaxially glabrous or glabrate, sparsely minutely glandular, midvein sparsely strigillose, pinnately veined, base rounded, margin entire, revolute, sparsely scabrous, apex acute, sometimes acuminate. Capitula numerous, in terminal corymbiform synflorescences, 0.7–0.8 cm. Phyllaries 3- or 4-seriate, unequal, 1.6–3.2 × 0.7–0.8 mm, membranous, slightly keeled, margin scarious, erose-fimbriate, viscid-glandular, apex acute or acuminate, purple, ciliate. Ray florets ca. 16, purplish, tube 2.4–3.5 mm, hairy above, lamina ca. 5 × 1.5–1.8 mm; disk florets yellow (but externally ± purplish), 4–5.2 mm, tube 1.4–1.8 mm, tube and limb base hairy, limb narrowly campanulate, lobes oblong-lanceolate, 0.8–1 mm. Achenes oblong, ± compressed, ca. 2.2 mm, 4-ribbed, strigose. Pappus 3-seriate, dirty white; outer bristles ca. 1 mm; inner bristles 3.5–3.7 mm, acute; innermost bristles 3.9–4.4 mm, clavate.

• 2200–3000 m. SE Xizang (Bomi).

According to one collector, the ray florets were stated as yellow but externally somewhat purple when dry, while another collector reported them as purplish.

5. Aster argyropholis Handel-Mazzetti, Acta Horti Gothob. 12: 208. 1938.

银鳞紫菀 yin lin zi wan

Shrubs, 100–200 cm tall. Stems multibranched; old branches gray-brown or reddish brown, shallowly striate, leaf scars and axillary buds prominent; current-year branches short, slender, densely leafy, white tomentose. Leaves petiolate (petiole 1–3 mm); blade abaxially ± white, adaxially green, elliptic, oblong, or lanceolate-ovate, 1–4 × 0.5–1.5 cm, subleathery, abaxially gray-white arachnoid-tomentose or cottony, adaxially moderately scabridulous, minutely glandular, resin-dotted, scabrous, midvein abaxially prominent, lateral veins apparent, pinnate, 4–6 pairs, base cuneate, margin revolute, entire, subundulate, apex acute to obtuse, mucronulate. Capitula 4–20, in corymbiform synflorescences terminal on axillary branches, 1.5–2 cm in diam.; peduncles slender, 0.5–5 mm, densely to-

mentose, minutely glandular; bracts linear. Involucres campanulate, 4–6 mm; phyllaries 4- or 5-seriate, unequal; outer phyllaries broadly lanceolate, 1.5–2 × ca. 0.5 mm, abaxially sparsely tomentulose proximally to glabrate, margin narrowly scarious, erose, ciliate, midvein pronounced, swollen; middle phyllaries lanceolate, 3.5–4 × 1–1.2 mm; inner phyllaries linear-lanceolate, 4–5 × 0.5–0.6 mm, margin scarious, erose, ciliate, apex acute, green or purple-red. Ray florets 15–20, white, tube sparsely hairy, lamina ca. 4 × 1.5 mm, glabrous, eglandular; disk florets yellow, 4.5–5 mm, tube sparsely hairy distally, limb narrowly campanulate, ca. 2.5 mm, sparsely glandular, lobes reflexed, triangular, 1–1.2 mm. Achenes reddish brown, cylindric, 2–2.7 mm (?immature), strigillose, translucent 6-veined. Pappus 3-seriate, dirty white; outer bristles few, slender, 0.3–0.6 mm; inner bristles ca. 2.5 mm, acute; innermost bristles ca. 4.5 mm, clavate. Fl. May–Oct, fr. Aug–Oct.

• Alpine and subalpine slopes, forests, grasslands, riverbanks; 2000–2800 m. Sichuan, Xizang, NW Yunnan.

1a. Involucre 5–6 mm, phyllaries 5-seriate; leaves abaxially sparsely tomentose, secondary veins abaxially prominent ... 5c. var. *paradoxus*
1b. Involucre 4–5 mm, phyllaries 4-seriate; leaves abaxially densely tomentulose or cottony, secondary veins abaxially not prominent.
2a. Leaf apex acute or abruptly acute, rarely rounded, abaxial surface and peduncles densely tomentulose ..... 5a. var. *argyropholis*
2b. Leaf apex obtuse or rounded, abaxial surface and peduncles densely white cottony ..... 5b. var. *niveus*

5a. Aster argyropholis var. **argyropholis**

银鳞紫菀(原变种) yin lin zi wan (yuan bian zhong)

Leaves abaxially densely tomentulose, secondary veins abaxially not prominent, apex acute or abruptly acute, rarely rounded. Peduncles densely tomentulose. Involucres 4–5 mm; phyllaries 4-seriate.

• W Sichuan, Xizang.

This variety is common.

5b. Aster argyropholis var. **niveus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985.

白雪银鳞紫菀 bai xue yin lin zi wan

Leaves abaxially densely white cottony, secondary veins abaxially not prominent, apex obtuse or rounded. Peduncles densely white cottony. Involucres 4–5 mm; phyllaries 4-seriate.

• SW Sichuan (Yanyuan), NW Yunnan (Lijiang).

5c. Aster argyropholis var. **paradoxus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 358. 1985 [*"paradoxa"*].

奇形银鳞紫菀 qi xing yin lin zi wan

Leaves abaxially sparsely tomentose, secondary veins abaxially prominent. Involucre 5–6 mm; phyllaries 5-seriate.

• NC Sichuan (Barkam).

6. Aster hypoleucus Handel-Mazzetti, J. Bot. 76: 285. 1938.

白背紫菀 bai bei zi wan

Shrubs, ca. 15 cm tall; stems fascicled. Stems numerous, densely branched; current-year branches simple or divaricately branched, erect, slender, strict, angled, white tomentose, densely leafy, terminal branches and peduncles hard and persistent by anthesis. Leaves suberect, shortly petiolate; blade adaxially dark green, elliptic or oblanceolate, 5–15 × 2–3.5 mm, leathery, abaxially white tomentose, adaxially arachnoid or glabrate, base attenuate, margin strongly revolute, entire or 1- or 2-serrate-spinose, apex acute or obtuse, spinose. Capitula 1–3 terminal on lateral branches; peduncles 2–3 cm; bracts minute, linear-lanceolate, membranous. Involucres campanulate, 4–5 mm in diam.; phyllaries 4-seriate, imbricate, subleathery, apex reddish purple; outer phyllaries lanceolate-ovate, short, apex acute; inner phyllaries linear-lanceolate, ca. 5 × 0.6 mm, 4–5 × as long as outer phyllaries, margin narrowly scarious, erose, villosulous-ciliate. Ray florets ca. 13, white when dry, tube ca. 2.2 mm, hairy, lamina ca. 4.5 × 1 mm; disk florets yellow, ca. 3.8 mm, tube 1–1.1 mm, limb narrowly funnelform, tube and limb base hairy, lobes lanceolate, ca. 1 mm, glabrous. Achenes tan, narrowly obovoid, slightly compressed, trigonous, ca. 1.6 mm (immature), silky, pale 3-ribbed. Pappus 3-seriate, whitish; outermost bristles ca. 0.5 mm; outer bristles slender, ca. 1.2 mm; inner bristles acute, 2.5–3.5 mm. Fl. Jul.

• 3000–3700 m. S Xizang (Zangbo valley).

7. Aster polius C. K. Schneider in Sargent, Pl. Wilson. 3: 459. 1917 [*"polia"*].

灰毛紫菀 hui mao zi wan

Shrubs, 0.6–1.2 m tall. Stems erect, multibranched; old branches erect, bark grayish brown, branched, striate; current- and second-year branches red-purple, leaf scars and axillary buds prominent, moderately to densely curly hairy, glabrescent. Leaves petiolate (petiole 1–2 mm); blade adaxially green, narrowly ovate to elliptic, 1.5–3.5 × 0.6–1.4 cm, subleathery, abaxially white tomentose, adaxially scabridulous, base cuneate, margin strongly revolute, entire, finely ciliate, apex obtuse or acute, mucronulate. Capitula terminal on current-year branches, 3–20 in corymbiform synflorescences, up to ca. 1.5 cm in diam.; peduncles slender, 5–11 mm; bracts linear, moderately tomentulose, sparsely minutely stipitate glandular. Involucres campanulate, 4–5 mm; phyllaries 3-seriate, unequal, apically green, abaxially glabrous, sparsely minutely stipitate glandular, midvein slightly swollen, distally translucent, apex acute, purplish tipped; outer phyllaries ovate, ca. 1 mm, margin narrowly scarious, erose, ciliate; inner phyllaries unequal, lanceolate, 3–4 × ca. 1 mm, margin scarious, erose, sometimes ciliate. Ray florets 8–10, white, tinged red, tube sparsely hairy, lamina 4–5 × ca. 1.5 mm, glabrous, eglandular; disk florets yellow, ca. 3.5 mm, limb narrowly campanulate, 1.5–2 mm, sparsely minutely hairy basally, eglandular, lobes spreading or recurved, narrowly triangular, 1–1.2 mm. Achenes obovoid, (immature) ca. 2 mm, sparsely strigillose, darkly 2–6-veined. Pappus 3-seriate, straw-colored; outer series of scales 0.5–0.7 mm; inner bristles ca. 2.5 mm, acute; innermost bristles 3–3.5 mm, clavate. Fl. Jul.

• Open shrubs; 2000–2700 m. W Sichuan (Maowen, Xiaojin).

8. Aster lavandulifolius Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 609. 1937.

线叶紫菀 xian ye zi wan

Shrubs, 60–100 cm tall. Stems multibranched, old branches ascending, bark brown, branched, shallowly striate, leaf scars and axillary buds prominent; current-year branches slender, yellow-brown, densely leafy, white tomentulose. Leaves sessile, adaxially green, linear, 1–4(–5) × 0.1–0.3(–0.5) cm, subleathery, abaxially gray-white tomentose, adaxially rugose, very sparsely scabrous, resinous, midvein pronounced, venation pinnate, base long cuneate, margin entire, strongly recurved, apex acute, mucronulate; upper leaves smaller. Capitula 3–50 or more in ± densely corymbiform synflorescences, terminal on current-year branches or 3–5 at ends of lateral branches, ca. 8 mm in diam.; peduncles slender, 2–6 mm, tomentulose; bracts subulate. Involucres narrowly campanulate, 5–6 mm; phyllaries 4- or 5-seriate, unequal; outer phyllaries ovate, 1–2 mm, sparsely tomentose, resinous, margin narrowly scarious, keeled, midvein apically swollen, translucent, apex acute; inner phyllaries lanceolate, 4–5 × 0.7–0.9 mm, margin narrowly scarious, erose, ciliate, midvein apically very swollen, apex obtuse to acute. Ray florets 5–7, white, tube sparsely hairy distally, lamina 2.5–3 × 0.5–0.8 mm, glabrous, eglandular; disk florets yellow, 3.5–4 mm, limb narrowly campanulate, ca. 3 mm, very sparsely hairy proximally, lobes spreading, narrowly triangular, 1.2–1.5 mm. Achenes cylindric, ca. 2.5 mm, moderately strigose, yellowish 6–8-ribbed. Pappus 3-seriate, straw-colored, of sparsely barbellulate bristles; outer bristles 0.5–0.7 mm; inner bristles 2–3 mm, acute; innermost bristles ca. 4 mm, clavate. Fl. Jun, fr. Jun–Sep.

• Subalpine stony slopes or riverbanks; 2000–2900 m. SW and W Sichuan, Yunnan.

Aster lavandulifolius differs from other *Aster* species by its linear leaves and cylindric achenes.

Aster motuoensis Y. L. Chen (Bull. Bot. Res., Harbin 8(3): 12. 1988), described from SE Xizang (Mêdog) as being close to *A. lavandulifolius*, differs from the latter in its notably reticulately veined, oblong to oblong-lanceolate leaves, narrowly cylindric involucres, and 4–6 ray florets. Further study is required to ascertain its status.

2. Aster sect. **Teretiachaenium** Kitamura, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 8: 357. 1937.

东风菜组 dong feng cai zu

Herbs, perennial, usually simple, erect. Leaves basal (withered at anthesis) and cauline; blade ovate or elliptic-ovate, margin flat, serrate, rarely subentire, 1-veined. Capitula radiate, terminal, corymbiform or paniculiform. Involucres campanulate to broadly campanulate; phyllaries 3-seriate, unequal or subequal, not keeled, margin scarious. Receptacles flat or convex. Ray florets 1-seriate, 4–9, white; disk floret limb campanulate, lobes equal. Achenes obovoid, ± compressed, 2–7-ribbed. Pappus of ray and disk florets 3- or 4-seriate, of numerous persistent, free bristles, innermost ± clavate, outermost of short bristles.

Seven species: E Asia; two species (one endemic) in China.

1a. Phyllaries unequal, narrowly herbaceous on back, margin broadly membranous; pappus of many bristles as long as disk florets; achenes glabrous ..... 9. *A. scaber*

1b. Phyllaries subequal, sometimes outer series herbaceous and green, inner series with membranous margins only; pappus of few bristles much shorter than corolla tube; achenes sparsely strigose ..... 10. *A. marchandii*

9. Aster scaber Thunberg in Murray, Syst. Veg., ed. 14, 763. 1784.

东风菜 dong feng cai

Aster komarovii H. Léveillé; *Biotia corymbosa* (Aiton) Candolle var. *discolor* (Maximowicz) Regel; *B. discolor* Maximowicz; *Doellingeria scabra* (Thunberg) Nees.

Herbs, perennial, 70–150 cm tall; rhizome short, thickened. Stems erect, glabrous. Leaves reduced upward, abaxially pale green, flat, 3- or 5-veined, margin and both surfaces scabrous, abaxially less so, eglandular; basal leaves withered by anthesis, petiole 10–15 cm, blade ovate, 9–15 × 6–15 cm, base cordate, margin serrate, teeth mucronate, apex acute; middle cauline leaves shortly petiolate, petiole broadly winged; blade ovate to narrowly ovate, base truncate to rounded; upper cauline leaves broadly winged shortly petiolate to sessile, lanceolate. Capitula in corymbiform synflorescences, 1.8–2.4 cm in diam.; peduncles 6–30 mm, sparsely to moderately scabridulous, eglandular or stipitate glandular, bracts linear. Involucre campanulate, 5–6 mm in diam.; phyllaries 3-seriate, strongly unequal, green area narrow; outer phyllaries ca. 1.5 × 1–1.5 mm, abaxially glabrous, base of outer thickened, margin broadly scarious, sometimes purplish apically, ciliate, apex obtuse, sometimes acute. Ray florets 4–9, white, 6–10 mm, tube 3–3.5 mm, lamina abaxially glabrous, eglandular; disk florets 4.5–5 mm, limb abruptly enlarged, campanulate, ca. 3 mm, sparsely shortly hairy at tube-limb junction, lobes spreading, triangular, 1.5–2 mm. Achenes obovoid, sometimes slightly compressed, 3–4 mm, glabrous, 3–7-ribbed. Pappus of many sordid-white, barbellate bristles, 3.5–4.2 mm (slightly shorter than disk florets); outer bristles short (50% or less of inner length), slender; inner bristles length 80–90% of innermost bristles, tapering; innermost bristles longest, clavate. Fl. Jun–Oct, fr. Aug–Oct. $2n = 18$.

Open slopes in valleys, grasslands, thickets, very common; below 2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Russia (Far East)].

This plant is used medicinally for treating bites from venomous snakes.

10. Aster marchandii H. Léveillé, Repert. Spec. Nov. Regni Veg. 11: 306. 1912.

短冠东风菜 duan guan dong feng cai

Herbs, perennial, 0.6–2 m tall; rhizomes robust. Stems erect, sparsely to moderately puberulent. Leaves reduced upward, abaxially pale green, both surfaces scabrous, eglandular, slightly rugose, 3- or 5-veined, margin scabrous; basal leaves withered by anthesis, petiole 9–17 cm, blade ovate, 7–13 × 7–11.5 cm, base cordate, margin serrate, teeth mucronate, apex acute to subrounded; middle cauline leaves narrowly winged petiolate, broadly ovate to ovate, base truncate; upper cauline leaves winged shortly petiolate, ovate, base cuneate, decurrent. Capitula in corymbiform synflorescences, 2.5–4 cm in diam.; peduncles 10–50 mm, glabrate to densely puberulent, eglandular or stipitate glandular; bracts linear. Involucres broadly campanulate, 6–8 mm in diam.; phyllaries 3-seriate, subequal, lanceolate-oblong; outer phyllaries 3–3.5 × 1–1.5 mm, abaxially glabrous or glabrate, apex rounded or obtuse, rarely margin ciliate; outer phyllaries green, herbaceous, base thickened, margin very narrowly scarious; inner phyllaries herbaceous, margin narrowly scarious; innermost phyllaries scarious. Ray florets 9–19, white, 5–7 mm, tube ca. 3 mm, lamina oblong-linear, abaxially glabrous, eglandular; disk florets 4.5–5 mm, limb abruptly enlarged, campanulate, ca. 2.5 mm, lobes spreading, triangular, ca. 2 mm, glabrous, eglandular. Achenes obovoid, slightly compressed, 2.5–3 mm, sparsely strigose to glabrate, 2–6-ribbed. Pappus 3-seriate, of few bristles, sordid white, 0.3–1.5 mm; outer bristles few, short, slender; inner bristles unequal, tapering; innermost bristles longest, sometimes weakly clavate. Fl. Aug–Sep, fr. Sep–Oct.

• Valleys, streamsides, fields, roadsides; 300–1400 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Jiangxi, Sichuan, Zhejiang.

The roots, leaves, and flowering capitula of *Aster marchandii* are used medicinally.

3. Aster sect. **Ageratoides** (Kitamura) G. L. Nesom, Phytologia 77: 247. 1994.

三脉叶紫菀组 san mai ye zi wan zu

Aster subsect. *Ageratoides* Kitamura, J. Jap. Bot. 12: 535. 1936.

Herbs, perennial, usually simple, erect. Leaves basal (withered at anthesis) and cauline; blade spatulate or ovate to narrowly ovate or lanceolate, margin flat, coarsely serrate to serrate, sometimes serrulate, 3-veined at base or below middle. Capitula radiate, terminal, paniculate-corymbiform to corymbiform. Involucres campanulate; phyllaries 3- or 4-seriate, unequal, not keeled, margin scarious. Receptacles flat or ± convex. Ray florets 1-seriate, 10–20, pale purple, lavender, or white; disk floret limb campanulate, lobes equal. Achenes obovoid to oblanceoloid, ± compressed, 3- or 4-ribbed (ray) or 2- or 3-ribbed (disk). Pappus of ray and disk florets 3-seriate, of numerous persistent, free bristles, innermost series clavate, outermost series of short bristles.

About eight species: E Asia; one species in China.

11. Aster trinervius Roxburgh ex D. Don, Prodr. Fl. Nepal. 177. 1825.

三基脉紫菀 san ji mai zi wan

Herbs, perennial, 25–205 cm tall; rhizomes thick. Stems erect, simple or sometimes branched, reddish striate, glabrous or villosulous to strigillose, sometimes glabrescent, eglandular or minutely stipitate glandular. Leaves cauline; middle cauline leaves usually largest, abaxially pale green, adaxially green, sometimes shiny, thinly or thickly papery to subleathery, abaxially villosulous, sparsely scabridulous, or glabrous, minutely stipitate glandular or eglandular, veins densely villosulous to sparsely strigose or glabrate, adaxially ± densely scabridulous, eglandular or sometimes ± minutely stipitate glandular, resinous, margin serrate to coarsely serrate, sometimes serrulate, ciliate, often prominently abaxially 3-veined at base or above (triplinerved), apex obtuse to acute or acuminate, mucronate; lowest leaves withered by anthesis, long narrowly winged petiolate (petiole to 6 cm); blade spatulate or ovate to narrowly lanceolate, 0.5–15(–17) × 0.3–5.5 cm, base attenuate; lower to upper cauline leaves shortly petiolate, ovate- or lanceolate-pandurate to lanceolate, 4.5–15 × 1.2–5 cm, base attenuate to rounded; synflorescence leaves shortly petiolate, ovate to linear-lanceolate, 1–8 × 0.2–3 cm, base cuneate to ± rounded. Capitula 7–100 or more florets in terminal paniculate-corymbiform to corymbiform synflorescences, 1.5–2 cm in diam.; peduncles 5–30 mm, strigillose, minutely stipitate glandular; bracts linear to lanceolate, entire. Involucres campanulate, 3–7 × 4–15 mm; phyllaries 3- or 4-seriate, unequal, apically green, sometimes ± purplish, abaxially glabrate to villosulous (on green part). apically sometimes minutely stipitate glandular, base hardened, margin scarious, erose, sometimes purplish, ciliate, midvein more pronounced distally, ± translucent, apex rounded to acute, erose, ciliate; outer phyllaries ovate to lanceolate, 2–2.5 × 0.5–1 mm, leaflike or distally leaflike; inner phyllaries oblong, 3–6 mm. Ray florets 6–15, purple, lavender, reddish, or white, tube ca. 2 mm, lamina 7–11 × 1.5–3 mm, glabrous, eglandular; disk florets yellow, 4–6.5 mm, tube base flared, limb campanulate, 2.2–4 mm, base sparsely strigillose, lobes spreading, narrowly triangular, 1.3–2 mm, glabrous, sparsely to moderately minutely stipitate glandular. Achenes gray-brown, oblanceolate to obovoid, slightly compressed, 2–2.5 mm, sparsely to moderately strigillose, minutely stipitate glandular or eglandular, 2- or 3-ribbed. Pappus 3-seriate, whitish or ± reddish, of slender, barbellate bristles; outermost bristles few, 0.2–0.3 mm; inner bristles 3–5 mm, tapering; innermost bristles 4.5–6 mm, clavate. Fl. and fr. Jul–Dec.

Forests, forest margins, thickets, wet places in valleys; 100–3400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, NE India, Japan, Korea, N Myanmar, Nepal, E Russia, N Thailand, Vietnam].

Y. Ling and Y. L. Chen (in FRPS 74: 159–167. 1985) segregated *Aster trinervius* from *A. ageratoides* (see key to subspecies below). Grierson (Notes Roy. Bot. Gard. Edinburgh 26: 67–163. 1964), how-

ever, mentioning that there are intermediate forms between the two taxa, treated *A. ageratoides* as a subspecies of *A. trinervius*. Although the name of the former has been used in E Asia for a long time and there are many described varieties, differences between the two species do not appear to warrant species-level segregation at the present time.

Aster trinervius subsp. *ageratoides* is widely distributed and polymorphic. Kitamura (Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 13: 327–377. 1937) and Handel-Mazzetti (Acta Horti Gothob. 12: 203–226. 1938) divided it into many varieties or subspecies (of *A. ageratoides*). The indumentum, leaf shape, capitula, and shape and size of the involucre are variable and often overlapping, however, and differences between some varieties are not clear. A thorough biosystematic and molecular phylogenetic investigation of the whole complex in Asia would be needed to identify entities that are worth recognition, as was done for Japanese members of the complex (e.g., Ito & Soejima in Iwatsuki et al., Fl. Japan 3b: 59–73. 1995), particularly in view of the possibility of hybridization among entities and with species of *A.* sect. *Pseudocalimeris*. Therefore, varieties usually recognized under *A. ageratoides* are here listed under *A. trinervius* subsp. *ageratoides*, with their main characteristics. It should be noted that some taxa listed here as varieties are recognized as species by Ito and Soejima (loc. cit.).

1a. Leaves subleathery (thick), 3-veined at base, base subrounded; involucres 8–15 mm in diam. ..... 11a. subsp. *trinervius*

1b. Leaves papery (thin), sometimes rather thick, 3-veined above base (triplinerved), base attenuate; involucres 4–10 mm in diam. ..... 11b. subsp. *ageratoides*

11a. Aster trinervius subsp. **trinervius**

三基脉紫菀(原亚种) san ji mai zi wan (yuan ya zhong)

Aster ageratoides Turczaninow subsp. *trinervius* (Roxburgh ex D. Don) Kitamura; *A. ageratoides* var. *trinervius* (Roxburgh ex D. Don) Handel-Mazzetti; *A. scabridus* C. B. Clarke; *Diplopappus asperrimus* (Nees) Candolle; *Galatella asperrima* Nees.

Stems erect, 60–205 cm tall, thick, branched, strigose. Leaves subleathery (thick), sometimes thin; blade ovate-lanceolate, abaxially strigillose or glabrate, glandular, adaxially strigose, 3-veined at base, conspicuously reticulate veined, base subrounded. Involucres 8–15 mm in diam.; phyllary apex green, sometimes tinged red. Ray florets white.

Pinus forests; ca. 3100 m. S Xizang [Bhutan, NE India, N Myanmar, Nepal, N Thailand].

Under *Aster trinervius* subsp. *trinervius* only var. *trinervius* occurs in China.

11b. Aster trinervius subsp. **ageratoides** (Turczaninow) Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 102. 1964.

三脉紫菀 san mai zi wan

Aster ageratoides Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 10(7): 154. 1837.

Stems erect, 40–100 cm tall, slender or thick, branched, strigose. Leaves papery (thin, sometimes rather thick); blade broadly ovate, elliptic, or oblong-lanceolate, abaxially puberulent, veins strigose, adaxially strigose, often glandular, or both surfaces tomentulose, 3-veined above base (triplinerved), base attenuate. Involucres 4–10 mm in diam.; phyllary apex green or purple-brown. Ray florets purple, reddish, or white.

Forests, forest margins, thickets, wet places in valleys; 100–3400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, NE India, Japan, Korea, N Myanmar, Nepal, E Russia, N Thailand, Vietnam].

Some of the varieties listed here under *Aster trinervius* subsp. *ageratoides* have available names under *A. trinervius*, while others do not. In view of the fact that all of the varieties have names under *A. ageratoides*, those names are used here in preference to publishing new combinations, pending the necessary thorough investigation mentioned above.

Aster ageratoides var. **ageratoides**

三脉紫菀(原变种) san mai zi wan (yuan bian zhong)

Aster adustus (Maximowicz) Koidzumi ex Nakai; *A. ageratoides* f. *adustus* (Maximowicz) Zdorovjeva; *A. ageratoides* var. *adustus* Maximowicz; *A. quelpaertensis* H. Léveillé & Vaniot; *A. trinervius* Roxburgh ex D. Don var. *adustus* (Maximowicz) Franchet & Savatier; *A. trinervius* var. *potaninii* Diels; *A. trinervius* var. *rosthornii* Diels.

Leaves oblong-lanceolate or narrowly lanceolate, thin, adaxially densely strigose, abaxially sparsely hairy or glabrous, veins ± hairy, slightly glandular, margin coarsely serrate. Involucres 5–7 × 6–10 mm, apex purple-brown. Ray florets purple or red.

S Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, E Qinghai, Shaanxi, Shandong, Shanxi, W Sichuan, NW Yunnan [Korea, Russia (E Siberia)].

Aster ageratoides var. **firmus** (Diels) Handel-Mazzetti, Acta Horti Gothob. 12: 215. 1938.

坚叶三脉紫菀 jian ye san mai zi wan

Aster trinervius var. *firmus* Diels, Bot. Jahrb. Syst. 29: 610. 1901 [*"firma"*].

Leaves ovate or oblong-lanceolate, thickly papery, abaxially long rough hairy on veins, veins conspicuously reticulate, adaxially densely strigose, glabrescent, often lucid, areoles foamy. Ray florets white or tinged red.

N Anhui, W Hunan, S Shaanxi, Sichuan, N Yunnan [S Himalayan region].

Aster ageratoides var. **gerlachii** (Hance) C. C. Chang ex Y. Ling, Fl. Reipubl. Popularis Sin. 74: 163. 1985.

狭叶三脉紫菀 xia ye san mai zi wan

Aster gerlachii Hance, J. Bot. 18: 262. 1880; *A. curvatus* Vaniot.

Stems strigose in upper part. Leaves linear-lanceolate, 5–8 × 0.7–1 cm, abaxially subglabrous, adaxially sparsely rough hairy, base attenuate, margin shallowly serrate, apex acuminate. Phyllary apex green. Ray florets white. $2n = 36$*.

● Guangdong, Guizhou, Hubei.

Aster ageratoides var. **holophyllus** Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 144. 1859.

异叶三脉紫菀 yi ye san mai zi wan

Aster nigrescens Vaniot.

Stems multibranched. Middle leaves oblong-lanceolate, margin roughly serrate, upper leaves smaller, margin often entire. Phyllaries narrow, apex green, often ?brown mucronate.

• S Gansu, Hebei, NW Hubei, Shaanxi, Shanxi, Sichuan, N Yunnan.

Aster ageratoides var. **lasiocladus** (Hayata) Handel-Mazzetti, Acta Horti Gothob. 12: 215. 1938.

毛枝三脉紫菀 mao zhi san mai zi wan

Aster lasiocladus Hayata, Icon. Pl. Formosan. 8: 49. 1919; *A. ageratoides* subsp. *lasiocladus* (Hayata) Kitamura; *A. trinervius* var. *lasiocladus* (Hayata) Yamamoto.

Stems yellow-brown or gray tomentose. Leaves oblong-lanceolate, often smaller, 4–8 × 1–3 cm, thick, adaxially densely strigose, or densely tomentose, veins often rough hairy, margin shallowly dentate, apex obtuse or acute. Phyllaries thick, densely tomentose. Ray florets white.

• Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, SE Yunnan.

This variety is easy to distinguish from other varieties of *Aster trinervius* subsp. *ageratoides* and appears closer to *A. trinervius* subsp. *trinervius*, but the latter has thicker leaves and is more densely tomentose.

This plant is used medicinally for treating common colds and headaches, osteodynia, and snakebites.

Aster ageratoides var. **laticorymbus** (Vaniot) Handel-Mazzetti, Acta Horti Gothob. 12: 214. 1938.

宽伞三脉紫菀 kuan san san mai zi wan

Aster laticorymbus Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 494. 1903.

Stems multibranched. Middle leaves oblong-lanceolate or ovate-lanceolate, abaxially often glabrescent, base attenuate, margin with 7- or 8-paired serrae, upper leaves ovate or lanceolate, small, margin entire or toothed. Phyllaries narrow, apex green. Ray florets often white. $2n = 18^*, 36^*, 54^*$.

• Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan.

Aster ageratoides var. **leiophyllus** (Franchet & Savatier) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 164. 1985.

光叶三脉紫菀 guang ye san mai zi wan

Aster leiophyllus Franchet & Savatier, Enum. Pl. Jap. 1: 223. 1875; *A. ageratoides* f. *leucanthus* Kitamura; *A. ageratoides* subsp. *leiophyllus* (Franchet & Savatier) Kitamura.

Leaves oblong-lanceolate, abaxially with short rough hairs on veins, adaxially ± strigose, base abruptly narrowed, sessile or shortly petiolate, margin densely acute-serrate, apex long acuminate. Capitula small, slender pedunculate. Involucre obconic when dry, ca. 4 × 5–6 mm; phyllary apex obtuse, apically brown. Ray florets white. Pappus white or red-brown. $2n = 18$, 18+1–3B, 27, 34, 36+0–4B, 37, 54, 81.

Taiwan [Japan].

Aster ageratoides var. **micranthus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 356. 1985.

小花三脉紫菀 xiao hua san mai zi wan

Stems 60–100 cm tall, slender, multibranched. Leaves linear-lanceolate, thinly papery, subglabrous on both surfaces, areoles adaxially ± foamy; middle leaves 6–17 × 0.4–1.5 cm, margin sparsely shallowly toothed or subentire. Capitula small, in axillary and terminal corymbs; peduncle slender. Involucre 3–4 × 4–5 mm; phyllaries thin, apex purple-brown or green. Ray florets white, linear, 4–5 mm; disk florets and pappus ca. 4 mm. $2n = 18^*$.

• Forests, thickets. Sichuan.

Aster ageratoides var. **oophyllus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 161. 1985.

卵叶三脉紫菀 luan ye san mai zi wan

Aster blinii H. Léveillé, Repert. Spec. Nov. Regni Veg. 13: 344. 1914.

Leaves ovate and ovate-lanceolate, rather thick, abaxially sparsely hairy, adaxially strigose, margin shallowly serrate. Phyllaries reddish at apex. Ray florets reddish or white.

• Hubei, Shaanxi, Sichuan, Yunnan; rarely seen in N China.

Y. Ling published *Aster ageratoides* var. *oophyllus* as a "nom. nov." based on *A. ageratoides* var. *ovatus* (Franchet & Savatier) Handel-Mazzetti, but he explicitly excluded the basionym (and thereby the type) of the latter name, i.e., *A. trinervius* var. *ovatus* Franchet & Savatier. Ling did not indicate a type for *A. ageratoides* var. *oophyllus*, which cannot, therefore, be validly published as the name of a new taxon; however, he cited *A. blinii* in synonymy with a full and direct reference to its author and place of valid publication, hence var. *oophyllus* was validly published as a replacement name based on *A. blinii*.

Aster ageratoides var. **pendulus** W. P. Li & G. X. Chen, Acta Phytotax. Sin. 44: 349. 2006.

垂茎三脉紫菀 chui jing san mai zi wan

Stems pendent, multibranched. Basal and lower cauline leaves abaxially very often purple. Cauline leaves linear-lanceolate, adaxially often hispid, base attenuate, margin with ca. 4-paired serrae. Phyllaries 1.25–1.75 mm wide, apex green. Ray florets white. $2n = 60–92^*$.

• N Hunan (Shimen: Huping Shan).

Aster ageratoides var. **pilosus** (Diels) Handel-Mazzetti, Acta Horti Gothob. 12: 214. 1938.

长毛三脉紫菀 chang mao san mai zi wan

Aster trinervius var. *pilosus* Diels, Bot. Jahrb. Syst. 29: 610. 1901 [*"pilosa"*].

Leaves ovate or oblong-lanceolate, rather thick, abaxially densely shortly hairy, glandular, adaxially shortly strigillose, adaxially on veins and stems spreading white or gray long hairy, hairs ca. 1 mm, base gradually or abruptly attenuate, margin shallowly serrate. Phyllaries purple-brown at apex.

• W Hubei, S Shaanxi, C and E Sichuan.

Aster ageratoides var. **scaberulus** (Miquel) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 162. 1985.

微糙三脉紫菀 wei cao san mai zi wan

Aster scaberulus Miquel, J. Bot. Néerl. 1: 100. 1861; *A. trinervius* f. *pubescens* Kuntze.

Leaves usually ovate or ovate-lanceolate, thicker, abaxially densely puberulent, densely glandular, veins often villous, or glabrescent, adaxially densely strigose, base gradually or abruptly attenuate into narrowly winged or unwinged short petiole, margin shallowly 6–9-serrate. Involucres 5–7 × 6–10 mm; phyllary apex green. Ray florets white or tinged red.

Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, E Sichuan, Yunnan, Zhejiang [Vietnam].

4. Aster sect. **Asteromoea** (Blume) Makino, Bot. Mag. (Tokyo) 12: 60. 1898.

马兰组 ma lan zu

Asteromoea Blume, Bijdr. 901. 1826; *Aster* subg. *Kalimeris* Cassini; *Hisutsua* Candolle; *Kalimeris* (Cassini) Cassini; *Martinia* Vaniot (1903), not Crié (1889) [fossil].

Herbs, perennial, usually simple, erect. Leaves basal (withered at anthesis) and cauline; blade cordate, broadly ovate, ovate, oblanceolate to oblong, or linear, margin flat, entire, dentate, serrate, or pinnatifid, sometimes pinnatilobate, 1-veined. Capitula radiate, terminal, in corymbiform synflorescences or solitary at ends of branches. Involucres hemispheric; phyllaries 3- or 4-seriate, unequal, not keeled, margin scarious. Receptacles ± conic or ± convex. Ray florets 1-seriate, 10–27, purple, lilac, blue, pink, or white; disk floret limb campanulate, lobes equal. Achenes obovoid to cylindric, ± compressed or sometimes triangular, 2–4-ribbed. Pappus of ray and disk florets 1-seriate, of persistent or deciduous, free (or rarely basally connate) short bristles or scales.

About ten species: C, E, and SE Asia, Himalayan region, E Russia; seven species (three endemic) in China.

The taxonomy of this group generally follows Gu and Hoch (Ann. Missouri Bot. Gard. 84: 762–814. 1997), except for treating the species in *Aster* sect. *Asteromoea* instead of *Kalimeris*.

1a. Leaves broadly ovate to cordate, margin dentate ..... 18. *A. longipetiolatus*
1b. Leaves oblong, ovate, or linear, margin entire, dentate, or pinnatifid.
2a. Phyllaries subleathery, with scarious margins, apically rounded or obtuse, green or reddish purple; achenes 2.5–3.5 mm, sparsely long hairy; pappus 0.7–1.5(–2) mm.
3a. Involucre 10–12 mm in diam., phyllaries narrow and small, 4–5 mm; leaves incised-dentate or sometimes pinnatifid ..... 15. *A. incisus*
3b. Involucre 10–15 mm in diam., phyllaries broader, 5–7 × 2–3 mm.
4a. Leaves entire or pinnatifid, or shallowly dentate, leathery ..... 16. *A. lautureanus*
4b. Leaves pinnatilobate, submembranous ..... 17. *A. mongolicus*
2b. Phyllaries herbaceous in upper part, apically slightly acute; achenes 1.5–2.5 mm, glandular and puberulent in upper part; pappus 0.1–0.8 mm.
5a. Leaves linear-lanceolate, oblong, or lanceolate, entire or minutely 1–3-denticulate ..... 14. *A. pekinensis*
5b. Leaves obovate-oblong or oblanceolate, dentate or pinnately lobed, often entire in upper part.
6a. Leaves thinner, sparsely puberulent or subglabrous; achenes 1.5–2 mm; pappus 0.1–0.3 mm; leaf margin more variable ..... 12. *A. indicus*
6b. Leaves thicker, densely velutinous; achenes 2.5–2.7 mm; pappus ca. 0.3 mm; leaf margin toothed in 1 or 2 pairs or subentire ..... 13. *A. shimadae*

12. Aster indicus Linnaeus, Sp. Pl. 2: 876. 1753.

马兰 ma lan

Herbs, perennial, 30–70 cm tall; rhizome stoloniferous, sometimes with vertical roots. Stems erect, puberulent above, branched from upper or lower part. Basal leaves withered by anthesis; cauline leaves long winged petiolate, obovate or oblanceolate to obovate-oblong or oblong, 3–6(–10) × 0.8–2(–5) cm, sparsely to densely puberulent or glabrous, sometimes sparsely glandular, base attenuate, margin serrate or pinnately lobed, apex obtuse or acute; upper leaves sessile, small, slightly thin, base abruptly attenuate, margin entire and hispidulous, midvein abaxially prominent. Capitula 8–120 in corymbiform synflorescences. Involucres hemispheric, 0.4–0.5 × 0.6–0.9 cm; phyllaries 3- or 4-seriate, unequal; outer phyllaries oblanceolate, 1.6–3.7(–4) mm; inner phyllaries oblong to obovate or spatulate, 2.5–7.5 mm, abaxially sparsely puberulent, leaflike above, margin scarious, ciliate, apex obtuse or sometimes acute. Receptacle conic. Ray florets 1-seriate, 15–20, tube 1.5–1.7 mm, lamina purplish, ca. 10 × 1.5–2 mm; disk florets ca. 3.5 mm, tube ca. 1.5 mm, densely puberulent. Achenes brown, obovoid-oblong, compressed, 1.5–2 × ca. 1 mm, marginally thickly ribbed, apically glandular and puberulent. Pappus 0.1–0.8 mm, subequal, easily deciduous. Fl. and fr. May–Nov.

Forest margins, grasslands, riverbanks, field margins, roadsides, protected shaded habitats; sea level to 3900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan,

Yunnan, Zhejiang [India, Japan, Korea, ?Laos, Malaysia, N Myanmar, E Russia, N Thailand, N Vietnam].

Aster indicus has been referred to the American genus *Boltonia* L'Héritier, but it differs from it in having achenes without long hairs at the top of the marginal ribs and ray floret achenes often thickly 3-ribbed and triangular.

This species is used medicinally to promote digestion and relieve dyspepsia, promote diuresis, dissipate blood stasis, eliminate toxins, and stop bleeding. The young leaves are usually used as a vegetable in the East.

1a. Leaf surfaces glabrous or sparsely puberulent, eglandular ..... 12a. var. *indicus*
1b. Leaf surfaces sparsely to densely puberulent, sparsely glandular.
2a. Cauline leaves lanceolate to oblong, sparsely puberulent; rhizomes 0.5–1(–3.5) cm ..... 12b. var. *stenolepis*
2b. Cauline leaves obovate to oblong, densely puberulent; rhizomes 5–15 cm ..... 12c. var. *collinus*

12a. Aster indicus var. **indicus**

马兰(原变种) ma lan (yuan bian zhong)

Aster cantoniensis (Loureiro) Courtois; *A. ursinus* H. Léveillé (1913), not E. S. Burgess (1903); *A. yangtzensis* Migo; *Asteromoea cantoniensis* (Loureiro) Matsumura; *A. indica* (Linnaeus) Blume; *Boltonia cantoniensis* (Loureiro) Franchet & Savatier; *B. indica* (Linnaeus) Bentham; *B. indica* var. *rivularis* Hance; *Hisutsua cantoniensis* (Loureiro) Candolle; *H. serrata* Hooker & Arnott; *Kalimeris indica* (Linnaeus) Schultz Bipontinus; *K. indica* var. *polymorpha* (Vaniot) Kitamura; *K. indica* var. *stenophylla* Kitamura; *K. lancifolia* J. Q. Fu; *Martinia polymorpha* Vaniot; *Matricaria cantoniensis* Loureiro.

Rhizomes 0.5–18 cm. Cauline leaves oblong, oblanceolate, elliptic, or obovate, glabrous or sparsely puberulent, eglandular. Phyllaries obovate-oblong. Fl. Jun–Nov.

Forest margins, grasslands, riverbanks, field margins, roadsides, very common; sea level to 3900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, S Japan, Korea, ?Laos, Malaysia, N Myanmar, E Russia, N Thailand, N Vietnam].

The young rosettes are used in salads; the leaves are used as folk medicine.

12b. Aster indicus var. **stenolepis** (Handel-Mazzetti) Soejima & Igari, Acta Phytotax. Geobot. 58: 98. 2007.

狭苞马兰 xia bao ma lan

Asteromoea indica var. *stenolepis* Handel-Mazzetti, Acta Horti Gothob. 12: 225. 1938; *Kalimeris indica* subsp. *stenolepis* (Handel-Mazzetti) H. Y. Gu; *K. indica* var. *stenolepis* (Handel-Mazzetti) Kitamura.

Rhizomes 0.5–1(–3.5) cm. Cauline leaves lanceolate to oblong, sparsely puberulent, sparsely glandular.

• Protected shaded habitats; 200–3000 m. Anhui, Fujian, Gansu, Guangdong, Henan, Hubei, Hunan, Jiangsu, Jiangxi, SW Shaanxi, E Sichuan, Zhejiang.

12c. Aster indicus var. **collinus** (Hance) Soejima & Igari, Acta Phytotax. Geobot. 58: 98. 2007.

丘陵马兰 qiu ling ma lan

Boltonia indica var. *collina* Hance, Ann. Sci. Nat., Bot., sér. 5, 5: 219. 1866; *Kalimeris indica* subsp. *collina* (Hance) H. Y. Gu; *K. indica* var. *collina* (Hance) Kitamura.

Rhizomes 5–15 cm. Cauline leaves obovate to oblong, densely puberulent, sparsely glandular. Fl. May–Nov.

• Roadsides, crop field margins; 200–1700 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Yunnan.

13. Aster shimadae (Kitamura) Nemoto, Fl. Jap. Suppl. 740. 1936 [*"shimadai"*].

毡毛马兰 zhan mao ma lan

Asteromoea shimadae Kitamura, Acta Phytotax. Geobot. 2: 37. 1933 [*"Shimadai"*]; *Aster indicus* Linnaeus var. *lautureanus* (Yamamoto) Yamamoto; *Asteromoea indica* (Linnaeus) Blume var. *lautureana* Yamamoto; *Kalimeris shimadae* (Kitamura) Kitamura.

Herbs, perennial, (30–)60–200 cm tall, rhizomatous. Stems erect, much branched, densely hispidulous. Leaves thick, densely velutinous, adaxial veins densely hispidulous, margin densely hispidulous-ciliate, 3-veined; lower cauline leaves withered by anthesis; middle cauline leaves subsessile, obovate, oblanceolate, or elliptic, 2.5–4 × 1.2–2 cm, base gradually attenuate, margin shallowly 1- or 2-toothed or entire; upper leaves gradually smaller, oblanceolate or linear. Capitula 20–85 in loose corymbiform synflorescences, 2–2.5 cm in diam. Involucres hemispheric, 6–7 × 8–10 mm; phyllaries 3-seriate, unequal, abaxially densely hairy; outer phyllaries narrowly oblong, 2–3 mm; inner phyllaries oblanceolate-oblong, ca. 5 mm, margin scarious, ciliate, apex leaflike. Ray florets ca. 10, purplish, tube ca. 1.5 mm, hairy, lamina 11–12 × 2–3 mm; disk florets 4–4.5 mm, tube ca. 1.5 mm, hairy. Achenes gray-brown, obovoid, compressed, 2.5–2.7 mm, strigillose, 2-ribbed. Pappus scaly, ferruginous, ca. 0.3 mm, persistent. Fl. and fr. Jun–Nov.

• Forest margins, grassy slopes, dry stony areas, riverbanks; sea level to 2800 m. Anhui, Fujian, Gansu, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang.

14. Aster pekinensis (Hance) F. H. Chen, Bull. Fan Mem. Inst. Biol., Bot. 5: 41. 1934.

全叶马兰 quan ye ma lan

Asteromoea pekinensis Hance, Ann. Sci. Nat., Bot., sér. 4, 15: 225. 1861; *Aster franchetianus* H. Léveillé; *A. holophyllus* Hemsley, nom. illeg. superfl.; *A. integrifolius* (Turczaninow ex Candolle) Franchet (1884), not Nuttall (1840); *Asteromoea integrifolia* (Turczaninow ex Candolle) Loesener; *Boltonia integrifolia* (Turczaninow ex Candolle) Bentham & J. D. Hooker; *B. pekinensis* (Hance) Hance; *Kalimeris integrifolia* Turczaninow ex Candolle.

Herbs, perennial, (10–)30–140 cm tall; roots erect, fusiform. Stems erect, solitary or several fascicled, hispidulous, fas-

tigiately branched from middle part. Leaves gray-green, puberulent-tomentulose, midvein adaxially prominent; lower cauline leaves withered by anthesis; middle leaves dense, sessile, linear-lanceolate, oblanceolate, or oblong, 2.5–4 × 0.4–0.6 cm, base gradually attenuate, margin revolute, entire, apex obtuse or acuminate, mucronate; upper leaves small, linear. Capitula in loose corymbiform synflorescences. Involucres hemispheric, ca. 4 × 7–8 mm; phyllaries 3-seriate, imbricate, abaxially densely hispidulous, densely glandular; outer phyllaries linear, ca. 1.5 mm; inner phyllaries oblong-lanceolate, ca. 4 mm, acute, leaflike distally. Ray florets 19–29, pale lilac to pale purple, tube ca. 1 mm, hairy, lamina (5.2–)6–13.5(–15) × ca. 2.5 mm; disk florets 2.1–3.4 mm, tube ca. 1 mm, hairy, lobes unequal. Achenes brownish, obovoid, compressed or sometimes trigonous, 1.8–2 × ca. 1.5 mm, apically puberulent and glandular, 2–4-ribbed. Pappus easily deciduous, brownish, fragile, 0.3–0.5 mm, unequal, sometimes absent. Fl. May–Oct, fr. Jul–Nov.

Forest margins, thickets, mountain slopes, riverbanks, roadsides; sea level to 1600 m. Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Korea, E Russia].

15. Aster incisus Fischer, Mém. Soc. Imp. Naturalistes Moscou 3: 76. 1812.

裂叶马兰 lie ye ma lan

Aster incisus var. *australis* Kitagawa; *A. pinnatifidus* Makino f. *robustus* Makino; *Asteromoea incisa* (Fischer) Koidzumi; *Boltonia incisa* (Fischer) Bentham; *Grindelia incisa* (Fischer) Sprengel; *Kalimeris incisa* (Fischer) Candolle; *K. incisa* var. *australis* (Kitagawa) Kitagawa; *K. platycephala* Cassini.

Herbs, perennial, 30–120 cm tall, rhizomatous. Stems erect, branched in upper part, sulcate, glabrous or sparsely strigose. Leaves thin; lower cauline leaves withered by anthesis; middle leaves sessile, elliptic-lanceolate or lanceolate, 6–10(–15) × 1.2–2.5(–4.5) cm, abaxially strigose to glabrate, adaxially glabrous or glabrate, base gradually attenuate, margin incised-serrate, sometimes pinnatilobed, rarely entire, scabrous, veins prominent, apex acuminate; upper leaves reduced, linear-lanceolate, entire. Capitula 10–55 in open corymbiform synflorescences, 2.5–3.5 cm in diam. Involucres hemispheric, 5–7.5 × 7–12 mm; phyllaries 3-seriate, imbricate, oblong-lanceolate, abaxially sparsely strigillose, margin ciliate; outer phyllaries 3–4 mm, acute; inner phyllaries 4–5 mm, margin scarious, purplish, apex obtuse. Ray florets (13–)16–27(–29), pale lilac to bluish purple, tube 1–1.5 mm, lamina 1.5–1.8 × 0.2–0.25 cm; disk florets yellow, 3–4 mm, tube 1–1.3 mm, limb campanulate, hairy, lobes triangular, ca. 0.6 mm, glabrous. Achenes brownish, obovoid, compressed, 3–3.5 mm, strigose, margin pale 2-ribbed or sometimes 3-ribbed. Pappus reddish, 0.5–1.2 mm. Fl. and fr. Jun–Oct. $2n = 18$.

Grasslands on slopes, thickets, open places between forests, semi-open second-growth forests, wet grasslands, sometimes roadsides; 400–1000 m. Heilongjiang, Jilin, Liaoning, E Nei Mongol [Japan, Korea, E Russia].

Only *Aster incisus* var. *incisus* occurs in China. The second variety, *A. incisus* var. *macrodon* (Vaniot & H. Léveillé) Soejima & Igari (*A. macrodon* Vaniot & H. Léveillé; *Kalimeris incisa* subsp. *macrodon* (Vaniot & H. Léveillé) H. Y. Gu), is known only from Korea (Cheju Island).

16. Aster lautureanus (Debeaux) Franchet, Mém. Soc. Sci. Nat. Cherbourg 24: 224. 1884.

山马兰 shan ma lan

Herbs, perennial, 50–100 cm tall. Stems erect, solitary or 2- or 3-fascicled, sulcate, branched in upper part, scabrous. Leaves thick or subleathery, sparsely scabrous or glabrous, margin revolute, scabrous; lower cauline leaves withered by anthesis; middle leaves sessile, oblong to broadly oblong or sometimes oblanceolate, 3–6(–9) × 0.5–2.4 cm, base gradually attenuate, margin remotely serrate to pinnatifid, sometimes entire, apex acute to obtuse; synflorescence leaves linear-lanceolate to linear, margin entire. Capitula 19–90 in corymbiform synflorescences, 2–3.5 cm in diam. Involucres hemispheric, 10–14 mm in diam.; phyllaries 3-seriate, unequal, apically green, glabrous, margin scabrous; outer phyllaries elliptic, 2.3–4.5 mm, apex acute; inner phyllaries oblanceolate-elliptic, 4.7–6.5(–7.6) × 1.8–3.2 mm, obtuse, margin scarious, erose-fimbriate, purplish. Ray florets 13–22, bluish, tube 1.2–1.4 mm, lamina 1.5–2 × 0.2–0.3 cm; disk florets yellow, 4–5.8 mm, tube 0.7–1.3 mm, upper tube and limb hairy, limb campanulate, lobes lanceolate, 0.5–1.1(–1.5) mm, glabrous. Achenes brownish, obovoid, compressed or sometimes trigonous, 3(–4) × ca. 2 mm, sparsely strigillose, pale 2- or 3-ribbed. Pappus straw-colored or brownish, 0.4–1 mm. Fl. and fr. Jun–Oct.

• Meadows, thickets, mountain slopes, stream banks, ditches, dry roadsides; 100–2200 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi, Zhejiang.

1a. Leaves oblong to oblanceolate, 0.5–2 cm wide; disk floret corolla 4.5–5.1 mm ..... 16a. var. *lautureanus*

1b. Leaves broadly oblong, 1.5–2.4 cm wide; disk floret corolla 5–5.8 mm ..... 16b. var. *mangtaoensis*

16a. Aster lautureanus var. **lautureanus**

山马兰(原变种) shan ma lan (yuan bian zhong)

Boltonia lautureana Debeaux, Actes Soc. Linn. Bordeaux 31: 215. 1877; *Asteromoea lautureana* (Debeaux) Handel-Mazzetti; *Kalimeris lautureana* (Debeaux) Kitamura.

Leaves oblong to oblanceolate, 0.5–2 cm wide. Disk floret corolla 4.5–5.1 mm. Fl. and fr. Jun–Oct.

• Meadows, thickets, mountain slopes, stream banks, ditches, dry roadsides; 100–2200 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi, Zhejiang.

16b. Aster lautureanus var. **mangtaoensis** (Kitagawa) Kitagawa, J. Jap. Bot. 13: 554. 1937.

小龙山马兰 xiao long shan ma lan

Aster mangtaoensis Kitagawa, J. Jap. Bot. 9: 109. 1933; *Kalimeris lautureana* subsp. *mangtaoensis* (Kitagawa) H. Y. Gu; *K. mangtaoensis* (Kitagawa) Kitamura.

Leaves broadly oblong, 1.5–2.4 cm wide. Disk floret corolla 5–5.8 mm. Fl. and fr. Jul–Aug.

• Liaoning (Xiaolongshan Dao).

17. Aster mongolicus Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 41. 1883.

蒙古马兰 meng gu ma lan

Aster associatus Kitagawa; *A. associatus* var. *stenolobus* Kitagawa; *A. lautureanus* (Debeaux) Franchet var. *holophyllus* (Maximowicz) F. H. Chen; *A. lautureanus* var. *mongolicus* (Franchet) Kitagawa; *Asteromoea mongolica* (Franchet) Kitamura; *Kalimeris associata* (Kitagawa) Kitagawa; *K. incisa* (Fischer) Candolle var. *holophylla* Maximowicz; *K. mongolica* (Franchet) Kitamura.

Herbs, perennial, 50–122 cm tall. Stems erect, sulcate upward, strigose, branched in upper part. Leaves submembranous; lowermost cauline leaves withered by anthesis; lower and middle leaves: blade oblanceolate to narrowly oblong, 5–9 × 2–4 cm, sparsely hispidulous or glabrate, margin pinnatifid, densely hispidulous; lobes linear-oblong, margin entire, apex obtuse; uppermost leaves linear-lanceolate, 1–2 cm. Capitula 12–45 in corymbiform synflorescences, 2.5–3.5 cm in diam. Involucre hemispheric, 1–1.5 cm in diam.; phyllaries 3- or 4-seriate, unequal, apically green, elliptic to obovate, 5–7 × 3–4 mm, glabrous, margin scarious, white or purplish, lacerate, apex obtuse. Ray florets (11–)14–25, bluish purple, bluish, or white, tube ca. 2 mm, lamina 13.5–25.5 × 2.7–4.8(–5.2) mm; disk florets yellow, 3.5–4.9 mm, tube 0.8–1.6(–1.8) mm, lobes unequal, 0.8–2.1 mm. Achenes straw-colored or brownish, obovoid, compressed or sometimes trigonous, ca. 3.5 × 2.5 mm, sparsely strigillose, rarely apically glandular, yellowish 2- or 3-ribbed. Pappus brownish, unequal, 0.3–1.2 mm. Fl. and fr. Jun–Oct.

Mountain slopes, thickets, semi-open secondary forests, margins of coniferous forests, mixed broad-leaved forests, field margins; sea level to 1300 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Korea, E Russia].

18. Aster longipetiolatus C. C. Chang, Sunyatsenia 6: 22. 1941.

长柄马兰 chang bing ma lan

Aster trichanthus Handel-Mazzetti; *Kalimeris longipetiolata* (C. C. Chang) Y. Ling.

Herbs, perennial, 50–70 cm tall, rhizomatous. Stems erect, simple, slender, villous. Leaves remote, thin, sparsely hairy, margin, adaxially along veins, and petiole densely villous, basally palmately veined, lateral veins 2- or 3-paired, reticulate veins ± conspicuous; basal leaves withered by anthesis or rarely persistent; lower cauline leaves long petiolate; petiole slender, 12–16 cm; blade broadly ovate, 6–7 × 4–6 cm, base truncate or shallowly cordate, margin coarsely serrate (teeth mucronulate), apex acute or cuspidate; middle leaves shortly petiolate; blade cordate, margin coarsely crenate; upper leaves gradually reduced, small, subentire, grading into linear-lanceolate bracts. Capitula 1 or 2, 3.5–4.5 cm. Phyllaries 2- or 3-seriate, equal, linear-oblanceolate, 5–6 mm, leaflike, apex acuminate, subulate-mucronate; inner phyllaries leaflike in upper part, hairy, margin scarious, erose. Ray florets ca. 30, bluish, tube ca. 2 mm, sparsely hairy near base, lamina linear, ca. 20 × 1–1.3 mm; disk florets yellow, ca. 3 mm, tube short, glabrous. Achenes (not seen; ovary) cylindric, ± compressed. Pappus dirty white, of scalelike bristles, 0.3–1 mm, unequal. Fl. Jul.

• Brooklet banks, valleys; ca. 2500 m. W Sichuan.

Aster longipetiolatus was not included in the revision of *Kalimeris* by Gu and Hoch (Ann. Missouri Bot. Gard. 84: 762–814. 1997); its affinities require investigation. Specimens were not seen by one of us (Brouillet).

5. Aster sect. **Pseudocalimeris** Kitamura, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 13: 363. 1937.

假马兰组 jia ma lan zu

Heteropappus Lessing.

Herbs, perennial, biennial, or annual, simple or branched, erect, ascending, or decumbent. Leaves basal (withered at anthesis) and cauline; blade linear, oblong-lanceolate, oblanceolate, or spatulate-oblong to spatulate, margin flat, entire or remotely serrate or crenate, 1-veined. Capitula radiate, sometimes discoid, terminal, corymbose-paniculiform or solitary at ends of branches or stems. Involucres hemispheric or patelliform; phyllaries 2- or 3-seriate, subequal (outer sometimes shorter), not keeled, margin sometimes scarious. Receptacles flat. Ray florets 1-seriate, sometimes absent, 15–40, purple, lilac, blue, pink, or white; disk floret limb campanulate, narrowly campanulate, or funnelform, lobes unequal (1 lobe deeper). Achenes obovate or obovoid to obovate-oblong, compressed to flattened, 2-ribbed. Pappus of ray florets sometimes absent or few, short, of disk florets present, 1–3-seriate, persistent or deciduous, inner bristles acute (when present), outer series of free (rarely connate) short scales or bristles.

About 17 species: C and E Asia, E Europe; 12 species (three endemic) in China.

1a. Perennial herbs, rarely biennial; pappus of ray and disk florets identical.
2a. Capitula discoid ..... 23. *A. eligulatus*
2b. Capitula radiate.
3a. Plants 2.5–7 cm, thickly taprooted ..... 22. *A. boweri*
3b. Plants (3.5–)5–60(–100) cm, not taprooted.
4a. Phyllary margin herbaceous or narrowly scarious ..... 20. *A. asagrayi*
4b. Phyllary margin ± broadly scarious (at least inner series).
5a. Phyllary margin broadly scarious; stems erect; ray florets ca. 20 ..... 19. *A. altaicus*
5b. Phyllary margin broadly scarious in inner series; stems decumbent to ascending; ray florets (20–)25–35 ..... 21. *A. semiprostratus*

1b. Annual or biennial herbs, sometimes also perennial (*A. arenarius*); pappus of ray florets usually short, sometimes absent or equaling that of disk.
6a. Leaves glabrous or glabrate (margin conspicuously ciliate).
7a. Stems erect; cauline leaves glabrate ..... 28. *A. oldhamii*
7b. Stems procumbent; cauline leaves glabrous or sometimes sparsely strigose ..... 27. *A. arenarius*
6b. Leaves hairy.
8a. Plants 8–30 cm tall, branched from base, branches decumbent to ascending ..... 30. *A. gouldii*
8b. Plants 10–50(–150) cm tall, branched from middle, branches ascending.
9a. Pappus of ray florets long ..... 26. *A. neobiennis*
9b. Pappus of ray florets absent or of short bristles (shorter than on disk florets); ray achene narrow, sterile.
10a. Capitula 30–50 mm in diam.; middle cauline leaf margin coarsely serrate in upper part or entire ..... 25. *A. meyendorffii*
10b. Capitula 10–25 mm in diam.; middle cauline leaf margin entire or crenate.
11a. Ray pappus a crown of scales; cauline leaves oblong-lanceolate or linear, margin entire ..... 24. *A. hispidus*
11b. Ray pappus a few short bristles or equaling that of disk; cauline leaves spatulate-oblong, margin crenate ..... 29. *A. crenatifolius*

19. Aster altaicus Willdenow, Enum. Pl. 2: 881. 1809.

阿尔泰狗娃花 a er tai gou wa hua

Herbs perennial, roots procumbent or vertical, not taprooted. Stems usually many, erect, 10–60(–100) cm, covered with closely-set thin hairs directed upward and often glandular in upper part, branched. Basal leaves withered by anthesis, lower linear or oblong-lanceolate, oblanceolate or subspatulate, 2.5–6(–10) × 0.7–1.5 cm, margin entire or remotely shallowly toothed, upper gradually diminished, both surfaces pubescent, densely minutely glandular, midvein abaxially slightly convex. Capitula radiate, numerous, 2–3.5(–4) cm in diam., solitary and terminal or in corymbose-paniculiform synflorescences. Involucres hemispheric, 0.8–1.8 cm in diam.; phyllaries 2- or 3-seriate, subequal or outer series short, oblong-lanceolate or linear, 4–8 × 0.5–1.8 mm, abaxially or all outer series leaflike, shortly rough pilose, short-stipitate glandular, acuminate, outermost linear and shorter than inner, margin ± broadly scarious. Ray florets ca. 20, bluish purple or lilac, tube 1.5–2.8 mm, hairy, lamina oblong-linear, 10–15 × 1.5–2.5 mm; disk florets yellow, 5–6 mm, tube 1.5–2.2 mm, lobes unequal, 0.6–1 × 1–1.4 mm, hairy. Achenes obovate-oblong, compressed, 2–3 mm, strigose, glandular. Pappus of ray and disk florets identical, sordid white or pale brown, of subequal bristles, 4–6 mm. Fl. and fr. Jul–Sep.

Steppes, meadows, salt marshes, grasslands, open slopes, stony slopes, rock outcrops, seasides, roadsides, sandy places by riverbanks; sea level to 4000 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, W Sichuan, Taiwan, Xinjiang, Xizang, NW Yunnan, Zhejiang [Afghanistan, NW India, Kashmir, Kazakhstan, Korea, Mongolia, Nepal, Pakistan, Russia (Siberia), Turkmenistan, Uzbekistan; SW Asia (Iran)].

1a. Inner phyllary margin narrowly scarious ..... 19f. var. *taitoensis*
1b. Inner phyllary margin narrowly or broadly scarious.
2a. Stems and leaves spreading and coarsely white hairy ..... 19e. var. *hirsutus*
2b. Stems and leaves strigose.
3a. Plants often gray-white, virgately branched; leaves, especially upper, adnate to stems or peduncles ..... 19b. var. *canescens*
3b. Plants green, procumbent-branched; leaves not always appressed to stems.
4a. Stems 10–30 cm tall, usually branched from base, ascending, ± procumbent at base; capitula solitary at ends of branches ..... 19a. var. *altaicus*
4b. Stems 20–60 cm tall, branched in upper part or multibranched and short, subequal; capitula in few to multibranched synflorescences.
5a. Leaves lanceolate; synflorescences few branched; stems erect ..... 19c. var. *scaber*
5b. Leaves linear-lanceolate, narrow; synflorescences multibranched; stems erect or ascending ..... 19d. var. *millefolius*

19a. Aster altaicus var. **altaicus**

阿尔泰狗娃花(原变种) a er tai gou wa hua (yuan bian zhong)

Aster gmelinii Tausch; *Heteropappus altaicus* (Willdenow) Novopokrovsky; *Kalimeris altaica* (Willdenow) Nees; *K. altaica* var. *subincana* Avé-Lallemant.

Plants green. Stems ascending or erect, 10–30 cm tall, covered with upwardly curved appressed short hairs, branched from base, with few branches. Leaves spreading, linear-lanceolate or spatulate, 3–7(–10) × 0.2–0.7 cm. Capitula solitary, terminal on branches. Involucres 5–15 mm in diam.; phyllaries with outer margin narrowly scarious, inner margin broadly scarious, glandular, hairy.

Steppes, meadows, salt marshes, stony slopes of lower hills, roadsides, roadsides by riverbanks. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong,

Shanxi, NW Sichuan, Xinjiang, Xizang [Kashmir, Kazakhstan, Mongolia, Russia (Siberia)].

"Aster angustifolius" (Royle, Ill. Bot. Himal. Mts. 251, t. 58, f. 1. 1835) belongs here but is a nomen nudum and was therefore not validly published (*Vienna Code*, Art. 32.1(d)).

19b. Aster altaicus var. **canescens** (Nees) Sergievskaya in Krylov, Fl. Zapadnoi Sibiri 11: 2664. 1949.

灰白阿尔泰狗娃花 hui bai a er tai gou wa hua

Kalimeris canescens Nees, Gen. Sp. Aster. 229. 1832; *Aster canescens* (Nees) Fisjun (1965), not Pursh (1813); *A. pyropappus* Boissier; *A. spatioides* C. B. Clarke; *Heteropappus alberti* (Regel) Novopokrovsky; *H. altaicus* var. *canescens* (Nees) Koroljuk; *H. canescens* (Nees) Novopokrovsky; *K. alberti* Regel.

Plants gray-white. Stems erect or ascending, 30–60 cm tall, strigillose, glandular, branched from base, virgately branched in upper part. Leaves broadly subspatulate, 0.5–0.6 cm; upper adnate to branches and peduncles, linear, ca. 1 × 0.1–0.2 cm, or oblong-linear. Involucres 0.9–1.1 cm in diam.; outer phyllaries leaflike, inner phyllaries with membranous margin, glandular, puberulent.

Dry stony mountains. N Xinjiang [Afghanistan, NW India, Kazakhstan, Mongolia, Pakistan, Russia (W Siberia), Turkmenistan, Uzbekistan; SW Asia (Iran)].

19c. Aster altaicus var. **scaber** (Avé-Lallemant) Handel-Mazzetti, Acta Horti Gothob. 12: 220. 1938.

粗糙阿尔泰狗娃花 cu cao a er tai gou wa hua

Kalimeris altaica var. *scabra* Fischer, C. A. Meyer & Avé-Lallemant, Index Sem. Hort. Petrop. 8: 53. 1842; *Heteropappus altaicus* var. *scaber* (Avé-Lallemant) Wang.

Plants green. Stems erect, 20–60 cm, usually branched from middle, sparsely strigillose. Leaves remote, lanceolate, ca. 3 × 0.4 cm. Capitula in few branched synflorescence.

• Liaoning, Shanxi.

19d. Aster altaicus var. **millefolius** (Vaniot) Handel-Mazzetti, Acta Horti Gothob. 12: 220. 1938.

千叶阿尔泰狗娃花 qian ye a er tai gou wa hua

Aster millefolius Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 496. 1903; *Heteropappus altaicus* var. *millefolius* (Vaniot) Grierson & Lauener.

Plants green. Stems erect or ascending, covered with upwardly curved appressed short hairs, glandular, with many subequal and spreading branches. Leaves spreading, linear or linear-lanceolate, 1–2 × 0.1–0.25 cm. Capitula in multibranched, densely leafy synflorescences. Involucres 0.5–8 mm in diam.; phyllaries with narrow or broad margins; outer phyllaries leaflike, hairy or glabrate, glandular. Ray florets 5–6 mm.

• Stony or soil-covered slopes, roadsides, very common. Gansu, Hebei, Heilongjiang, Liaoning, Nei Mongol, Shaanxi, Shanxi.

The stems with many subequal long branches, smaller leaves, and smaller capitula differ significantly from other varieties.

19e. Aster altaicus var. **hirsutus** Handel-Mazzetti, Acta Horti Gothob. 12: 221. 1938.

糙毛阿尔泰狗娃花 cao mao a er tai gou wa hua

Heteropappus altaicus var. *hirsutus* (Handel-Mazzetti) Y. Ling.

Plants green. Stems ascending or erect, densely spreading and coarsely white hairy, especially upper part, hairs ca. 1 mm or more, few branched from base. Leaves linear-lanceolate or spatulate, spreading coarsely white hairy. Capitula solitary, terminal on branches. Involucres 5–15 mm in diam.; outer phyllaries with narrowly scarious margin; inner with broadly scarious margin, glandular, coarsely white hairy.

• Grasslands, open slopes; 2200–3500 m. W Sichuan (Garzê, Jinchuan, Kangding), NW Yunnan.

This variety is similar to *Aster altaicus* var. *altaicus* but differs in having stems white hirsute.

19f. Aster altaicus var. **taitoensis** Kitamura, Acta Phytotax. Geobot. 1: 289. 1932.

台东阿尔泰狗娃花 tai dong a er tai gou wa hua

Heteropappus altaicus var. *taitoensis* (Kitamura) Y. Ling.

Plants green, ca. 50 cm tall. Stems branched from base, densely spreading and ascending appressed hairy. Lower leaves withered by anthesis, oblanceolate-linear or linear, 3–6 × 0.1–0.2(–0.4) mm, margin entire or remotely toothed; middle leaves 2–3 × ca. 0.1 cm; upper leaves small, similar to phyllaries. Involucres 1.5–1.8 cm in diam.; outer phyllaries leaflike, inner phyllaries with narrowly scarious margin, densely hairy.

• Sandy places by riverbanks. Taiwan (Taidong).

20. Aster asagrayi Makino, Bot. Mag. (Tokyo) 22: 157. 1908.

华南狗娃花 hua nan gou wa hua

Kalimeris ciliata A. Gray, Mem. Amer. Acad. Arts, n.s., 6: 394. 1858; *Aster ciliosus* (Turczaninow) Handel-Mazzetti (1937), not Kitamura (1934); *Heteropappus ciliosus* (Turczaninow) Y. Ling; *K. ciliosa* Turczaninow.

Herbs, perennial, 15–35 cm tall, taprooted. Stems ascending or decumbent, few branched in upper part, sterile stems short, sparsely to moderately strigose or glabrate, sometimes minutely short-stipitate glandular. Leaves sessile, glabrous or adaxial veins sparsely strigose, eglandular, margin entire, strigose-ciliate, midvein abaxially slightly prominent; lower cauline leaves withered by anthesis; middle leaves narrowly oblanceolate to oblanceolate or spatulate-oblong, 1.5–2.5 × 0.15–0.4 cm, base gradually attenuate, apex rounded; upper leaves smaller, similar to phyllaries, sparsely scabrous; leaves of sterile stems spatulate, 1–1.5 × 0.3–0.4 cm. Capitula solitary at ends of branches or sometimes in corymbiform synflorescences, 2–2.5 cm in diam. Involucres hemispheric, 0.8–1.2 cm in diam.; phyllaries green, 2-seriate, equal or outer phyllaries shorter, lanceolate to linear-lanceolate, 4–5 × 0.5–0.7 mm, abaxially scabrous, margin herbaceous or narrowly (rarely broadly) scarious, erose, scabrous-ciliate, apex acuminate. Ray florets 1-seriate, 15–20, white or pink, tube 2–2.5 mm, sparsely hairy, lamina 8–10.1 × 0.8–1.2 mm; disk florets yellow, 3.3–4 mm, tube 1–1.7 mm, sparsely hairy, limb campanulate, lobes unequal, 1 deep, 0.7–

1.2 mm, hairy. Achenes brownish, obovate, flattened, 2–2.7 mm, scabrous, apically glandular, 2-ribbed. Pappus ca. 2-seriate, reddish or reddish brown, of unequal bristles 2.5–3.3 mm, acute. Fl. and fr. Jul–Sep. $2n = 18$.

Sandy areas by seasides, sandy meadows, grasslands by riversides; sea level to 100 m. Fujian, Guangdong, Hainan [Japan].

21. Aster semiprostratus (Grierson) H. Ikeda, Fl. Mustang [Nepal] 351. 2008.

半卧狗娃花 ban wo gou wa hua

Heteropappus semiprostratus Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 151. 1964.

Herbs, perennial, (3.5–)5–15 cm tall, caespitose; rhizome short. Stems and branches decumbent or ascending, branched from base, sometimes with densely leafy undeveloped branches in leaf axils, reddish, long white strigose, sparsely short-stipitate glandular (particularly upward). Leaves linear-oblanceolate or oblanceolate to spatulate, 1–3.2 × 0.2–0.4 cm, ± densely strigose, with sessile glands, or adaxially sparsely strigose, base attenuate, margin entire, strigose-ciliate, midvein abaxially convex, slightly concave adaxially, sometimes basally 3-veined, apex obtuse to acute, mucronate. Capitula radiate, solitary at ends of stems or branches, or sometimes 2 or 3 in corymbiform synflorescences, 1.5–3 cm in diam. Involucres hemispheric, 1–1.5 cm in diam.; phyllaries 3-seriate, green, lanceolate, 6–8 × 0.8–1.8 mm, abaxially strigose, short-stipitate glandular, outer margin leaflike or narrowly scarious, inner phyllaries ± broadly scarious, erose, scabrous- or glandular ciliate, apex acuminate, often purplish. Ray florets (20–)25–35, blue or purplish, tube 2–2.9 mm, hairy, lamina 1.2–1.5 × 0.1–0.2 cm; disk florets yellow, 4–6.3 mm, tube 1.5–2.3 mm, tube and limb sparsely hairy, limb narrowly campanulate, lobes unequal, 1 deep, 5–7.5 mm, hairy. Achenes straw-colored, becoming black mottled or nearly black, obovate, flattened, 1.8–2.5 mm, strigose, apically with sessile glands, margin faintly 2-ribbed, long strigose. Pappus 2- or 3-seriate, reddish to reddish brown, unequal, 4–5 mm. Fl. Jun–Aug.

Dry open stony, gravelly, or sandy slopes, gravelly and sandy open or shrubby floodplains, alpine meadows, rock outcrops; 3200–4600 m. Qinghai, Xizang [Kashmir, Nepal].

22. Aster boweri Hemsley, J. Linn. Soc., Bot. 30: 113. 1894 [*"Bowerii"*].

青藏狗娃花 qing zang gou wa hua

Aster boweri f. *annuus* Onno; *Heteropappus boweri* (Hemsley) Grierson.

Herbs, biennial or perennial, 2.5–7 cm tall, from caudex, thickly taprooted, sometimes clad with marcescent leaf bases. Stems solitary or 3–6, simple or branched near base, decumbent or ascending, slender, moderately to densely white hispid, more densely so upward, ± densely stipitate glandular below capitula. Leaves ± densely strigose or adaxially glabrate, margin entire, strigose-ciliate, basally crowded, shortly winged petiolate or subsessile, narrowly oblanceolate to spatulate, 1–3 × 0.2–0.4 cm, base clasping, apex acute to obtuse; upper cauline leaves lanceolate to linear, 0.5–0.8 × ca. 0.2 cm. Capitula terminal, solitary, 25–30 mm in diam. Involucres hemispheric, 1–1.5(–2) cm in diam.; phyllaries 2- or 3-seriate, subequal, linear to linear-lanceolate, abaxially ± densely strigose to villous-strigose, herbaceous, margin strigose, of inner phyllaries scarious, erose. Ray florets ca. 40, purple, tube 2–3 mm, lamina 9–13 × 1.5–1.7 mm; disk florets yellow, 4.5–5 mm, tube ca. 1.5 mm, lobes triangular, hairy, unequal, 4 short, 0.5–0.6 mm, 1 long, 1–1.2 mm. Achenes pale brown and blackish streaked, narrowly obovoid, 2.8–3 mm, sparsely strigose. Pappus brownish, 2- or 3-seriate; outer bristles short, 0.5–0.9 mm; inner bristles 4–5.5 mm. Fl. and fr. Jul–Aug.

• Alpine stony and sandy grounds, alpine meadows, montane river floodplains, field margins; 2200–5200 m. W Gansu, Qinghai, Xinjiang, Xizang, Yunnan.

23. Aster eligulatus (Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan) Brouillet, Semple & Y. L. Chen, **comb. nov.**

无舌狗娃花 wu she gou wa hua

Basionym: *Heteropappus eligulatus* Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 85. 1981.

Herbs, perennial, 5–15 cm tall; caudex short, from woody taproot. Stems procumbent to ascending, many branched, rigid, green or purple tinged, usually branched from base, white strigose. Leaves sessile, linear, 0.4–2 × 0.1–0.2(–0.4) cm, strigose, midvein slightly raised abaxially, margin entire, strigose, apex obtuse, mucronulate; uppermost leaves small. Capitula discoid, terminal, solitary, 8–13 mm in diam.; phyllaries 2- or 3-seriate, green or purple tinged, lanceolate, 5.5–6.5 × 1.2–2 mm, strigose, margin scarious, apex acuminate. Ray florets absent; disk florets yellow, 4.3–5 mm, tube 1–1.3 mm, limb funnelform, glabrous, lobes triangular to lanceolate, unequal, 0.8–1.2 mm, hairy. Achenes pale yellow-brown, obovoid, compressed, ca. 2 × 1 mm, sericeous, margin 2-ribbed. Pappus pale yellow-brown, 2-seriate, of 35–45 unequal bristles 3–3.5 mm. Fl. and fr. Jul–Sep.

• Stony grounds; 3200–3900 m. Xizang.

Aster eligulatus is similar to *Heteropappus holohermaphroditus* Grierson, described from India, Kashmir, and Pakistan, but differs in having stems branched from the base and capitula terminal, solitary. The differences noted above, however, might stem from phenotypic plasticity: the plants from south of the Himalaya being taller (15–45 cm) and the capitula numerous, borne at the ends of long peduncles. More material and a morphometric study are needed to resolve this issue.

24. Aster hispidus Thunberg, Nova Acta Regiae Soc. Sci. Upsal. 4: 39. 1783.

狗娃花 gou wa hua

Aster batakensis Hayata; *A. fusanensis* H. Léveillé & Vaniot; *A. hispidus* var. *decipiens* (Maximowicz) Y. Ling; *A. hisptdus* var. *heterochaeta* Franchet & Savatier; *A. hispidus* var. *mesochaeta* Franchet & Savatier; *A. hispidus* var. *microphyllus* Pampanini; *A. oldhamii* Hemsley var. *batakensis* (Hayata) Sasaki; *A. omerophyllus* Hayata; *A. rufopappus* Hayata; *Heteropappus decipiens* Maximowicz; *H. hispidus* (Thunberg) Lessing; *H. hispidus* f. *decipiens* (Maximowicz) Komarov; *H. hispidus* var. *decipiens* (Maximowicz) Voroschilov; *H. incisus* Sie-

bold & Zuccarini; *H. pinetorum* Komarov; *Kalimeris hispida* (Thunberg) Nees.

Herbs, annual or biennial, 30–50(–150) cm tall; taproot vertical, fusiform. Stems solitary or sometimes several fascicled, branched, strigose or hispid, glabrescent in lower part. Leaves thin, sparsely strigose or glabrous, margin ciliate, midvein and secondary veins prominent; basal and lower cauline leaves withered by anthesis, long petiolate; blade obovate, 4–13 × 0.5–1.5 cm, attenuate, margin entire or remotely serrate, apex obtuse or rounded; middle leaves oblong-lanceolate or linear, 3–7 × 0.3–1.5 cm, margin often entire; upper leaves reduced in size, linear. Capitula radiate, in broad corymbiform synflorescences, 3–5 cm in diam., long pedunculate. Involucres hemispheric, 7–8 × 10–20 mm; phyllaries 2-seriate, subequal, abaxially strigose, often glandular; outer phyllaries linear-lanceolate, ca. 1 mm wide, leaflike; inner phyllaries rhombic-lanceolate, margin scarious, strigose. Ray florets ca. 30, reddish or white, tube ca. 2 mm, lamina linear-oblong, 12–20 × 2.5–4 mm; disk florets 5–7 mm, tube 1.5–2 mm, lobes unequal, 1–1.5 mm. Achenes obovoid, compressed, 2.5–3 × ca. 1.5 mm, strigose, marginally finely 2-ribbed. Pappus of ray florets a crown of scales ca. 0.5 mm, of disk florets white, later red tinged, bristles nearly equaling corolla. Fl. Jul–Sep, fr. Aug–Oct.

Forest margins, grasslands, roadsides; sea level to 2400 m. Anhui, Fujian, Gansu, Hebei, Heilongjiang, Hubei, Jiangsu, Jiangxi, Jilin, Nei Mongol, Shaanxi, Shandong, Shanxi, N, NE, and NW Sichuan, Taiwan, Zhejiang [Japan, Korea, Mongolia, E Russia].

25. Aster meyendorffii (Regel & Maack) Voss, Vilm. Blumengärtn., ed. 3, 469. 1894.

砂狗娃花 sha gou wa hua

Galatella meyendorffii Regel & Maack, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 4: 81. 1861; *Aster ciliosus* Kitamura; *A. depauperatus* H. Léveillé & Vaniot (1909), not Fernald (1908); *Heteropappus hispidus* (Thunberg) Lessing var. *longiradiatus* Komarov; *H. magnicalathinus* J. Q. Fu; *H. meyendorffii* (Regel & Maack) Komarov & Alissova-Klobukova; *H. meyendorffii* var. *hirsutus* Y. Ling & W. Wang; *H. tataricus* (Lindley ex Candolle) Tamamschjan var. *hirsutus* (Y. Ling & W. Wang) H. C. Fu.

Herbs, annual, 35–50 cm tall. Stems erect, striate, ± densely strigose or hispid, strigillose, usually branched from middle, branches ascending. Leaves: basal and lower cauline withered by anthesis, long petiolate, ovate or obovate-oblong, 5–6 × 2.5–3.5 cm, 3-veined, base attenuate, margin roughly crenate, apex obtuse or acute; middle cauline leaves sessile, abaxially pale green, adaxially green, narrowly oblong, 6–8 × 1–2 cm, strigose or adaxially glabrate, abaxial veins strigose, midvein and lateral veins slightly conspicuous on both surfaces, base gradually attenuate, margin coarsely serrate in upper part or entire, strigose-ciliate, apex obtuse or acute; upper leaves gradually smaller, lanceolate to linear-lanceolate, 1–1.5 × ca. 0.3 cm, margin entire, 1-veined. Capitula terminal, solitary on branches, 30–50 mm in diam. Involucres hemispheric, 13–18 mm in diam.; phyllaries 2- or 3-seriate, leaflike, linear-lanceolate, 7–8 mm, apex acuminate, hispid, glandular, inner margin scarious in lower part. Ray florets blue-purple, tube ca. 1.8 mm, lamina linear-oblong, 14–17(–27) × 2–2.5 mm, apex 3-toothed or entire; disk florets yellow, ca. 5 mm, tube 1–1.5 mm, sparsely hairy, lobes unequal, 0.8–1.2 mm. Achenes of ray florets narrow, sterile, of disk oblong-obovate, compressed, densely silky. Pappus of ray florets few, short or sometimes absent, of disk florets reddish to reddish brown, of 25–35 bristles, 2–4.45 mm, unequal. Fl. Aug–Sep.

Sandy riverbanks, sandy hillside forest understories, grasslands on slopes; above 800 m. NE Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Shaanxi, Shanxi [Japan, Korea, E Russia].

This species is very decorative due to the presence of numerous large capitula.

26. Aster neobiennis Brouillet, Semple & Y. L. Chen, **nom. nov.**

鞑靼狗娃花 da da gou wa hua

Replaced synonym: *Callistephus biennis* Lindley ex Candolle, Prodr. 5: 275. 1836, not *Aster biennis* Nuttall, Gen. N. Amer. Pl. 2: 155. 1818, nom. illeg. superfl. [*Aster canescens* Pursh, Fl. Amer. Sept. 2: 547. 1813]; *A. hispidus* Thunberg var. *sibiricus* (Komarov) Y. Ling; *Heteropappus hispidus* (Thunberg) Lessing var. *sibiricus* Komarov; *H. meyendorffii* (Regel & Maack) Komarov & Alissova-Klobukova var. *tataricus* (Lindley ex Candolle) Y. Ling & W. Wang; *H. tataricus* (Lindley ex Candolle) Tamamschjan; *Kalimeris biennis* (Lindley ex Candolle) Ledebour (1845), not Nees (1832); *K. tatarica* Lindley ex Candolle (1836), not *Aster tataricus* Linnaeus f. (1782).

Herbs, biennial, 20–40 cm tall. Stems erect, usually solitary, rarely 2- or 3-fascicled, branched in upper part, branches ascending, purplish or reddish, strigose to hirsute, glandular or not. Lower cauline leaves deciduous by anthesis; middle leaves lanceolate to linear-lanceolate, sometimes linear, 2–5 × 0.2–0.5 cm, strigose, eglandular or sparsely minutely glandular, margin long strigose-ciliate, apex acuminate; uppermost leaves reduced. Capitula terminal, solitary on branches, forming open corymbiform synflorescences, 25–40 mm in diam. Involucres hemispheric, 1.2–2 cm in diam.; phyllaries linear-lanceolate to lanceolate, 8–11 mm, abaxially strigose, inconspicuously glandular in lower half, margin scarious, ciliate, apex acuminate. Ray florets blue or blue-lilac, tube 2.5–3 mm, sparsely hairy, lamina 14–28 × 2–2.2 mm; disk florets yellow, sparsely hairy (tube and limb), 3.7–5 mm, tube 1.2–1.8 mm, limb narrowly campanulate, lobes lanceolate, unequal, 0.6–0.8(–1.5) mm. Achenes obovoid, (immature) ca. 2 mm, strigillose. Pappus reddish brown to yellowish, of ray and disk florets ± equal, 3–3.5 mm. Fl. Jul–Aug.

Forest understories on sandy hills, sandy riverbanks. Hebei, Nei Mongol, Shanxi [Mongolia, E Russia (E European part, Siberia)].

"*Aster biennis* Ledebour" (in Weinmann, Bot. Gart. Dorpat, Suppl. I, [1]. 1811; Franchet, Mém. Soc. Sci. Nat. Math. Cherbourg 24: 224. 1884) belongs here but is a nomen nudum and was therefore not validly published (*Vienna Code*, Art. 32.1(d)).

27. Aster arenarius (Kitamura) Nemoto, Fl. Jap. Suppl. 736. 1937.

普陀狗娃花 pu tuo gou wa hua

Heteropappus arenarius Kitamura, Acta Phytotax. Geobot. 2: 43. 1933; *H. hispidus* (Thunberg) Lessing subsp. *arenarius* (Kitamura) Kitamura.

Herbs, biennial or perennial, 15–70 cm tall; taproot woody. Stems procumbent or ascending, branched from base, sparsely to moderately strigose or glabrate. Leaves: basal petiole 1.5–3 cm; blade spatulate, 3–6 × 1–1.5 cm, thick, glabrate or sparsely villous, base cuneate to attenuate, margin entire or sometimes remotely serrate, scabrous-ciliate, apex rounded to acute; lower and basal cauline leaves withered by anthesis; middle and upper leaves oblanceolate-oblong, 1–2.5 × 0.2–0.6 cm, glabrous or sometimes sparsely strigose, base attenuate, margin scabrous-ciliate, apex rounded to acute. Capitula solitary at ends of branches, 25–30 mm in diam., peduncle apex dilated; bracts leaflike, surrounding capitulum. Involucres patelliform, 1.2–1.5 cm in diam.; phyllaries 2-seriate, lanceolate, 7–8 × 1–1.5 mm, sparsely scabrous or glabrous, margin scabrous-ciliate, apex acuminate. Ray florets bluish or whitish, tube ca. 1.5 mm, lamina linear-oblong, ca. 1.2 × 0.25 cm; disk florets yellow, 4–5 mm, tube 1.3–1.5 mm, limb funnelform, enlarged, sparsely hairy at base, lobes unequal, triangular, ca. 0.7 mm. Achenes yellowish brown, obovoid, compressed, 2.5–3 mm, strigose, 2- or 3-ribbed. Pappus 1-seriate, of ray florets sordid, basally connate scales ca. 1 mm, of disk florets brownish, numerous, rigid bristles 3–4.2 mm.

Sandy seashores; near sea level. Zhejiang (Putuo) [Japan].

28. Aster oldhamii Hemsley, J. Linn. Soc., Bot. 23: 414. 1888 [*"Oldhami"*].

台北狗娃花 tai bei gou wa hua

Heteropappus hispidus (Thunberg) Lessing subsp. *oldhamii* (Hemsley) Kitamura; *H. oldhamii* (Hemsley) Kitamura.

Herbs, biennial, 50–60 cm tall, taprooted. Stems erect, sometimes decumbent, branched from lower part; branches ascending, sparsely to moderately (upward) villous-strigose, strigillose, with sessile glands upward. Leaves thick, margin entire, strigose-ciliate; basal leaves rosulate, withered by anthesis; blade spatulate-oblong, 8–15 × 3–6 cm, glabrous or glabrate, base attenuate, apex rounded; cauline leaves spatulate-oblong or narrowly obovate to oblong, 2.5–4.5 × 0.8–1.7 cm, glabrate, base cuneate, margin entire, strigose-ciliate, apex rounded; uppermost leaves remote, oblanceolate, gradually reduced, 0.5–1.2 × 0.2–0.4 cm. Capitula radiate or sometimes discoid, terminal, solitary on branches, forming open paniculate-corymbiform synflorescences, ca. 25 mm in diam. Involucres hemispheric, 0.6–1 cm in diam.; phyllaries 2-seriate, subequal, lanceolate to spatulate or oblanceolate (inner), 5–6 mm, ± strigose, margin sometimes partly scarious, strigose-ciliate, apex acute to acuminate. Ray florets sometimes absent, whitish, ca. 10 × 1.3–3 mm, tube 1–1.7 mm, sparsely hairy; disk florets 3–4.5 mm, tube 0.8–1.5 mm, tube and limb hairy, limb narrowly campanulate to campanulate, lobes unequal, 1 longer, 0.4–0.6(–1.3) mm, minutely with sessile glands and/or strigose-hairy. Achenes obovoid to broadly obovoid, compressed, 1.8–2.5 mm, strigose. Pappus of ray florets whitish, lacerate scales 0.4–1(–1.5) mm, of disk florets reddish, stout bristles 1.8–2.5(–3.5) mm.

● Rocky seashores; sea level. N Taiwan (Taibei).

Some individuals of *Aster oldhamii* are without ray florets (capitula discoid) and have been called *Heteropappus oldhamii* f. *discoidus* Kitamura (Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 13: 321. 1937; 盘状台北狗娃花 pan zhuang tai bei gou wa hua).

29. Aster crenatifolius Handel-Mazzetti, Symb. Sin. 7: 1092. 1936.

圆齿狗娃花 yuan chi gou wa hua

Aster crenatifolius var. *subracemosus* Handel-Mazzetti; *Heteropappus crenatifolius* (Handel-Mazzetti) Grierson.

Herbs, annual or biennial, 10–60 cm tall, taprooted. Stems erect, solitary, branched only above, sparsely to densely strigose, stipitate glandular upward. Leaves strigose, with sessile glands; basal leaves rosulate, withered by anthesis; cauline leaves remote; lower cauline leaves shortly winged petiolate; blade oblanceolate, oblong, or spatulate, 2–10 × 0.5–1.6 cm, base attenuate to cuneate, margin entire or ± crenate, apex obtuse or rounded; middle leaves sessile, smaller, base sometimes ± rounded, margin often entire; upper leaves small, linear-oblanceolate or -oblong. Capitula solitary, terminal on branches, sometimes forming ± corymbiform synflorescences, 20–25 mm in diam. Involucres hemispheric, 1–1.5 cm in diam.; phyllaries 3-seriate, sometimes purplish tinged, subequal, linear or linear-lanceolate, 5–8 × 0.6–1.5 mm, abaxially sometimes scabrous or sparsely villous, ± stipitate glandular, margin scabrous-ciliate or glandular, outer phyllaries leaflike, inner phyllaries margin scarious. Ray florets 35–40, mauve or blue, tube 1.2–1.8 mm, glabrous or hairy, lamina 8–12 × 1.6–2.4 mm; disk florets yellow, 4.2–4.8 mm, tube 1–2 mm, glabrous or hairy, limb ± narrowly campanulate, lobes lanceolate, unequal, 0.5–1.5 mm, hairy. Achenes pale greenish brown to pale brownish mottled black or black mottled to black, obovoid, 2–2.8 mm, 2-ribbed marginally, sparsely strigose, sparsely apically glandular. Pappus of ray florets often few and short, sometimes absent or equaling that of disk, of disk 2-seriate, straw-colored or brownish, of unequal bristles 2.9–4.2 mm. Fl. and fr. May–Oct.

Open disturbed slopes, pebbly-sandy river floodplains, riverbanks, alpine or montane meadows, *Juniperus* slopes, montane woodlands, fields, roadsides; 1200–4100 m. Gansu, Hebei, Ningxia, Qinghai, Shaanxi, Sichuan, E Xizang, NW Yunnan [Nepal].

30. Aster gouldii C. E. C. Fischer, Bull. Misc. Inform. Kew 1938: 286. 1938.

拉萨狗娃花 la sa gou wa hua

Aster crenatifolius Handel-Mazzetti, p.p. quod syn.; *Heteropappus gouldii* (C. E. C. Fischer) Grierson.

Herbs, annual, 8–30 cm tall, spreading, taprooted. Stems branched from base; branches decumbent to ascending, ± densely strigose, stipitate glandular, especially above. Basal leaves withered by anthesis, winged petiolate, base of petiole clasping, blade oblanceolate, base gradually attenuate; cauline leaves sessile or indistinctly petiolate; blade linear, oblong, oblanceolate, or spatulate, 0.7–3.5 × 0.2–0.5 cm, strigose, stipitate glandular, base attenuate, margin entire, strigose-ciliate, apex obtuse or acute. Capitula solitary or few at ends of branches,

1.5–2.5 cm in diam. Involucres hemispheric, 1–1.5 cm in diam.; phyllaries 2- or 3-seriate, green, subequal, linear-lanceolate to lanceolate, 5–7 × 0.8–1.8 mm, herbaceous, abaxially stipitate glandular, sparsely villous-strigose, acuminate, margin glandular, of inner phyllaries scarious, erose. Ray florets 25–40, purplish or bluish, tube 1.5–2.1 mm, tube and lamina base sparsely hairy, lamina 10–11 × 1.2–2 mm; disk florets yellow, 3.5–4 mm, tube 1–1.2 mm, sparsely hairy, limb campanulate, lobes unequal, 4 short, 0.6–0.9 mm, 1 long, 1.1–1.3 mm, glabrous. Achenes of ray florets pale olive green and black mottled to black, obovoid, ± compressed, 2–2.5 × 1–1.2 mm, strigose, sparsely glandular apically, faintly 2- or 3-ribbed; of disk florets straw-colored, ± black mottled, obovate to oblanceolate, flattened, 2.2–2.3 mm, strigose, markedly 2-ribbed. Pappus of ray florets 1-seriate, scales 0.3–0.5 mm; of disk florets 2-seriate, reddish; outer bristles ca. 0.5 mm; inner bristles ± stiff, 3.3–3.7 mm. Fl. and fr. Jun–Sep.

Open grassy slopes, disturbed open or bare slopes in alpine meadows, sometimes sandy soils and riverbanks, field margins; 2900–5600 m. Qinghai, Xizang [Bhutan, India (Sikkim)].

6. **Aster** sect. **Aster**

紫菀组 zi wan zu

Gymnaster Kitamura (1937), not F. Schütt (1891) [Algae]; *Kitamuraea* Rauschert; *Kitamuraster* Soják; *Leptocoma* Lessing; *Miyamayomena* Kitamura; *Rhynchospermum* Reinwardt; *Zollingeria* Schultz Bipontinus.

Herbs, perennial, usually simple, sometimes branched, erect. Leaves basal (withered at anthesis) and cauline; blade spatulate or ovate to narrowly ovate or lanceolate, sometimes pandurate, margin flat, entire or serrate to coarsely serrate, 1-veined (rarely 3-veined). Capitula radiate, rarely discoid, terminal, numerous, in corymbiform synflorescences, rarely few, rarely solitary at ends of branches or in leaf axils. Involucres hemispheric, campanulate, or obconic, to cylindric-campanulate; phyllaries 3–7-seriate, unequal or sometimes subequal, membranous (upper part sometimes leaflike) or outer leaflike, not keeled, margin scarious. Receptacles flat or ± convex, rarely conic. Ray florets 1(or 2)-seriate, 10–40, purple, blue, lavender, pink, or white; disk floret limb campanulate or sometimes funnelform, lobes equal. Achenes obovoid or oblong to oblanceoloid, ± compressed, 2–6-ribbed. Pappus of ray and disk florets 1–4-seriate, of persistent, rarely caducous, numerous free bristles, innermost series clavate, outermost series of short bristles, rarely of scales, sometimes absent in ray and/or disk florets.

About 60 species: Asia, Europe; 49 species (40 endemic) in China.

As circumscribed here, *Aster* sect. *Aster* is paraphyletic to *A.* sect. *Alpigeni* (Brouillet et al. in Funk et al., Syst. Evol. Biogeogr. Compositae, 589–629. 2009). The separation of *A.* sect. *Aster* and *A.* sect. *Orthomeris* Torrey & A. Gray (Y. Ling & Y. L. Chen, FRPS 74: 134, 157. 1985) is unclear, and data supporting the segregation of monophyletic groups within the section are insufficient at the present time. Removal of the shrubby species of *A.* ser. *Albescentes* (Incertae sedis group above) renders the group more natural. Furthermore, the name *A.* sect. *Orthomeris* belongs to the North American *Oclemena* Greene (Brouillet, Fl. N. Amer. 20: 78–81. 2006) and would be inappropriate in *Aster* s.s.

A hitherto unrecognized group of species within *Aster* sect. *Aster* (formerly part of *A.* sect. *Orthomeris*, see Y. Ling & Y. L. Chen, loc. cit.) was identified in molecular phylogenies (Brouillet et al., loc. cit.), where it appeared to be sister to members of *A.* sect. *Alpigeni*. The group also includes *Miyamayomena* and *Rhynchospermum*. Morphologically, it is characterized by distally unreduced or slightly reduced cauline leaves that are abaxially pale and often appearing spongy on the surface; some species are glabrous, but most are hairy with minutely stipitate glands that are often (but not always) found in shallow pits and produce an abundance of resin, making the surface or parts of the surface vernicose. Some members of the group have a caducous pappus (*Rhynchospermum*) or have lost the pappus of ray and/or disk achenes (*Miyamayomena*). Further phylogenetic work is necessary to determine the monophyly and limits of this group.

1a. Leaf surfaces (both) glabrous (sometimes abaxial veins sparsely strigillose), eglandular; leaves thick, margin revolute.
2a. Capitula solitary in leaf axils or terminal, overall forming a paniculose-corymbiform synflorescence; pappus dirty white ..... 65. *A. hunanensis*
2b. Capitula in corymbiform synflorescences; pappus reddish or yellowish.
3a. Leaves abaxially with 3 or 4 pairs of lateral veins joining to form a raised submarginal vein on each side; achenes 4-ribbed; pappus reddish ..... 49. *A. dolichophyllus*
3b. Leaves with lateral veins 2- or 3-paired; achenes 2-ribbed; pappus yellowish ..... 50. *A. moupinensis*
1b. Leaf abaxial and/or adaxial surfaces hairy or glandular; leaves thick or thin, margin flat or revolute.
4a. Abaxial leaf surface minutely stipitate glandular in pits.
5a. Pappus absent in all achenes, or absent in ray and of scales in disk achenes.
6a. Disk pappus of short scales ..... 58. *A. piccolii*
6b. Disk pappus absent.
7a. Ray achenes long beaked ..... 64. *A. verticillatus*
7b. Ray achenes not beaked.
8a. Achenes inconspicuously ribbed; leaf margin entire.
9a. Stems and leaves hispidulous-villous; middle leaves oblong-lanceolate or subelliptic, 1.5–2.5(–4) × 0.3–0.6(–0.9) cm; ray florets ca. 16 mm ..... 60. *A. pseudosimplex*

9b. Stems hirsutulous, leaves strigose; middle leaves lanceolate-ovate to narrowly oblong or linear, 1–3 × 0.1–0.6 cm; ray florets 5–7 mm ..... 61. *A. lixianensis*
8b. Achenes 2–4- to multiribbed; leaf margin ± serrate or crenate.
10a. Leaf margin coarsely serrate to serrate ..... 59. *A. yuanqunensis*
10b. Leaf margin remotely serrate, serrulate, or obscurely repand-crenate.
11a. Middle leaf blades oblanceolate to narrowly lanceolate, margin remotely serrate to serrulate ..... 62. *A. sinoangustifolius*
11b. Middle leaf blades ovate, broadly elliptic, or obovate, margin obscurely repand-crenate ..... 63. *A. lushiensis*
5b. Pappus present in all achenes.
12a. Ray achenes long beaked ..... 64. *A. verticillatus*
12b. Ray achenes not beaked.
13a. Phyllary abaxially with midvein plus 3–7 dark green striae; peduncle bracts crowded below head, often grading into phyllaries ..... 73. *A. falcifolius*
13b. Phyllary without dark green striae; peduncle bracts not grading into phyllaries.
14a. Capitula terminal, solitary (rarely 2) on branches ..... 69. *A. molliusculus*
14b. Capitula few to many (rarely 1) in terminal corymbiform synflorescences.
15a. Involucres cylindric-campanulate.
16a. Ray florets purple ..... 55. *A. alatipes*
16b. Ray florets white.
17a. Phyllaries 3- or 4-seriate; leaf blade ovate, base cordate ..... 48. *A. formosanus*
17b. Phyllaries 5–7-seriate; leaf blade obovate to oblanceolate, base attenuate ..... 51. *A. taiwanensis*
15b. Involucres campanulate to hemispheric.
18a. Phyllaries 3- or 4-seriate, unequal.
19a. Ray florets purple ..... 36. *A. veitchianus*
19b. Ray florets white.
20a. Lower leaf margin coarsely 3- or 4-serrate distally, teeth pointing forward ..... 53. *A. taoyuenensis*
20b. Lower leaf margin crenate-serrate ..... 57. *A. morrisonensis*
18b. Phyllaries 2- or 3-seriate, subequal.
21a. Ray florets 10–14; capitula 1–10 ..... 54. *A. homochlamydeus*
21b. Ray florets 25–35(–60); capitula 10 to numerous.
22a. Ray florets 30–35(–60); achenes 4-ribbed ..... 70. *A. sikkimensis*
22b. Ray florets 25–30; achenes 2-ribbed ..... 72. *A. nigromontanus*
4b. Abaxial leaf surface eglandular or glandular (but not in pits).
23a. Subshrubs or woody perennial herbs.
24a. Phyllaries 3-seriate, unequal to subequal; leaf blades lanceolate, 4–7.5[–10] cm; ray florets 21–25 ..... 46. *A. smithianus*
24b. Phyllaries 4- or 5-seriate, unequal; leaf blades linear-oblong, oblong, or oblong-lanceolate to elliptic, 0.5–2.5(–3) cm; ray florets 10–20.
25a. Leaf and phyllary surfaces strigose, villous; involucres cylindric-campanulate; phyllaries ± leaflike ..... 42. *A. poliothamnus*
25b. Leaf and phyllary surfaces densely velutinous; involucres hemispheric; phyllaries membranous ..... 43. *A. sikuensis*
23b. Herbs perennial.
26a. Phyllaries 2- or 3-seriate, subequal, outer usually leaflike (if sometimes unequal then outer leaflike).
27a. Ray florets purple, mauve, pink, or blue; achenes obovoid.
28a. Involucres hemispheric; ray florets 50–60 ..... 44. *A. taliangshanensis*
28b. Involucres campanulate to broadly campanulate; ray florets 13–30.
29a. Leaf blade broadly ovate or oblong to lanceolate, base cordate or rounded, margin coarsely serrate to serrate; achenes 4-ribbed, pappus red-brown; disk corolla limb funnelform ..... 34. *A. fuscescens*
29b. Leaf blade oblanceolate, base attenuate to cuneate or rounded, margin entire or serrulate to serrate or coarsely serrate; achenes 2-ribbed, pappus dirty white or straw-colored; disk corolla limb campanulate.
30a. Ray florets mauve or pink; pappus dirty white; leaf surfaces scabridulous ..... 31. *A. indamellus*
30b. Ray florets blue; pappus straw-colored; leaf abaxially villosulous, adaxially strigillose ..... 39. *A. trichoneurus*
27b. Ray florets white; achenes oblong or oblanceoloid, rarely obovoid.
31a. Herbs scapiform; leaves basal, rosulate; capitula 1 or 2, terminal ..... 68. *A. itsunboshi*
31b. Herbs erect; leaves cauline; capitula 2 to numerous in terminal corymbiform synflorescences (rarely solitary).
32a. Middle leaf base auriculate, clasping; ray florets 18–30 ..... 35. *A. auriculatus*
32b. Middle leaf base cuneate, rounded, or attenuate; ray florets 10–20.
33a. Leaf base cuneate to rounded, apex obtuse or rounded, margin revolute, entire ..... 40. *A. mangshanensis*

33b. Leaf base attenuate, apex acute to acuminate, margin flat, ± serrate or entire.
34a. Leaf blade ovate to ovate-lanceolate, midvein prominent ..... 45. *A. procerus*
34b. Leaf blade oblong-lanceolate, triplinerved ..... 66. *A. menelii*
26b. Phyllaries 3–7-seriate, unequal, leaflike in upper part or not leaflike (notably if subequal).
35a. Leaf margin revolute, entire or ± serrate.
36a. Pappus white or dirty white (innermost reddish).
37a. Middle leaf blade oblanceolate to ovate, base cuneate-rounded to rounded; ray florets white; pappus dirty white (innermost reddish) ..... 52. *A. chingshuiensis*
37b. Middle leaf blade narrowly lanceolate to linear-lanceolate, base attenuate; ray florets blue-purple; pappus white ..... 67. *A. gracilicaulis*
36b. Pappus reddish brown or orangish.
38a. Middle leaf abaxial surface tomentose; phyllaries 3-seriate ..... 41. *A. vestitus*
38b. Middle leaf abaxial surface velutinous or moderately scabridulous, strigose; phyllaries 4–6-seriate.
39a. Middle leaves sessile or shortly petiolate, blade lanceolate, abaxially velutinous ..... 77. *A. velutinosus*
39b. Middle leaves winged petiolate, blade ovate to linear-obovate, abaxially moderately scabridulous, strigose, minutely stipitate glandular ..... 79. *A. sampsonii*
35b. Leaf margin flat, coarsely serrate or serrate to serrulate or entire.
40a. Ray florets white.
41a. Abaxial leaf surface moderately scabrous or moderately strigose, adaxial surface scabrous, margin serrate or serrulate; phyllaries 5–7-seriate.
42a. Middle leaf blade pandurate or ovate to ovate-lanceolate, base truncate or rounded to auriculate-clasping; capitula 1–10 in racemiform synflorescences; involucres 10–12 mm ..... 74. *A. turbinatus*
42b. Middle leaf blade narrowly ovate to lanceolate, base attenuate to rounded; capitula numerous in corymbiform to paniculiform synflorescences; involucres 6–7 mm ..... 75. *A. baccharoides*
41b. Abaxial leaf surface ± hispidulous, adaxial surface sparsely puberulent or hispidulous, margin entire to subentire or sparsely serrate; phyllaries 4- or 5-seriate.
43a. Middle leaf blade oblong or oblong-elliptic, base attenuate ..... 76. *A. sinianus*
43b. Middle leaf blade ovate, base rounded ..... 78. *A. ovalifolius*
40b. Ray florets purple.
44a. Middle leaf blade cordate, reniform, or subrounded, cordate-ovate ..... 56. *A. limosus*
44b. Middle leaf blade pandurate or ovate to ovate-lanceolate, lanceolate, or linear-lanceolate.
45a. Middle and upper leaves petiolate; disk corolla limb funnelform, lobes lanceolate; achenes lanceoloid ..... 71. *A. pycnophyllus*
45b. Middle and upper leaves winged petiolate or sessile; disk corolla limb campanulate, lobes narrowly triangular; achenes obovoid.
46a. Phyllaries 5- or 6-seriate; involucres 10–12 mm ..... 74. *A. turbinatus*
46b. Phyllaries 3- or 4-seriate; involucres 4–10(–12) mm.
47a. Involucres 7–10(–12) mm.
48a. Middle leaf blade ovate or pandurate to lanceolate-pandurate, base attenuate or auriculate, clasping ..... 37. *A. sphaerotus*
48b. Middle leaf blade oblanceolate to ovate or lanceolate, base attenuate.
49a. Leaf midvein prominent; phyllary apex acute or acuminate; ray florets 14–30; achenes 4–6-ribbed ..... 32. *A. tataricus*
49b. Leaf 3-veined; phyllary apex obtuse to rounded; ray florets 30–40; achenes 2-ribbed ..... 33. *A. maackii*
47b. Involucres 4–6 mm.
50a. Middle leaves sessile, blade lanceolate to linear-lanceolate, apex acuminate; pappus white ..... 47. *A. dolichopodus*
50b. Middle leaves winged petiolate or sessile, blade ovate or pandurate to lanceolate-pandurate or elliptic to oblanceolate, apex obtuse or acute; pappus reddish.
51a. Middle leaf blade ovate or pandurate to lanceolate-pandurate ..... 38. *A. panduratus*
51b. Middle leaf blade ovate to elliptic or oblanceolate ..... 41. *A. vestitus*

31. Aster indamellus Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 87. 1964.

叶苞紫菀 ye bao zi wan

Aster pseudamellus J. D. Hooker, Fl. Brit. India 3: 249. 1881, not Wenderoth (1831).

Herbs, perennial, 11–50 cm tall, from woody caudices, rhizomatous. Stems erect or ascending, simple, reddish strigillose, minutely stipitate glandular. Leaves cauline, gradually increased in size upward; lowest leaves withered by anthesis, sessile, oblanceolate, scabridulous, minutely stipitate glandular, (sometimes glabrous), margin entire or 1–7-serrulate to coarsely ser-

rate, scabridulous-ciliate, midvein slightly prominent adaxially, apex acute, mucronulate; middle to upper leaves oblanceolate, 1.6–4(–6) × 0.4–1.7(–2) cm, base attenuate to cuneate; synflorescence leaves oblanceolate, 1.4–1.6 × 0.2–0.4 cm. Capitula 1–20 in terminal, corymbiform to paniculate-corymbiform synflorescences, rarely solitary; peduncles 30–70 mm, strigillose; bracts oblanceolate, entire, upper bracts closely subtending capitula. Involucres campanulate, 5–7 mm; phyllaries 2- or 3-seriate, subequal, base hardened, margin erose, ciliate, green in distal 1/3, conspicuous midvein slightly translucent; outer phyllaries narrowly to broadly lanceolate, 5–6 × 1.5–2.5 mm, midvein sparsely to moderately strigillose, proximally minutely stipitate glandular, both surfaces densely so upward, leaflike distally, margin narrowly scarious, apex sometimes spreading, acute, ciliate; middle phyllaries oblong, 5–6 × 1.3–1.8 mm, abaxially proximally sparsely and distally densely minutely stipitate glandular, leaflike in distal 1/4 to only tip, margin ± broadly scarious, apex obtuse, mucronate, distal margin and apex purplish; inner phyllaries linear-oblong, 6–7 × 0.8–1 mm, scarious, apex sometimes purplish. Ray florets 25–30, blue, mauve, or pink, tube sparsely strigillose, lamina 13–16 × 1–2 mm, eglandular; disk florets yellow, 4.5–5 mm, tube apex and limb base sparsely strigillose, sparsely minutely stipitate glandular, limb campanulate, 2.5–3 mm, lobes erect, tip spreading, triangular to narrowly triangular, 1.2–1.5 mm, sparsely strigillose, eglandular. Achenes obovoid, ± compressed, 3–3.5 mm, sparsely to moderately strigillose, sparsely minutely stipitate glandular apically, 2-ribbed. Pappus 3-seriate, dirty white, of slender, barbellate bristles; outer bristles 0.3–1.1 mm; inner bristles 3–3.5 mm, tapering; innermost bristles 4.5–5 mm, tapering. Fl. and fr. Jul–Sep.

Alpine and subalpine open forests on grassy slopes, rock crevices, screes; 1900–4200 m. W Xizang (Yangsi) [Afghanistan, NW India, Kashmir, Nepal, Pakistan].

Aster indamellus is closely related to *A. amellus* Linnaeus but differs in having outer phyllaries leaflike, distinctly veined, acute at apex, with broader tips, and by often being glandular. Native to the area from Europe to W Siberia, *A. amellus* is sometimes cultivated in China.

32. Aster tataricus Linnaeus f., Suppl. Pl. 373. 1782.

紫菀 zi wan

Aster nakaii H. Léveillé & Vaniot; *A. tataricus* var. *nakaii* (H. Léveillé & Vaniot) Kitamura; *A. trinervius* Roxburgh ex D. Don var. *longifolius* Franchet & Savatier.

Herbs, perennial, 11–150 cm tall; rhizomes becoming woody; stemless rosettes often present. Stems erect, simple, ribbed, glabrate proximally to sparsely strigillose distally, minutely stipitate glandular below leaves. Leaves cauline, much reduced upward, scabrous, abaxially sparsely minutely stipitate glandular, margin scabrous-ciliate, midvein prominent abaxially, apex acuminate to acute or rounded, mucronate; lowest leaves withered by anthesis, long, slightly winged petiolate (petiole to 30 cm), petiole base sheathing; blade oblanceolate to ovate, (2.1–)30–50 × (0.9–)6–12 cm, base attenuate, margin undulate, coarsely serrate, veins pinnately 6–10-paired; lower to upper leaves shortly petiolate (base sheathing) or sessile, oblanceolate to lanceolate, 2–18 × 0.6–5 cm, base attenuate, margin coarsely serrate to serrulate or entire; synflorescence leaves lanceolate, 1.3–7 × 0.2–1 cm. Capitula (2–)14–50 or more, in terminal corymbiform synflorescences; peduncles 25–65 mm, sparsely strigillose, moderately to densely minutely stipitate glandular; bracts linear-lanceolate, entire, sometimes grading into phyllaries. Involucres campanulate, 7–10(–12) mm; phyllaries 3-seriate, unequal, green along midvein, membranous, base ± hardened, margin erose, ciliate, midvein ± pronounced, slightly translucent; outer phyllaries narrowly lanceolate, 4–5 × 0.8–1 mm, sparsely strigillose, distally sparsely minutely stipitate glandular, sometimes ± leaflike, margin narrowly scarious, apex acute, ciliate, tip purplish; middle phyllaries oblong to lanceolate-oblong, 6–7 × ca. 1 mm, abaxially glabrous to sparsely strigillose distally or along midvein, eglandular or very sparsely glandular, margin scarious, apex acuminate, sometimes mucronate, distal margin and apex purplish; inner phyllaries linear-lanceolate to linear-oblong, 8–10 × 0.6–1 mm, glabrous, sparsely minutely stipitate glandular, margin scarious, apex acuminate, erose, purplish. Ray florets 14–30, blue or pale lavender or to purple, lamina 7–15 × 1.5–2.5 mm, glabrous, eglandular; disk florets yellow, 5–7 mm, limb campanulate, 3.5–4 mm, lobes erect, tip spreading, narrowly triangular, ca. 2 mm, glabrous, eglandular. Achenes dark, obovoid, slightly compressed, 2.5–3 mm, sparsely to moderately strigillose, sparsely minutely stipitate glandular apically, 4–6-ribbed. Pappus 4-seriate, reddish, of barbellate bristles; outermost bristles few, slender, 0.2–0.3 mm; outer bristles slender 1.5–2 mm; inner bristles 4.5–5 mm, tapering; innermost bristles 6–7 mm, slightly clavate. Fl. Jul–Sep, fr. Aug–Oct. $2n = 54$.

Shaded damp places, meadows, steppes, damp riverbanks; 400–3300 m. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan [Japan, Korea, Mongolia, Russia].

The roots of *Aster tataricus* are used medicinally to relieve coughs and reduce sputum.

33. Aster maackii Regel, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 4: 81. 1861.

圆苞紫菀 yuan bao zi wan

Aster horridifolius H. Léveillé & Vaniot; *A. kodzumanus* Makino.

Herbs, perennial, 40–90 cm tall, rhizomatous. Stems erect, simple, reddish striate, sparsely scabridulous upward, sparsely minutely stipitate glandular below leaves, more so distally. Leaves cauline, gradually increased in size upward; lowest leaves withered by anthesis, sessile, (blade shape not observed), sparsely to densely scabridulous, minutely stipitate glandular, very sparsely so adaxially, margin serrate to serrulate, scabridulous-ciliate, 3-veined, midvein prominent adaxially, apex acute or sometimes obtuse, mucronulate; lower to upper leaves lanceolate, 4–11 × 0.7–2 cm, base attenuate; synflorescence leaves lanceolate, 2–6 × 0.5–1.5 cm, margin serrulate to entire. Capitula (1 or)2–10 or more, in terminal corymbiform synflorescences, rarely solitary; peduncles 20–80 mm, moderately to densely scabridulous, minutely stipitate glandular; bracts nar-

rowly ovate, entire, upper bracts closely subtending capitula. Involucres broadly campanulate, 7–9 mm; phyllaries 3-seriate, unequal, base hardened, abaxially glabrous, eglandular or sparsely minutely stipitate glandular, margin scarious, erose, leaflike in distal 1/3, ciliate, midvein slightly translucent, apex obtuse to rounded, ciliate; outer phyllaries lanceolate to oblong, 2–4 × 0.9–1.1 mm, abaxially minutely stipitate glandular distally, midvein sparsely to moderately strigillose; middle phyllaries oblong, 6–7 × 1.2–1.3 mm, distal margin and apex purplish; inner phyllaries linear-oblong, 9.5–10 × 1–2 mm, scarious, apex purplish. Ray florets 30–40, purple, tube sparsely hairy, lamina 15–18 × ca. 1.5 mm, eglandular; disk florets yellow, ca. 7 mm, tube and limb base sparsely hairy, sparsely minutely stipitate glandular, limb campanulate, ca. 4 mm, lobes spreading, tip recurved, triangular to narrowly triangular, 1.2–1.5 mm, sparsely strigillose apically, eglandular. Achenes purple proximally to mottled purple distally, obovoid, compressed, 2.3–2.5 mm, moderately to densely strigillose, sparsely minutely stipitate glandular apically, 2-ribbed. Pappus 4-seriate, dirty white, of slender, barbellate bristles; outermost bristles 0–4, 0.2–0.6 mm; outer bristles absent or 1, ca. 2.8 mm; inner bristles 4.8–5.2 mm, tapering; innermost bristles 5.3–5.7 mm, tapering. Fl. and fr. Jul–Oct. $2n = 18$.

Damp forests, damp grasslands, mountain meadows; 400–1000 m. Heilongjiang, Jilin, Liaoning, Nei Mongol, S Ningxia [Japan, Korea, E Russia].

34. Aster fuscescens Bureau & Franchet, J. Bot. (Morot) 5: 49. 1891.

褐毛紫菀 he mao zi wan

Herbs, perennial, 15–120 cm tall; rhizomes long; adjacent rosettes often present. Stems erect to ascending, simple, striate, sometimes reddish, villosulous, minutely stipitate glandular, more densely so distally. Leaves cauline, usually gradually decreasing upward, abaxially pale green or silvery green, adaxially dark green, abaxially strigillose, adaxially glabrous or glabrate, or both surfaces strigillose, villosulous on veins, abaxially sparsely to densely minutely stipitate glandular, adaxially more abundantly so marginally, margin coarsely serrate to serrate (teeth mucronate), villosulous-ciliate, veins prominent abaxially or on both surfaces, apex mucronate; lowest leaves withered by anthesis or often present, long petiolate (petiole to 20 cm); blade broadly ovate or oblong to lanceolate, 4.5–12 × (2.5–)3.8–7(–10) cm, base cordate or rounded (or attenuate), apex rounded to obtuse; lower to upper leaves long to shortly petiolate; blade broadly to narrowly ovate or lanceolate, (3–)4–11 × (1.5–)3.2–11 cm, base rounded (or attenuate), apex obtuse to acute; synflorescence leaves shortly petiolate, narrowly ovate to lanceolate, 2.7–5.5 × 0.3–2.2 cm, base rounded (attenuate), margin serrulate to entire, apex acute. Capitula 7–36 in terminal corymbiform synflorescences, ca. 3 cm in diam.; peduncles 10–80 mm, glabrate to sparsely villosulous or strigillose, densely minutely stipitate glandular; bracts linear-lanceolate, entire. Involucres broadly campanulate, 5–11 × 10–15 mm; phyllaries 3-seriate, subequal, linear-lanceolate, 7–11 × 1.3–2.5 mm, abaxially sparsely villosulous along midvein to glabrous, moderately to densely minutely stipitate glandular or eglandular, base sometimes hardened, margin scarious (outer phyllaries narrowly scarious), erose, purplish, villosulous-ciliate, green, midvein slightly translucent, apex acuminate, tip purplish, ciliate. Ray florets 13–21(–25), lamina purple to bluish, 7.5–13 × 2.2–3 mm, glabrous, eglandular; disk florets yellow, 7.2–7.5 mm, tube green, sparsely strigillose, eglandular, limb funnelform, 7.2–7.5 mm, lobes spreading, sometimes tip recurved, narrowly triangular, 1.5–1.7 mm, purple tinged, glabrous or sparsely strigillose apically, sparsely glandular apically. Achenes obovoid, compressed, ca. 3.5 mm, sparsely strigillose, proximally sparsely to apically moderately to densely minutely stipitate glandular, 4-ribbed. Pappus 4-seriate, of red-brown, slender, barbellate bristles; outermost bristles 0–2, ca. 0.5 mm; outer bristles many, 1.2–4 mm; inner bristles 4–5.5 mm, tapering; innermost bristles 6–9, 7–8 mm, slightly clavate. Fl. Jul–Oct, fr. Aug–Dec.

Alpine and subalpine meadows and grassy slopes among shrubs, bamboo-*Rhododendron* thickets, bamboo thickets in disturbed deciduous forests, meadows in broad-leaved evergreen forests, rocky slopes; 2700–4200 m. Sichuan, Xizang, Yunnan [NE Myanmar].

Aster fuscescens is clearly divided into three varieties.

1a. Lower cauline leaves oblong to lanceolate, ± densely villous, glandular ..... 34c. var. *oblongifolius*
1b. Lower cauline leaves broadly ovate, base cordate, glabrate or sparsely to moderately villous and glandular.
2a. Leaves thin and soft, reticulate veins hardly prominent ..... 34a. var. *fuscescens*
2b. Leaves rough, reticulate veins prominent on both surfaces ..... 34b. var. *scaberoides*

34a. Aster fuscescens var. **fuscescens**

褐毛紫菀(原变种) he mao zi wan (yuan bian zhong)

Aster doronicifolius H. Léveillé.

Stems to 60 cm tall, robust, base 4–6 mm in diam., pubescent, glandular. Lower cauline leaves broadly ovate; lowermost leaves (withered by anthesis): petiole to 12 cm; blade 7–12 × 6.5–10 cm; middle leaves: petiole to 12 cm, smaller; uppermost leaves sessile, ovate-lanceolate, sparsely villous or glabrate, sparsely glandular, thin and soft, reticulate veins hardly prominent. Phyllaries villous, short-stipitate glandular.

W Sichuan, SE Xizang, NW Yunnan [NE Myanmar].

34b. Aster fuscescens var. **scaberoides** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 46. 1935.

少毛褐毛紫菀 shao mao he mao zi wan

Stems to 45 cm tall, slender, base ca. 4 mm in diam., glabrescent below, brownish pubescent above, sometimes short-stipitate glandular. Lower cauline leaves: petiole to 15 cm; blade broadly ovate, 3–6.5 × 3–6 cm, base cordate; upper cauline leaves sessile, narrower, ovate or lanceolate, adaxially sparsely to moderately villous, sparsely to moderately glandular, reticulate veins prominent on both surfaces. Phyllaries glabrous.

• E Xizang, NW Yunnan.

34c. Aster fuscescens var. **oblongifolius** Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 93. 1964.

长圆叶褐毛紫菀 chang yuan ye he mao zi wan

Stems to 35 cm tall, slender, base to 4 mm in diam., villous, glandular. Lower cauline leaves oblong to lanceolate, 5–8.5 × 2.5–3.5 cm, margin repand-dentate, teeth mucronate; upper leaves few, sessile, lanceolate, 3–7 × 1.5–3 cm, densely villous, short-stipitate glandular, reticulate veins hardly prominent on both surfaces. Phyllaries ± densely villous, densely stipitate glandular.

E Xizang (Qamdo) [N Myanmar].

35. Aster auriculatus Franchet, J. Bot. (Morot) 10: 376. 1896.

耳叶紫菀 er ye zi wan

Herbs, perennial, 23–90 cm tall, rarely caespitose; rhizomes ± woody. Stems erect, simple, ± striate, sparsely to densely villous, densely minutely stipitate glandular. Leaves cauline, somewhat reduced upward, base sometimes marcescent, both surfaces villosulous, sparsely to densely minutely stipitate glandular, margin serrate to serrulate, villosulous-ciliate, midvein prominent, more so abaxially, apex mucronulate; lowest leaves withered by anthesis, broadly winged petiolate, petiole base auriculate; blade oblanceolate, obovate, or oblong, base attenuate, apex obtuse; lower to upper leaves sessile, obovate or oblong to oblanceolate, sometimes pandurate, 1.5–7 × 0.4–1.5 cm, base auriculate, clasping, apex obtuse to acute (upper leaves); synflorescence leaves narrowly ovate to lanceolate, 1–4.5 × 0.1–0.9 cm, margin serrulate to entire. Capitula 2–23, in terminal corymbiform synflorescences, rarely solitary; peduncles 10–30 mm, sparsely hispidulous to villosulous, densely minutely stipitate glandular; bracts linear, entire. Involucres campanulate, 6–7 mm; phyllaries 3-seriate, unequal (to nearly subequal), abaxially glabrous or strigose, sparsely to densely minutely stipitate glandular (middle and inner phyllaries base eglandular), base hardened, midvein slightly translucent; outer phyllaries lanceolate to linear-lanceolate, 2.5–6 × 0.5–0.8 mm, leaflike, margin barely to ± scarious, eciliate or sparsely ciliate, glandular, apex sometimes spreading or squarrose, acute, ciliate; middle phyllaries narrowly oblong to narrowly lanceolate, 5–6 × 0.7–1.5 mm, margin narrowly scarious, tip green, sometimes leaflike, apex acute to acuminate, distal margin and apex ± purplish; inner phyllaries distally green, linear-oblong, 6–7 × 0.7–1.3 mm, margin broadly scarious, erose, apex sometimes acuminate, erose, sometimes purplish. Ray florets 18–30, white, tube sparsely strigillose, lamina 6–9 × 1–2.5 mm, eglandular; disk florets yellow, 4.5–5 mm, limb campanulate, 3–3.5 mm, proximally glabrous and sparsely minutely stipitate glandular, lobes erect, tip sometimes spreading, narrowly triangular, 1–1.3 mm, glabrous, tip sparsely minutely stipitate glandular. Achenes lanceolate, compressed, 3–4 mm, sparsely strigillose, sparsely to moderately minutely stipitate glandular apically, 2-ribbed. Pappus 4-seriate, reddish, of slender barbellate bristles; outermost bristles absent or 1, 0.2–0.3 mm; outer bristles 0–3, 1.2–2.5 mm; inner bristles 3.7–4 mm, tapering; innermost bristles 4–4.3 mm, barely clavate. Fl. and fr. Apr–Aug.

• Open forests, mixed forests, thickets, grasslands; 800–3000 m. Gansu, Guangxi, Guizhou, Hubei, Sichuan, Xizang (Zayü), Yunnan.

Aster auriculatus, especially the roots, is used medicinally to reduce phlegm and treat snakebites.

36. Aster veitchianus Hutchinson & J. R. Drummond ex Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 214. 1935.

峨眉紫菀 e mei zi wan

Herbs, perennial, 6–40 cm tall; rhizomes long, thin. Stems erect, simple, slender, striate, sparsely villous (crosswalls brown), sparsely minutely stipitate glandular distally. Leaves cauline, abruptly reduced upward, abaxially pale green, adaxially green, abaxially sparsely pilose on midvein and distally, sparsely minutely stipitate glandular in shallow pits, adaxially moderately pilose, very sparsely minutely stipitate glandular, margin serrate to serrulate (teeth mucronulate), pilose-ciliate, midvein slightly prominent abaxially, apex mucronate; lowest leaves present and dominant at anthesis, long petiolate (petiole to 7 cm); blade spatulate or obovate to oblanceolate, 1.5–9 × 0.8–3.8 cm, base attenuate, apex rounded to obtuse; lower to middle leaves sessile, pandurate, 4–8.5 × 0.9–1.7 cm, base auriculate, clasping, margin entire; upper leaves sessile, lanceolate to linear-lanceolate, 2.5–4 × 0.3–1 cm, base auriculate, clasping; synflorescence leaves few, linear-lanceolate, 0.8–2 × 0.1–0.5 cm, base ± auriculate, margin entire. Capitula 1–10 in terminal corymbiform synflorescences, sometimes solitary; peduncles 3.5–10 cm, pilose, strigillose, sparsely to moderately minutely stipitate glandular; bracts linear, entire, upper bracts closely subtending capitula and grading into phyllaries. Involucres hemispheric, 6–8 mm; phyllaries 3-seriate, unequal, green apically, glabrous, base ± hardened, margin broadly scarious, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex acuminate, sometimes erose, purplish, eciliate; outer phyllaries lanceolate, 3–4 × 0.6–1 mm, (outermost tip recurved, ciliate, minutely stipitate glandular); middle and inner phyllaries membranous, often multiveined; middle phyllaries oblanceolate, 5.5–6.5 × 1.2–1.3 mm; inner phyllaries lanceolate, 6.5–7 × ca. 1 mm. Ray florets 35–54, purple, tube hairy, lamina 9–10 × 1–1.5 mm, eglandular; disk florets yellow, 4.5–5.5 mm, tube base flared, tube apex and limb base strigillose, eglandular, limb campanulate, 2.8–3 mm, lobes spreading, narrowly triangular, 2.1–2.3 mm, glabrous, eglandular. Achenes oblong, slightly compressed, 2–2.5(–3) mm (immature), sparsely strigillose, minutely stipitate glandular, 2-ribbed. Pappus 3-seriate, ± reddish, of barbellate bristles; outermost series of white scales, 0.4–0.6 mm; inner bristles 4–4.6 mm, tapering; innermost bristles 5–5.2 mm, weakly clavate. Fl. May–Jun, fr. Jun–Aug.

• Shaded damp places, ravines, canal sides on slopes; 800–2400 m. C and W Sichuan.

37. Aster sphaerotus Y. Ling, Fl. Reipubl. Popularis Sin. 74: 145. 1985.

圆耳紫菀 yuan er zi wan

Erigeron panduratus C. C. Chang, Sunyatsenia 6: 17. 1941, not *Aster panduratus* Nees ex Walpers (1843).

Herbs, perennial, 30–40 cm tall, rhizomatous; stolons long, slender. Stems erect, simple, purplish striate, ± densely villous, very sparsely minutely stipitate glandular, more densely long-stipitate glandular under leaves. Leaves cauline, gradually reduced upward, petiole base and midvein marcescent, abaxially purplish, sparsely villous, veins sparsely minutely stipitate glandular (long stipitate at base and on petiole), adaxially villous to pilose, minutely stipitate glandular apically, margin serrate, ciliate, midvein prominent abaxially, apex obtuse to acute, mucronate; lowest leaves withered by anthesis, lower to upper leaves narrowly to broadly winged petiolate (petiole to 1.3 cm, petiole base auriculate-clasping, proximal margin villous) or sessile, ovate or pandurate to lanceolate-pandurate, 2.5–3.5 × 0.7–2 cm, base attenuate or auriculate, clasping; synflorescence leaves shortly petiolate, ovate to lanceolate, 1–2.3 × 0.4–1 cm. Capitula 3–5 in terminal, corymbiform synflorescences; peduncles 10–42 mm, villosulous, densely minutely long-stipitate glandular; bracts ovate to lanceolate, entire. Involucres hemispheric, 7–8(–10) mm; phyllaries 4-seriate, unequal, abaxially glabrous, densely minutely stipitate glandular, base usually hardened, midvein prominent, translucent; outer phyllaries bractlike, linear-lanceolate, 5–5.5 × 1–1.2 mm, distal 1/2 leaflike, margin not or ± narrowly scarious, ciliate, densely minutely stipitate glandular, apex spreading, sometimes squarrose, acute, sometimes mucronulate, purplish, middle and inner phyllaries with margin erose, ciliate, apex long acuminate, tip leaflike, purplish; middle phyllaries oblong, 6–8 × 1.3–1.5 mm, margin broadly scarious, ciliate; inner phyllaries linear-lanceolate, 8–8.5 × 1–1.2 mm, scarious. Ray florets 35–40, purplish to pink, tube sparsely hairy, lamina 7–9 × 1–1.2 mm, eglandular; disk florets yellow, ca. 4 mm, tube and limb base sparsely hairy, eglandular, limb campanulate, 2.2–2.5 mm, lobes erect to spreading, narrowly triangular, ca. 1 mm, glabrous, eglandular. Achenes (immature; shape unknown) ca. 2.7 mm or more, sparsely strigillose, minutely stipitate glandular, 2-ribbed. Pappus 3-seriate, reddish, of slender barbellate bristles; outermost bristles few, 1.3–1.6 mm; inner bristles 3.3–3.7 mm, tapering; innermost bristles 3.5–4 mm, long clavate. Fl. Jul–Aug, fr. Aug(to later).

• Mountain forests; ca. 2700 m. W Guangxi.

38. Aster panduratus Nees ex Walpers, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 258. 1843.

琴叶紫菀 qin ye zi wan

Aster argyi H. Léveillé; *A. candelabrum* Vaniot.

Herbs, perennial, 14–100 cm tall, sometimes caespitose, rhizomatous, sometimes with next year's rosette. Stems erect, simple or branched upward, purplish striate, ± densely villous, ± densely minutely long-stipitate glandular. Leaves cauline, gradually reduced upward, abaxially villous to shortly villous (upper leaves), adaxially villous to strigose (upper leaves), veins villous, densely minutely long-stipitate glandular, margin coarsely serrate to serrulate or entire (upper leaves), villous- to strigose-ciliate, midvein prominent abaxially, sometimes somewhat 3-veined, apex obtuse to acute, mucronulate; lowest leaves withered by anthesis, (long) winged petiolate, ovate, base attenuate; lower to upper leaves sessile, ovate or pandurate to lanceolate-pandurate, 1.5–7(–9) × 0.4–1.8(–2.5) cm, base auriculate, clasping; synflorescence leaves oblong-ovate, 1–2.5 × 0.2–0.8 cm. Capitula 3–40, in terminal, laxly corymbiform synflorescences, rarely solitary; peduncles 5–50 mm, villosulous, densely minutely long-stipitate glandular; bracts lanceolate, entire, upper bracts grading into phyllaries. Involucres hemispheric to campanulate, ca. 5 mm; phyllaries 3-seriate, unequal, midvein thin; outer phyllaries linear-lanceolate, 3–3.5 × 0.5–0.7 mm, abaxially glabrous, densely minutely long-stipitate glandular, leaflike, margin not to ± narrowly scarious, ciliate, apex sometimes spreading, acute, sometimes mucronate, sometimes purplish, ciliate, middle and inner phyllaries green distally, base hardened, margin erose, ciliate; middle phyllaries oblanceolate, 3.8–4 × 1–1.3 mm, abaxially densely minutely long-stipitate glandular, margin broadly scarious, ciliate, apex acuminate; inner phyllaries linear-oblong, 4–4.5 × 0.8–1.1 mm, distally densely minutely long-stipitate glandular, scarious. Ray florets 15–25, purple to blue, or white tinged purplish, tube sparsely strigillose, lamina 5–7 × 1.5–2 mm, eglandular; disk florets yellow, 4.5–5 mm, tube and limb base sparsely strigillose, minutely stipitate glandular, limb campanulate, 2.5–3 mm, lobes erect to spreading, narrowly triangular, 1.5–1.7 mm, glabrous, sparsely minutely stipitate glandular. Achenes obovoid, slightly compressed, ca. 1.5 mm, sparsely strigillose, minutely stipitate glandular, 2-ribbed. Pappus 3- or 4-seriate, of few, reddish, slender barbellate bristles; outermost bristles few, ca. 0.5 mm; outer bristles absent or 1, ca. 2 mm; inner bristles 2.5–3 mm, tapering; innermost bristles 4–5 mm, weakly clavate. Fl. Feb–Sep, fr. Jun–Oct.

• Thickets, grasslands on slopes, canal sides, roadsides, field margins; 100–1400 m. Fujian, Guangdong, Guangxi, Guizhou, W Hubei, Hunan, Jiangsu, Jiangxi, W Sichuan, Zhejiang.

39. Aster trichoneurus Y. Ling, Fl. Reipubl. Popularis Sin. 74: 355. 1985.

毛脉紫菀 mao mai zi wan

Herbs, perennial, 30–50 cm tall; rhizomes thick. Stems erect, simple, densely villous, more sparsely so upward, densely minutely stipitate glandular. Leaves cauline, somewhat reduced upward, base sometimes marcescent, abaxially villosulous, adaxially strigillose, both surfaces minutely stipitate glandular, thin, margin serrulate to serrate, villosulous-ciliate, 3-veined, lower secondary veins prominent, apex obtuse to acute, mucronulate; lowest leaves withered by anthesis, long winged petiolate, petiole base auriculate; blade oblanceolate, base attenuate; lower to upper leaves shortly winged petiolate (base clasping) to sessile, oblanceolate to oblong, 3–8 × 0.7–1.8 cm, base rounded; synflorescence leaves lanceolate, 2–3.5 × 0.5–0.9 cm, base cuneate-rounded, margin entire. Capitula 3 or 4 or more (simple specimen) in terminal corymbiform synflorescences, rarely solitary, ca. 3 cm in diam.; peduncles 25–90 mm, strigillose to villosulous, densely minutely stipitate glandular; bracts lanceolate to linear-lanceolate, entire. Involucres broadly campanulate, 5–6(–7) × ca. 10 mm; phyllaries 3-seriate, nearly subequal, abaxially strigillose to villosulous, sparsely to densely minutely stipitate glandular, base hardened, midvein slightly

translucent, distal margin and apex ± purplish; outer phyllaries linear-oblong, 4–4.6 × 0.6–0.7 mm, distal 1/2 leaflike, margin barely to ± scarious, ciliate, glandular, apex sometimes spreading or squarrose, acute, mucronulate, ciliate; middle phyllaries linear-oblong to linear-lanceolate, 5–6 × 1–1.2 mm, margin narrowly scarious, tip green or sometimes leaflike, apex acute to acuminate; inner phyllaries linear-lanceolate, 5–5.5 × ca. 1 mm, margin broadly scarious, erose, tip green, apex erose. Ray florets 23–27, blue, tube sparsely strigillose, lamina 7–9 × 1.6–2 mm, eglandular; disk florets yellow, ca. 4.5 mm, limb campanulate, ca. 3 mm, proximally sparsely strigillose and minutely stipitate glandular, lobes erect, tip sometimes spreading, narrowly triangular, ca. 1 mm, tip sparsely strigillose and minutely stipitate glandular. Achenes narrowly obovoid, ± compressed, 2.5–2.8 mm, densely strigillose, sparsely strigillose on ribs, minutely stipitate glandular apically, 2-ribbed. Pappus 3- or 4-seriate, straw-colored, of slender barbellate bristles; outermost bristles few, 0.2–0.5 mm; outer bristles absent or 1, ca. 2 mm; inner bristles 3.5–3.7 mm, tapering; innermost bristles 4.2–4.3 mm, barely clavate. Fl. and fr. Sep.

● Ravines, mountain canals; ca. 2700 m. NW Yunnan (Dêqên).

Aster trichoneurus is similar to *A. auriculatus* but differs in its broader and larger, 3-veined leaves without clasping auricles, and narrow, sparsely hairy phyllaries.

40. Aster mangshanensis Y. Ling, Fl. Reipubl. Popularis Sin. 74: 355. 1985.

莽山紫菀 mang shan zi wan

Herbs, perennial, 17–30 cm tall; rhizomes ± robust. Stems erect, ± densely yellowish strigose, more so upward, stipitate glandular on peduncles. Leaves moderately to densely strigose, ± with dense sessile glands, adaxially densely strigose, abaxially midvein slightly prominent, lateral veins 3- or 4-paired, obscure; lower leaves withered by anthesis; middle leaves sessile or shortly petiolate (petiole less than ca. 2 mm); blade oblong to obovate-oblong, 2.2–2.5 × 0.3–1.1 cm, base cuneate to rounded, margin entire, revolute, scabrous-ciliate, apex obtuse to rounded; upper leaves gradually reduced, 0.8–1 × 0.4–0.6 cm. Capitula in paniculate-corymbiform synflorescence, ca. 1.5 cm in diam.; peduncles 1–3 cm; bracts oblanceolate. Involucres hemispheric (broadly obconic), 4–5 × ca. 7 mm; phyllaries 3-seriate, subequal, obovate-oblong, abaxially strigose, with sessile glands, margin strigose- to ± villous-ciliate; outer phyllaries reflexed, ca. 4 × 1–1.5 mm, leaflike or distally leaflike, apex obtuse to acute; inner phyllaries 4–4.5 × ca. 1 mm, acute, margin scarious, erose, ciliate. Ray florets 14–16, white, tube 1–1.3 mm, lamina 6–7 × 1.5–1.8 mm; disk florets 4–4.2 mm, tube 1.1–1.5 mm, upper tube and limb base hairy, limb campanulate, lobes lanceolate, ca. 0.7 mm, recurved, glandular. Achenes greenish, oblanceolate, slightly compressed, slightly trigonous, 1.9–2.3 mm, sparsely strigillose, with sparse sessile glands, pale 3-ribbed. Pappus 3-seriate, orangish; outer bristles ca. 0.4 mm; inner bristles ca. 5.6 mm; innermost bristles ca. 7.2 mm, barely clavate.

● S Hunan (Yizhang: Mang Shan).

41. Aster vestitus Franchet, J. Bot. (Morot) 10: 378. 1896.

密毛紫菀 mi mao zi wan

Aster mairei H. Léveillé; *A. sherriffianus* Handel-Mazzetti.

Herbs, perennial, 50–130 cm tall, rarely caespitose, rhizomatous. Stems erect-ascending, simple, reddish striate, villosulous, minutely long-stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially gray-green, adaxially green, abaxially tomentose, sometimes sparsely villous, densely minutely stipitate glandular, adaxially strigose, sparsely minutely stipitate glandular, margin serrate to serrulate, strigose-ciliate, midvein prominent abaxially, apex acute, mucronulate; lowest leaves withered by anthesis (unobserved); lower to upper leaves broadly and shortly petiolate (lower leaves) to sessile, ovate to elliptic or oblanceolate, 1.8–6 × 0.5–1.7 cm, base rounded or slightly auriculate to cuneate-rounded, sometimes subclasping; synflorescence leaf blade ovate to lanceolate, 1.3–2.5 × 0.4–0.7 cm, entire. Capitula 6–35 or more, in terminal corymbiform synflorescences; peduncles 10–35 mm, sparsely villosulous, densely minutely stipitate glandular (glands sometimes long stipitate); bracts absent or 1, oblanceolate, entire. Involucres broadly campanulate to hemispheric, 4–6 mm; phyllaries 3-seriate, unequal, distally green, distal margin and apex tip purple, abaxially glabrous, densely minutely stipitate glandular, base hardened, densely minutely stipitate glandular, midvein prominent, translucent; outer phyllaries linear-lanceolate, 3–4 × ca. 0.8 mm, margin narrowly scarious, eciliate, apex acute, mucronulate, proximally strigillose, sparsely long-stipitate glandular; middle and inner phyllaries oblong to lanceolate-oblong, 4.5–5.5 × 1.2–1.8 mm, margin broadly scarious, erose, eciliate, apex acuminate, erose. Ray florets 18–30, white or pale purple, lamina 5–9 × 1.5–2 mm, glabrous, eglandular; disk florets yellow, ca. 4.5 mm, limb campanulate, ca. 2.5 mm, base sparsely strigillose, sometimes sparsely minutely stipitate glandular, lobes erect to spreading, narrowly triangular, ca. 1.2 mm, glabrous, sparsely minutely stipitate glandular. Achenes obovoid, compressed, 2.5–3 mm, strigillose, sparsely minutely stipitate glandular, 2-ribbed. Pappus 3-seriate, reddish, of barbellate bristles; outermost bristles few, slender, 0.3–0.6 mm; inner bristles 3–3.5 mm, tapering; innermost bristles 4.2–4.7 mm, slightly clavate. Fl. and fr. Sep–Dec.

Alpine and subalpine forest margins, grasses, slopes, riverbanks, sandy places; 2200–3200 m. SW Sichuan, S Xizang, N and NW Yunnan [Bhutan, India (Sikkim), N Myanmar].

42. Aster poliothamnus Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 503. 1922.

灰枝紫菀 hui zhi zi wan

Subshrubs, 15–100 cm tall, sometimes shrublike, caespitose, caudex woody. Stems branched, bark gray-brown, lacerate; branches erect, densely leafy, sparsely to densely villosulous, often in decurrent lines below leaves, minutely stipitate glandular. Leaves cauline, slightly reduced upward; lower leaves withered by anthesis, shortly petiolate; blade oblong or linear-oblong, sometimes conduplicate and arched, 0.5–2(–3) × 0.1–0.5(–0.8) cm, abaxially densely strigillose, minutely gland-dotted, sometimes stipitate glandular on veins, adaxially strigose, base decurrent, attenuate to cuneate, margin entire, strigose-ciliate, midvein abaxially prominent, apex obtuse to acute,

mucronate. Capitula in corymbiform, sometimes paniculate-corymbiform, synflorescences, or solitary; peduncles 10–30 mm, strigillose, minutely short- to long-stipitate glandular; bracts remote, lanceolate to oblanceolate, 5–10 mm. Involucres cylindric-campanulate, 5–8 mm; phyllaries 4–6-seriate, unequal, base hardened, ± keeled, midvein translucent distally, apex acute; outer phyllaries lanceolate, 3–4 × 0.1–0.7 mm, abaxially sparsely to moderately strigillose distally (leaflike part), densely minutely stipitate glandular, leaflike to distally leaflike, margin broadly scarious, narrowly so distally or not (when leaflike), ciliate; middle phyllaries lanceolate to linear-lanceolate, 5–7 × 0.5–0.7 mm, margin narrowly to broadly scarious, ciliate, purplish (except leaflike ones), distal 1/10–1/4 leaflike to green area purplish, sparsely strigillose or minutely stipitate glandular in leaflike part; inner phyllaries linear-lanceolate, 6–7 × ca. 1 mm, scarious, tip purplish, sparsely minutely stipitate glandular. Ray florets 10–20, lavender or lilac to purple, tube distal 1/2 and lamina base strigillose, sometimes sparsely stipitate glandular, lamina 7–10 × 1.2–2 mm; disk florets yellow, 5–6.5 mm, limb funnelform, ca. 4 mm, lobes spreading, narrowly triangular, 0.7–1.2 mm, tip glabrous, sparsely stipitate glandular. Achenes obovoid to elliptic, compressed, 3–3.5 mm, sparsely strigillose, minutely stipitate glandular, mostly on ribs, 2- or 3-ribbed. Pappus 4-seriate, straw-colored, of slender, barbellate bristles; outermost bristles few, very slender, 0.1–0.5 mm; outer bristles few, very slender, 2.5–3 mm; inner bristles 4.2–4.5 mm, tapering; innermost bristles 4.5–5 mm, tip flattened. Fl. Jun–Sep, fr. Aug–Oct.

• Dry slopes, rocky cliffs, stony places, *Artemisia-Stipa* formations, xerophytic shrublands, riverbanks, roadsides; 800–4200 m. S Gansu, E Qinghai, Shaanxi, W Sichuan, E Xizang.

43. Aster sikuensis W. W. Smith & Farrer, Notes Roy. Bot. Gard. Edinburgh 9: 80. 1916.

西固紫菀 xi gu zi wan

Subshrubs, 30–40 cm, caespitose. Stems numerous, erect or ascending, puberulent, branched above, densely leafy. Leaves cauline, thick, densely puberulent, abaxially gray-green, midvein and 3- or 4-pairs of lateral veins prominent, adaxially dark green; lower leaves withered by anthesis; middle leaves subsessile, oblong, elliptic, or oblong-lanceolate, 1.5–2.5 × 0.5–0.8 cm, base ± rounded or broadly cuneate, margin entire, revolute, apex obtuse or rounded; upper leaves gradually reduced, 0.4–0.6 × 0.2–0.3 cm. Capitula ca. 1.5 cm in diam., solitary or in corymbiform synflorescences; peduncles to 3 cm. Involucres hemispheric, 1.5–5 × 6–7 mm; phyllaries 4-seriate, unequal, abaxially puberulent, membranous, margin villous-ciliate; outer phyllaries ovate-lanceolate, 1.5–2 × ca. 0.8 mm, acute, sometimes somewhat purplish; inner phyllaries lanceolate, ca. 3 × 1 mm, acute; innermost phyllaries linear-lanceolate, 4.5–5 × ca. 0.8 mm, margin narrowly scarious, acuminate. Ray florets 10–16, white or reddish, tube 2–2.4 mm, hairy, lamina linear-oblong, 8–10 × 1.3–1.5 mm; disk florets 4.8–5.2 mm, tube 1.8–2.1 mm, tube and limb sparsely hairy, lobes lanceolate, ca. 1.2 mm, tip glandular. Achenes lanceolate, slightly compressed, ca. 2 mm, strigose, 4-ribbed. Pappus 3-seriate, yellowish to reddish; outer bristles ca. 0.2 mm; inner bristles ca. 3 mm, acute; innermost bristles 4–4.5 mm, clavate. Fr. Oct.

• Dry slopes or stony places, dry roadsides; 800–2300 m. S Gansu (Xigu), NW Sichuan.

44. Aster taliangshanensis Y. Ling, Fl. Reipubl. Popularis Sin. 74: 356. 1985.

凉山紫菀 liang shan zi wan

Herbs, perennial, 50–80 cm; rhizome vertical or procumbent. Stems erect or ascending, thick, multibranched, finely sulcate, strigose and strigillose. Leaves cauline, abaxially strigose, veins with sparse sessile glands and sparsely villous-strigose, midvein and 5 or 6 pairs of lateral veins prominent, conspicuously reticulate, adaxially densely strigose; lower leaves withered by anthesis; middle leaves sessile or shortly petiolate; blade ovate to broadly lanceolate, 6–11 × 1.5–2.5 cm, base gradually or abruptly attenuate, rarely subrounded, subclasping, margin serrate, teeth mucronulate, scabrous, apex acute to acuminate; upper leaves lanceolate, 3–5 × 0.5–1 cm, margin entire or serrulate. Capitula in terminal, open corymbiform synflorescences, 3–4 cm in diam.; peduncles 2–10 cm; bract linear-lanceolate when present. Involucres hemispheric, 10–12 mm in diam.; phyllaries 3-seriate, subequal, 5–6 × 1.5–1.8 mm, abaxially villous-strigillose, margin scarious (outer phyllaries narrowly so), erose-fimbriate, purplish; outer phyllaries oblong to oblanceolate, leaflike, base hardened, apex acute to acuminate, sometimes recurved, glandular; inner phyllaries membranous, apex herbaceous. Ray florets 50–60, blue-purple, tube 0.7–1 mm, glabrous, lamina 8–15 × 1.5–2 mm; disk florets yellow, 3–4 mm, glabrous, tube ca. 1.1 mm, limb campanulate, lobes 1–1.1 mm. Achenes brown, obovoid, compressed, 2–2.5 mm, sparsely strigillose to glabrate, pale 2–4-ribbed. Pappus 3-seriate, dirty white or reddish brown, of barbellate bristles; outermost bristles slender, 0.4–0.9 mm; inner bristles ca. 3.8 mm, acute; innermost bristles 4–4.1 mm, slightly clavate. Fl. Jun–Aug, fr. Aug–Sep.

• Low mountains and alpine forests, grasslands, dry stony shrubby slopes, roadsides; 2500–3100 m. SW and W Sichuan.

The involucre and the number of ray florets of *Aster taliangshanensis* are distinctive.

45. Aster procerus Hemsley, J. Linn. Soc., Bot. 23: 415. 1888.

高茎紫菀 gao jing zi wan

Asteromoea procera (Hemsley) Y. Ling; *Kalimeris procera* (Hemsley) S. Y. Hu.

Herbs, perennial, 70–100 cm tall. Stems erect, thick, strigose or ± glabrescent in lower part, stipitate glandular below capitula, spreading branched from middle. Leaves abaxially pale green, both surfaces scabrous, thin, midvein abaxially prominent; (lower leaves not seen); middle leaves shortly petiolate; blade ovate to ovate-lanceolate, 7–11 × 3–5.5 cm, base attenuate, margin serrate, apex acute to acuminate; upper leaves sessile, small, finely serrate or subentire. Capitula solitary at ends of branches or long peduncles, in open corymbiform synflorescences, 3–4 cm in diam.; peduncles 3–4 cm; bracts densely scabrous, glandular. Involucres hemispheric, 6–7 mm, 12–15 mm in diam.; phyllaries 2- or 3-seriate; outer phyllaries leaflike, subequal, shorter to slightly longer than inner phyllaries, ca. 5.1 × 1–1.5 mm, densely scabrous, margin sca-

brous, apex acuminate; most inner phyllaries membranous, narrower, sparsely scabrous or glabrate, margin narrowly scarious. Ray florets 10–20, white, tube 0.7–1 mm, hairy (not seen), lamina oblong-linear, ca. 15 × 2–2.5 mm; disk florets ca. 3.7 mm, tube 1.1–1.5 mm, hairy, limb campanulate, lobes lanceolate, 1–1.2 mm, recurved. Achenes brown, obovoid, slightly compressed, trigonous, 3.5–4 mm, strigose, 3-ribbed. Pappus 1-seriate, dirty white, of unequal, rigid bristles 1–1.5(–2) mm. Fl. May–Sep, fr. Aug–Oct.

• Forest margins, mountain slopes; below 400 m. S Anhui, W Hubei, N Zhejiang.

46. Aster smithianus Handel-Mazzetti, Acta Horti Gothob. 12: 216. 1938.

甘川紫菀 gan chuan zi wan

Aster smithianus var. *pilosior* Handel-Mazzetti; *Kalimeris smithiana* (Handel-Mazzetti) S. Y. Hu.

Subshrubs or herbs (woody), perennial, 60–150 cm tall, rhizomatous. Stems erect, simple or branched, shallowly striate, villosulous, minutely stipitate glandular, resinous. Leaves cauline, gradually reduced upward, abaxially silvery green, adaxially green, abaxially villosulous-strigillose, veins villosulous, sparsely to moderately minutely stipitate glandular, adaxially scabridulous, resinous, base attenuate, margin entire, sometimes shortly serrate, strigose-ciliate, midvein prominent on both surfaces, apex acute; lowest leaves withered by anthesis, shortly and narrowly winged petiolate (blade not observed); lower to upper leaves lanceolate, 4–7.5(–10) × 1–2.3 cm; synflorescence leaves lanceolate, sometimes falcate, 1.2–6 × 0.3–1.8 cm, mucronulate. Capitula 7 to numerous in terminal corymbiform synflorescences; peduncles 18–70 mm, sparsely to moderately strigillose-villosulous, sparsely to moderately stipitate glandular, resinous, more densely so below capitula; bracts oblanceolate, entire, grading into phyllaries. Involucres hemispheric, 2–3 mm; phyllaries 3-seriate, unequal to subequal, abaxially sparsely to densely villosulous, more densely villosulous distally, densely minutely stipitate glandular, resinous, base hardened, slightly keeled, membranous, margin narrowly scarious, erose, ciliate, green distally, midvein prominent, translucent, sometimes faintly multiveined, inner surface shiny, apex acute to obtuse, sometimes mucronulate; outer phyllaries lanceolate, 2–4 × 0.8–1.5 mm; middle phyllaries oblanceolate, 4–4.5 × 1–1.3 mm; inner phyllaries oblanceolate, 4–4.5 × ca. 1 mm, tip sometimes purplish. Ray florets 21–25, white or light purple, tube apex and lamina base sparsely hairy, sometimes sparsely minutely stipitate glandular, lamina 6–10 × 1.5–2 mm; disk florets yellow, ca. 3 mm, tube apex and limb base sparsely hairy, sparsely minutely stipitate glandular, limb campanulate, ca. 2 mm, lobes spreading, narrowly triangular, ca. 0.7 mm, glabrous, eglandular. Achenes dark purple, broadly obovoid, ± compressed to ± trigonous, ca. 2 mm, strigillose, sparsely minutely stipitate glandular, 2- or 3-ribbed. Pappus 1–3-seriate, of few dirty white, basally flattened barbellate bristles; outermost series (always present) of scales ca. 0.1 mm; inner series of bristles ca. 0.5 mm; innermost bristles 1–1.5 mm; those of ray florets reduced in number. Fl. Aug–Oct, fr. Sep–Oct.

• Low mountains, subalpine grasslands, stony riverbanks; 1300–3400 m. S Gansu, W Sichuan, NW Yunnan.

47. Aster dolichopodus Y. Ling, Fl. Reipubl. Popularis Sin. 74: 356. 1985.

长梗紫菀 chang geng zi wan

Herbs, perennial, 38–90 cm tall, sometimes caespitose; rhizomes long, thin. Stems erect, simple, sometimes branched upward, reddish striate, villous, sparsely minutely stipitate glandular. Leaves cauline, gradually reduced upward; blade abaxially pale green, adaxially green, abaxially sparsely strigose, eglandular, adaxially scabridulous, base rounded (lower leaves) or auriculate, clasping, margin remotely serrate to entire, strigose-ciliate, midvein prominent on both surfaces, apex acuminate, often falcate, mucronulate; lowest leaves withered by anthesis (unobserved); lower to upper leaves shortly petiolate (lower leaves) or sessile, lanceolate to linear-lanceolate, 3.5–13 × 0.3–1.8 cm; synflorescence leaves lanceolate to linear-lanceolate, 1.5–5 × 0.1–1 cm. Capitula 1–16 in terminal corymbiform synflorescences, sometimes solitary; peduncles 25–150 mm, sparsely villosulous, sparsely stipitate glandular, more densely so below capitula; bracts linear-lanceolate, entire, sometimes falcate, sometimes subtending involucre. Involucres broadly campanulate, 5–6 mm; phyllaries 3- or 4-seriate, unequal, green distally, abaxially glabrous, densely minutely stipitate glandular, base hardened, membranous, margin narrowly scarious, erose, ± purplish distally, glandular, midvein prominent, translucent, sometimes faintly multiveined, apex sometimes curved, acute, sometimes mucronulate, purplish; outer phyllaries oblong-lanceolate, 2.5–3 × 0.6–0.8 mm; middle phyllaries narrowly oblanceolate, 4–5 × 1–1.2 mm; inner phyllaries narrowly oblanceolate, 5–5.5 × 0.8–1.1 mm, scarious. Ray florets 19–26, light purple to purple, tube apex and lamina base sparsely hairy, sometimes sparsely minutely stipitate glandular, lamina 10–14 × 1.5–2 mm; disk florets yellow, sometimes becoming purplish, 4–4.5 mm, tube apex and limb base sparsely strigillose, sparsely minutely stipitate glandular, limb campanulate, 2.2–2.5 mm, lobes spreading, narrowly triangular, 1–1.2 mm, tip very sparsely strigillose, sparsely minutely stipitate glandular. Achenes dark purple, broadly obovoid, ± compressed to ± trigonous, 2.5–3 mm, sparsely strigillose, sparsely minutely stipitate glandular distally or eglandular, 2- or 3-ribbed. Pappus 4-seriate, dirty white, of few barbellate bristles; outermost series of narrow scales 0.2–0.4 mm; outer bristles slender, 0.8–1.5 mm; inner bristles ca. 2.5 mm, tapering; innermost bristles ca. 3 mm, clavate. Fl. and fr. Jul–Sep.

• Grasslands on slopes, *Quercus-Abies* scrub on dry slopes, scrub, thicket margins, dry stream banks, canal sides, roadsides; 2400–3500 m. Gansu, S Shaanxi, NW and W Sichuan.

48. Aster formosanus Hayata, Icon. Pl. Formosan. 8: 46. 1919.

台岩紫菀 tai yan zi wan

Herbs, perennial, 30–80 cm tall (specimens incomplete); rhizomes long, slender. Stems erect, simple, flexuous, sometimes branched in upper part, finely striate, purplish, glabrous, eglandular. Leaves cauline, gradually reduced upward, long

petiolate (petiole to 7 cm); petiole purple, base hyaline-auriculate, clasping; blade abaxially pale green, adaxially green, shiny, abaxially glabrous, minutely stipitate glandular in pits, adaxially scabridulous near margin, base cordate, margin coarsely serrate, sparsely ciliate, midvein and main lateral veins prominent abaxially, apex long acuminate, mucronate; lowest leaves (not seen) withered by anthesis, sometimes marcescent, blade oblong; lower to upper leaves ovate, 6–11(–16) × 2.5–7 cm; synflorescence leaves petiolate (petiole to 1 cm), lanceolate, 2–4 × 0.2–0.8 cm, base cuneate, margin serrulate or entire. Capitula to 130 or more, in terminal paniculiform-corymbiform synflorescences; peduncles 7–10 mm, sparsely to moderately strigillose, minutely stipitate glandular; bracts lanceolate, entire. Involucres cylindric-campanulate, 3–5 mm; phyllaries 3- or 4-seriate, unequal, green, ca. 1 mm wide, glabrous, minutely stipitate glandular, rēsinous, margin narrowly to broadly scarious, erose, midvein pronounced, ± translucent, apex rounded to obtuse or acute, erose, purplish, ciliate; outer phyllaries ovate, 1.5–2 mm; middle phyllaries oblong, 2–3 mm, base hardened; inner phyllaries oblong, 4–5 mm. Ray florets 8–15, tube strigillose, lamina white, 4–5(–6.5) × 1–1.5 mm, eglandular; disk florets yellow, ca. 7 mm, tube base flared, tube apex and limb base strigillose, limb campanulate, ca. 3.5 mm, lobes spreading, recurved, narrowly triangular, ca. 3 mm, eglandular. Achenes (immature) oblong, slightly compressed, 2.5–3 mm, 4-ribbed, strigillose, eglandular. Pappus (immature) 3-seriate, straw-colored, of barbellate bristles; outer bristles few, slender, ca. 2 mm; inner bristles 3.5–4 mm, tapering; innermost bristles ca. 4.5 mm, weakly clavate. Fl. and fr. May–Dec.

• Roadsides, exposed and damp places in mixed broad-leaved and coniferous forests; 1400–2700 m. Taiwan, Zhejiang.

49. Aster dolichophyllus Y. Ling, Fl. Reipubl. Popularis Sin. 74: 357. 1985.

长叶紫菀 chang ye zi wan

Herbs, perennial, up to ca. 45 cm tall; rhizomes strong, branched. Stems ascending, densely leafy in lower part, more sparsely leafy in upper part, glabrous or strigose in upper part. Leaves ± thick, glabrous, eglandular, abaxially with 3 or 4 pairs of lateral veins joining to form a raised submarginal vein on each side, reticulate veins ± conspicuous; basal and lower leaves present at anthesis, long petiolate; petiole subclasping; blade oblanceolate, 10–17 × 1–2 cm, base gradually attenuate, margin distally sparsely crenate-serrulate, teeth mucronulate, apex falcate-acuminate or acuminate; middle leaves shortly petiolate, narrowly lanceolate, 5–9 × 0.5–0.8 cm, base attenuate, margin entire, rarely crenulate-serrulate; upper leaves sessile, reduced, linear-lanceolate. Capitula ca. 8 in open corymbiform synflorescences, ca. 2.5 cm in diam.; peduncles densely strigose; bracts linear. Involucres hemispheric, 6–7 × 6–7 mm; phyllaries 3-seriate, lanceolate, apex long acuminate; outer phyllaries ca. 2.5 mm, sparsely strigose, apex leaflike; inner phyllaries membranous, margin scarious, ciliate. Ray florets ca. 10, white, tube ca. 2 mm, densely hairy, lamina linear, up to 10 × 1 mm; disk florets 5–6 mm, tube 1.7–2.5 mm, densely hairy, limb funnelform, lobes lanceolate, ca. 1.7 mm, glabrous. Achenes brown, narrowly oblanceolate, slightly compressed, ca. 4.8 mm, densely strigose, pale 4-ribbed. Pappus reddish, 4-seriate; outermost series ca. 0.6 mm; outer series slender, ca. 2.8 mm; inner series ca. 5 mm, acute; innermost series ca. 5.7 mm, clavate. Fl. Oct.

• With mosses on rocks along riverbanks in forests. N Guangxi (Longsheng).

50. Aster moupinensis (Franchet) Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 613. 1937.

川鄂紫菀 chuan e zi wan

Erigeron moupinensis Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 10: 36. 1887; *Aster henryi* Hemsley.

Herbs, perennial, 12–40 cm tall, ± caespitose; rhizomes robust, ± woody. Stems erect, slender, branched in upper part, canaliculate, glabrous or sparsely strigillose in lower part, strigillose in upper part. Leaves glabrous, eglandular, thick, margin slightly revolute or flat, thickened, remotely, sparsely serrulate or serrate, teeth mucronulate, scabrous, midvein conspicuously raised, lateral veins 2- or 3-paired, subparallel to margin and inconspicuous; basal leaves present at anthesis, ± rosulate, long petiolate, narrowly oblanceolate to linear-oblanceolate, 4–12 × 0.2–0.7 cm, gradually attenuate, apex acute or acuminate, mucronate; lower and middle leaves linear-oblong to linear, 2–4 × 0.2–0.4 cm, ± erect; upper leaves small, linear, abaxially sparsely strigillose, 1-veined. Capitula in open corymbiform synflorescences, 3–4 cm in diam. Involucres hemispheric, 7–8 × 10–12 mm; phyllaries 3-seriate, narrowly oblong, acute, apex tinged purple, strigillose; outer phyllaries narrower, green, membranous, ca. 7 × 1.5 mm, margin ciliate, of inner phyllaries scarious, erose-fimbriate. Ray florets 16–20, white, tube ca. 3 mm, hairy, lamina narrowly elliptic, ca. 15 × 1.5 mm; disk florets yellow, ca. 6 mm, tube ca. 2.5 mm, tube and limb hairy, limb funnelform, lobes ca. 1.5 mm, glabrous. Achenes tan to brown, oblong, compressed, ca. 3 mm, strigose, 2-ribbed. Pappus 3-seriate, yellowish; outer series ca. 0.3 mm; inner series ca. 4 mm, acute; innermost series ca. 5.5 mm, clavate. Fl. and fr. Jul–Sep.

• Riverbanks, grassy slopes, sandy areas, on rocks; 100–200 m. W Hubei, E Sichuan.

51. Aster taiwanensis Kitamura, Acta Phytotax. Geobot. 1: 145. 1932.

台湾紫菀 tai wan zi wan

Aster baccharoides (Bentham) Steetz var. *kanehirae* Yamamoto; *A. scaberrimus* Hayata; *A. trinervius* Roxburgh ex D. Don var. *hayatae* Yamamoto; *A. trinervius* var. *scandens* Hayata.

Herbs, perennial, 30–100(–300) cm tall; rhizomes long, slender. Stems erect, simple, sometimes branched in upper part, finely striate, glabrous or glabrate or sparsely strigillose proximally, strigillose distally, minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, shiny, abaxially glabrous, minutely stipitate glandular in pits, veins sparsely strigillose, adaxially scabridulous, margin sparsely ciliate, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis, shortly winged petiolate; blade obovate to oblanceo-

late, 0.7–9 cm, base attenuate, margin serrulate to coarsely serrate; lower to upper leaves shortly petiolate (petiole 0.2–0.5 cm); blade oblanceolate to narrowly lanceolate, 3–14 × 0.5–3 cm, base cuneate-rounded to rounded, margin serrate; synflorescence leaves shortly petiolate, lanceolate, 1.5–6 × 0.3–1.2 cm, base rounded, margin 1–5-serrate. Capitula 17–150 or more in terminal paniculate-corymbiform synflorescences; peduncles 3–10 mm, strigillose; bracts lanceolate, entire. Involucres cylindric-campanulate, 4.5–7 mm; phyllaries 5–7-seriate, unequal, green distally, ca. 1 mm wide, apically minutely stipitate glandular, margin scarious, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex rounded, erose, purplish, ciliate; outer phyllaries broadly ovate, ca. 1 mm; middle phyllaries oblong, 2–3 mm, base hardened; inner phyllaries oblong, 4–5 mm. Ray florets 8–17, white, tube hairy, lamina 3.5–5(–7) × 1–1.5 mm, eglandular; disk florets yellow, 5.5(–6) mm, tube base flared, tube apex and limb base hairy and sparsely minutely stipitate glandular, limb campanulate, ca. 3 mm, lobes spreading, narrowly triangular, ca. 2 mm, glabrous, eglandular. Achenes mottled purple, oblong, slightly compressed, 2–2.5 mm, strigillose, eglandular, 2-ribbed. Pappus 3-seriate, white or (innermost) ± reddish; outermost bristles few, 0.5–0.7 mm; inner bristles ca. 4 mm, acute; innermost bristles ca. 4.2 mm, weakly clavate. Fl. and fr. May–Dec. $2n = 18$*.

• Grassy slopes, deciduous or mixed evergreen forests on steep slopes, roadsides or trailsides in forests, rock walls, cliffs, often on limestone, exposed open sites; 100–3000 m. Taiwan.

52. Aster chingshuiensis Y. C. Liu & C. H. Ou, Quart. J. Chin. Forest. 14: 26. 1981.

清水马兰 qing shui ma lan

Aster hualiensis S. S. Ying.

Herbs, perennial, 10–25 cm tall, sometimes caespitose; rhizomes long, slender. Stems ascending, simple, finely striate, densely villosulous proximally, strigillose distally, minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, shiny, abaxially strigillose, minutely stipitate glandular, veins densely strigillose, adaxially scabridulous, margin revolute, sparsely ciliate, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis, shortly winged petiolate; blade obovate to oblanceolate, 0.7–1.5 cm, base tapering, margin serrulate to serrate; lower to upper leaves shortly petiolate (petiole 0.1–0.2 cm); blade oblanceolate to ovate, 1.2–3 × 0.5–2 cm, base cuneate-rounded to rounded, margin serrate to serrulate; synflorescence leaves shortly petiolate, ovate to lanceolate, 0.5–2.5 × 0.1–0.6 cm, base rounded, margin 1–5-serrate. Capitula 3–50 in terminal, dense corymbiform synflorescences; peduncles 3–30 mm, strigillose; bracts lanceolate, entire. Involucres cylindric-campanulate, 4–5 mm; phyllaries 3–5-seriate, unequal, green distally, ca. 0.7 mm wide, apically strigillose and minutely stipitate glandular, margin scarious, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex rounded to obtuse, erose, purplish, ciliate; outer phyllaries broadly ovate, ca. 1 mm; middle phyllaries oblong, 2–2.5 mm, base hardened; inner phyllaries oblong to linear-oblong, 4–4.5 mm. Ray florets 5–10, white, tube strigillose, lamina 3–5 × 1–1.5 mm, eglandular; disk florets yellow, ca. 3 mm, tube base flared, tube apex and limb base hairy and minutely stipitate glandular, limb campanulate, ca. 2 mm, lobes spreading, narrowly triangular, ca. 1 mm, abaxially sparsely minutely stipitate glandular. Achenes oblong, slightly compressed, ca. 2 mm, sparsely strigillose, minutely stipitate glandular, 3-ribbed. Pappus brownish, 4-seriate, dirty white or (innermost) ± reddish; outermost bristles few, 0.5–0.7 mm; outer bristles slender, very few or none, ca. 1.2 mm; inner bristles 2.8–3.2 mm, tapering; innermost bristles 3.5–4 mm, weakly clavate. Fl. and fr. Aug–Nov.

• Limestone crevices and gravel; 2000–2200 m. Taiwan.

53. Aster taoyuenensis S. S. Ying, J. Jap. Bot. 63: 49. 1988.

桃园马兰 tao yuan ma lan

Herbs, perennial, 30–70 cm tall; rhizomes long, slender. Stems ascending, simple, branched distally, finely striate, moderately to densely villous proximally, strigillose distally, sparsely minutely stipitate glandular. Leaves cauline, not or slightly reduced upward; lowest leaves withered by anthesis, abaxially pale green (spongelike), adaxially green, shiny, abaxially strigose, minutely stipitate glandular in pits, adaxially scabridulous, margin slightly revolute, coarsely 3- or 4-serrate distally, teeth pointing forward, villous-ciliate, ± 3-veined, veins prominent abaxially, apex acuminate, mucronate; lowest leaves shortly winged petiolate; blade obovate to oblanceolate, ca. 2.5 cm (insufficient material), base attenuate, margin serrate; lower to upper leaves shortly petiolate (petiole to 0.3 cm); blade oblanceolate (proximally) to usually lanceolate, 5.2–6.5 × 1.5–2(–2.5) cm, base rounded; synflorescence leaves shortly petiolate, lanceolate, 2.2–4 × 0.8–1.3 cm, base rounded, margin 1–3-serrate or entire. Capitula 7–9 in terminal, loose corymbiform synflorescences; peduncles 1–4 mm, densely strigillose, minutely stipitate glandular in pits; bracts narrowly lanceolate to oblanceolate or linear-oblanceolate, scarious, erose. Involucres broadly campanulate to hemispheric, (3–)5 mm; phyllaries 3- or 4-seriate, unequal, green distally, apically strigillose and minutely stipitate glandular, sometimes slightly pitted, margin scarious, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex acuminate, erose, purplish, ciliate; outer phyllaries narrowly ovate to oblong-lanceolate, 1.5–2 × ca. 0.5 mm; middle phyllaries oblong, 3–4 × ca. 0.9 mm, base hardened; inner phyllaries linear-oblong, 4–5 × 0.4–0.5 mm. Ray florets 8–15, white, tube apex sparsely hairy, lamina 7–10 × 1.5–1.8 mm, eglandular; disk florets greenish yellow, 3.5–4 mm, tube base flared, tube apex and limb base strigillose and minutely stipitate glandular, limb campanulate, ca. 2.5 mm, lobes spreading, narrowly triangular, 1.5–1.7 mm, abaxially minutely stipitate glandular. Achenes black to mottled purple, obovoid, slightly compressed, 2–2.5 mm, strigillose, minutely stipitate glandular, 2-ribbed (straw-colored). Pappus 4-seriate, with dirty white barbellate bristles; outermost bristles few, slender, 0.3–0.7 mm; outer bristles very few, slender, ca. 2 mm; inner bristles 2.5–3 mm, tapering; innermost bristles 3.2–3.3 mm, apically flattened. Fl. Jun–Aug.

• Damp rocky mountain ridges and slopes, *Machilus-Castanopsis* forests; 500–900 m. Taiwan.

54. Aster homochlamydeus Handel-Mazzetti, Symb. Sin. 7: 1091. 1936.

等苞紫菀 deng bao zi wan

Aster ageratoides Turczaninow var. *grossedentatus* (Thunberg ex Diels) Kitamura; *A. trinervius* Roxburgh ex D. Don var. *grossedentatus* Thunberg ex Diels (Sep 1912); *A. trinervius* var. *grossedentatus* Franchet ex Diels (Oct 1912).

Herbs, perennial, 20–50 cm tall, sometimes caespitose; rhizomes long, slender. Stems erect, simple, finely striate, sparsely to moderately strigillose proximally, minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, abaxially glabrous, veins strigillose to scabridulous, adaxially densely scabridulous, both surfaces sparsely minutely stipitate glandular in pits, more so apically, margin ciliate, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis, narrowly winged petiolate (petiole 0.5–10 cm); blade ovate, 1–2.5 cm, base attenuate, margin coarsely serrate; lower to upper leaves narrowly to very broadly petiolate; blade ovate to lanceolate, 5–10 × 1.5–4 cm, base cuneate-rounded to rounded, sometimes auriculate, sometimes clasping, margin coarsely serrate; synflorescence leaves sessile, lanceolate, 2–7 × 0.5–2 cm, base cuneate to rounded, margin 1–5-serrate. Capitula 1–10 in terminal corymbiform synflorescences; peduncles 10–90 mm, strigillose; bracts lanceolate, entire. Involucres campanulate, 5–8 mm; phyllaries 2- or 3-seriate, subequal, often squarrose, oblanceolate, abaxially sparsely to moderately villous-strigillose, sparsely minutely stipitate glandular, leaflike and green distally, margin erose, sparsely ciliate, midvein more pronounced distally, ± translucent, apex acuminate, sometimes purplish, sparsely ciliate; outer phyllaries 6–8 × ca. 1.5 mm, margin narrowly scarious; inner phyllaries 5–9 × ca. 2 mm, base ± hardened, margin broadly scarious. Ray florets 10–14, white or purple, lamina 10–15 × 2–3 mm, glabrous, eglandular; disk florets yellow, 4–5 mm, tube base flared, tube and limb glabrous, eglandular, limb campanulate, ca. 3 mm, lobes spreading, narrowly triangular, ca. 2 mm, sparsely strigose apically, eglandular. Achenes mottled purple, oblong, slightly compressed, 4–5 mm, sparsely strigillose, more densely so distally, eglandular, 4-ribbed (± translucent). Pappus 3-seriate, ± reddish; outermost bristles few, slender, 0.4–0.8 mm; inner bristles 2.5–3 mm, acute; innermost bristles 3.5–4 mm, slightly clavate. Fl. Apr–Aug, fr. Jul–Sep.

• Alpine and subalpine mixed forests; 3000–3700 m. S Gansu, SW Sichuan, NW Yunnan.

55. Aster alatipes Hemsley, J. Linn. Soc., Bot. 23: 407. 1888.

翼柄紫菀 yi bing zi wan

Herbs perennial, 36–100 cm tall; rhizomes long, slender, stoloniferous. Stems erect, simple, sometimes distally branched, ± flexuous, ± striate, hispid-villous, minutely stipitate glandular. Leaves cauline, slightly reduced upward, abaxially pale green, adaxially green, abaxially hispid-strigose, densely so on veins, adaxially hispid-strigose, both surfaces sparsely minutely stipitate glandular in pits, margin coarsely serrate to serrate, hispid, strigose, or villous-ciliate, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis (not seen); lower to upper leaves broadly winged petiolate; blade ovate to lanceolate, 3.5–5.5(–10) × 1.5–2.5(–4) cm, base cuneate-rounded to rounded; synflorescence leaves broadly winged shortly petiolate, lanceolate, 1.3–2 × 0.6–0.9 cm, base cuneate, margin 3–6-serrate, slightly resinous. Capitula 16 or more in terminal corymbiform synflorescences, ca. 1.5 cm in diam.; peduncles 7–15 mm or longer, densely hispid-strigose, minutely stipitate glandular, resinous; bracts lanceolate, entire. Involucres campanulate, (4–)5–5.2 × ca. 5 mm; phyllaries 4-seriate, unequal, green apically, abaxially distally villosulous and minutely stipitate glandular, margin scarious, erose, moderately to densely villous-ciliate, midvein more pronounced distally, ± translucent, apex acute to rounded, villous-ciliate; outer phyllaries narrowly ovate, 1.5–2 × ca. 0.8 mm; inner phyllaries oblong, 3–6 × 1.8–1.2 mm, base hardened. Ray florets 10–14 or more, purple, tube apex and lamina base strigose, lamina 6–7(–9) × 1–1.5 mm, eglandular; disk florets yellow, (4–)5 mm, tube base flared, tube apex and proximal limb hairy, minutely stipitate glandular, limb campanulate, ca. 3.2 mm, lobes spreading, narrowly triangular, curved, ca. 1.5 mm, apically sparsely hairy, moderately to densely minutely stipitate glandular. Achenes (immature) oblong, slightly compressed, 2–3 mm, sparsely strigillose, sparsely minutely stipitate glandular, 2-ribbed (± translucent). Pappus 4-seriate, ± reddish; outermost bristles few, slender, 0.5–0.6 mm; outer bristles slender, 2–2.3 mm; inner bristles few, ca. 3 mm, acute; innermost bristles ca. 4 mm, weakly clavate. Fl. and fr. Jul–Oct.

• Shaded places in valleys of low mountains or canal banks; 800–1600 m. Anhui, Henan, NW Hubei, S Shaanxi, Sichuan.

56. Aster limosus Hemsley, J. Linn. Soc., Bot. 23: 413. 1888.

湿生紫菀 shi sheng zi wan

Herbs, perennial, 22–70 cm tall; rhizome thick. Stems often solitary, erect, simple or branched at middle, finely canaliculate, strigillose. Leaves thick, abaxially sparsely strigillose, veins densely villous, midvein or nearly palmate veins raised, lateral veins 3-paired, conspicuous, adaxially densely scabrous; lower leaves withered by anthesis, petiole 2–6 cm; blade cordate, reniform, or suborbicular, 2–5 × 2.2–4.5 cm; middle leaves cordate-ovate, margin serrate (teeth mucronulate), apex acute to acuminate; upper leaves gradually reduced, subsessile, ovate. Capitula many, in terminal corymbiform synflorescences, 2–2.5 cm in diam.; peduncles 7–12 cm; bracts oblong or linear. Involucres campanulate, 6–7 × ca. 8 mm; phyllaries 4-seriate, unequal (loosely imbricate), oblong, apex obtuse; outer phyllaries ca. 2 × 0.5 mm, densely strigillose, apex leaflike; inner phyllaries ca. 5 × 0.7 mm, glabrous, margin scarious, apex obtuse to acute, often purple-red. Ray florets ca. 10, purple, tube ca. 2 mm, lamina oblong, 8–9 × 1.5–2 mm; disk florets ca. 5 mm, tube 1.5–2 mm, lobes ca. 1 mm (not seen). Achenes (not seen) oblong, ca. 2 mm, densely strigillose, 2- or 3-ribbed. Pappus (not seen) of dirty white or ± reddish, subequal bristles.

• Muddy fields; ca. 1200 m. W Hubei (Yichang).

The leaf shape of *Aster limosus* is distinct from that of other species.

57. Aster morrisonensis Hayata, Icon. Pl. Formosan. 8: 48. 1919.

玉山紫菀 yu shan zi wan

Herbs, perennial, 10–40 cm tall or more, rhizomatous, stoloniferous. Stems erect, simple, sometimes branched in upper part; branches ascending, strigillose, densely leafy. Leaves cauline, slightly reduced upward, abaxially pale green, adaxially green, shiny, both surfaces scabrous, minutely stipitate glandular in pits, margin coarsely 1–5-serrate, scabrous, abaxially prominently 3-veined, apex acuminate, mucronate; lowest leaves withered by anthesis, long winged petiolate (petiole to 5.5 cm); blade spatulate to oblanceolate or lanceolate, 1.3–2.5 cm, base attenuate; lower to upper leaves shortly petiolate; blade lanceolate, 2–4 × 0.7–0.9 cm, base attenuate; synflorescence leaves shortly petiolate, lanceolate, margin entire. Capitula many in terminal paniculiform-corymbiform synflorescences (not measurable on specimen); peduncles 10–50 mm or longer, strigillose; bracts lanceolate, entire. Involucres campanulate to hemispheric, 3–5 mm; phyllaries 3-seriate, unequal, green distally, 0.7–0.9 mm wide, apically minutely glandular, margin narrowly scarious, erose, purplish, ciliate, midvein more pronounced distally, ± translucent, apex rounded, erose, purplish, ciliate; outer phyllaries broadly ovate, ca. 1.5 mm; middle phyllaries oblong, 2–3 mm, base hardened; inner phyllaries oblong, 4–5 mm. Ray florets 8–20, white, tube hairy, lamina 3.5–5(–7) × 1–1.5 mm, eglandular; disk florets yellow, 4–5.5(–6) mm, tube base flared, tube apex and limb base hairy, limb campanulate, lobes spreading, lanceolate, ca. 2 mm, glabrous, eglandular. Achenes mottled purple, oblong, slightly compressed, 1.8–2.5 mm, strigillose, eglandular, 2-ribbed. Pappus 3-seriate, white or (innermost) ± reddish; outermost bristles few, 0.5–0.7 mm; inner bristles ca. 4 mm, acute; innermost bristles ca. 4.2 mm, weakly clavate. Fl. Jul–Sep.

• Alpine areas; 3000–3700 m. Taiwan.

58. Aster piccolii J. D. Hooker, Bot. Mag. 125: t. 7669. 1899.

裸菀 luo wan

Asteromoea piccolii (J. D. Hooker) Handel-Mazzetti; *Gymnaster piccolii* (J. D. Hooker) Kitamura; *Kalimeris piccolii* (J. D. Hooker) S. Y. Hu; *Miyamayomena piccolii* (J. D. Hooker) Kitamura.

Herbs, perennial, 60–120 cm tall, rhizomatous. Stems erect, simple, sometimes branched in upper part, finely striate, strigillose, sparsely minutely stipitate glandular distally. Leaves cauline, gradually reduced upward, abaxially pale green (spongelike), adaxially green, both surfaces scabridulous, sometimes more sparsely so adaxially, abaxially minutely stipitate glandular in pits, margin coarsely serrate to serrate or entire (upper leaves), revolute, scabridulous, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis (not seen); lower to upper leaves shortly winged petiolate (petiole to 0.8 cm) or sessile, obovate or oblanceolate to narrowly lanceolate, 4–9 × 1.2–1.8 cm, base attenuate; synflorescence leaves sessile, linear-lanceolate, 2.1–2.8 × 0.4–0.5 cm, base cuneate, margin strongly revolute, entire. Capitula numerous in terminal or axillary corymbiform synflorescences; peduncles 20–60 mm, strigillose, minutely stipitate glandular; bracts linear-lanceolate, entire, distally grading into phyllaries. Involucres hemispheric, 4–5 mm; phyllaries 3–6-seriate, unequal, often squarrose, green distally, abaxially distally sparsely strigillose, sparsely minutely stipitate glandular, margin scarious, erose, sometimes purplish, ciliate, midvein enlarged basally, almost keeled, distally ± translucent, apex obtuse to acute, erose, purplish, ciliate; outer phyllaries oblong, ca. 3 × 1.3 mm; middle phyllaries oblanceolate, 3.5–4 × ca. 1.2 mm, base hardened; inner phyllaries broadly oblanceolate, 4–5 × ca. 1.5 mm. Ray florets 10–26, purple-blue, veins prominent, tube sparsely minutely stipitate glandular, lamina 7–8.5 × 1–2.5 mm, glabrous; disk florets yellow, 3–4 mm, veins prominent, tube base flared, tube and limb base glabrous, minutely stipitate glandular, limb campanulate, 2–2.5 mm, lobes spreading, lanceolate, 0.8–1.5 mm, glabrous, minutely stipitate glandular. Achenes oblanceolate, 2.7–3 mm, sparsely strigose to glabrate or glabrous, minutely stipitate glandular distally, 3–6-ribbed. Pappus of ray absent, of disk 1-seriate; outermost series of scales 0.2–0.5 mm. Fl. Aug–Oct.

• Grasslands on slopes; 900–1700 m. Gansu, Guizhou, Henan, Shaanxi, Shanxi, Sichuan.

Specimens of *Aster piccolii* were not seen by one of us (Brouillet).

59. Aster yuanqunensis (J. Q. Fu) Brouillet, Semple & Y. L. Chen, **comb. nov.**

垣曲裸菀 yuan qu luo wan

Basionym: *Gymnaster yuanqunensis* J. Q. Fu, Bull. Bot. Res., Harbin 5(3): 141. 1985.

Herbs, perennial, ca. 57 cm tall, rhizomatous. Stems erect, simple, finely striate, glabrate at base, strigillose above. Leaves cauline, gradually reduced upward, laxly patent; lowest leaves withered by anthesis; lower to upper leaves shortly petiolate or sessile, ovate-oblong to narrowly oblong or lanceolate, 1.7–8 × 0.5–2.3 cm, thin, both surfaces sparsely strigillose, base cuneate, margin coarsely serrate to serrate, scabridulous, apex acuminate. Capitula 1–4 in terminal corymbiform synflorescences or solitary, ca. 3 cm in diam. Involucres hemispheric; phyllaries 4-seriate, unequal, green apically, abaxially strigillose, margin scarious, erose. Ray florets purple-blue, lamina oblong, ca. 17 mm; disk florets yellow, ca. 5 mm, sparsely hairy, limb campanulate, lobes reflexed, lanceolate. Achenes dark purple, obovoid, compressed, glabrous, 2–4-ribbed. Pappus (not described and absent on illustration). Fl. Oct.

• Among shrubs in mountain valleys; 900–1000 m. S Shanxi (Yuanqu).

Material of this species was not seen by us. The description is from the original Latin description and the illustration. This species is close to *Aster piccolii*.

60. Aster pseudosimplex Brouillet, Semple & Y. L. Chen, **nom. nov.**

四川裸菀 si chuan luo wan

Replaced synonym: *Aster simplex* C. C. Chang, Sinensia 6: 541. 1935, not *Aster simplex* Willdenow, Enum. Pl. 2: 887.

1809; *Asteromoea simplex* Handel-Mazzetti; *Gymnaster simplex* Y. Ling; *Miyamayomena simplex* Y. L. Chen.

Herbs, perennial, 10–67 cm tall. Stems ascending, solitary or 2–4, simple or 2- or 3-branched from middle part, white hispidulous-villous. Leaves: basal spatulate, long petiolate; lower cauline leaves withered by anthesis; middle leaves oblong-lanceolate or subelliptic, 1.5–2.5(–4) × 0.3–0.6(–0.9) cm, white hispidulous-villous on both surfaces, minutely stipitate glandular in pits, midvein abaxially convex, adaxially concave, base rounded, sessile, margin entire, apex obtuse or acute; uppermost leaves remote, linear, ca. 1 cm. Capitula solitary, 2–2.5 in diam. Involucres hemispheric, ca. 6 × 1.5 mm; phyllaries 3- or 4-seriate, unequal; outer phyllaries green, rather short, lanceolate, 4–5 × 1.2–1.5 mm, acute or obtuse, externally pubescent; inner phyllaries obovate-oblong, 5–5.5 × 1.5–2 mm, acute, margin broadly scarious, ciliate, apically red-purplish. Ray florets purplish red, ca. 16 × 2 mm, tube ca. 2 mm, glandular puberulent; disk florets ca. 4 mm, tube ca. 1 mm, puberulent. Achenes yellowish, obovoid, slightly compressed, ca. 2 × 1.3 mm, inconspicuously marginally ribbed, glabrous. Pappus absent. Fl. and fr. Jul–Sep.

• Grasslands on slopes, canal sides; 2600–3000 m. NW Sichuan.

61. Aster lixianensis (J. Q. Fu) Brouillet, Semple & Y. L. Chen, **comb. nov.**

理县裸菀 li xian luo wan

Basionym: *Gymnaster lixianensis* J. Q. Fu, Bull. Bot. Res., Harbin 5(3): 143. 1985.

Herbs, perennial, 15–48(–60) cm tall, caespitose. Stems ascending, solitary or 2–4, simple, striate, densely retrorsely hirsutulous. Leaves sessile, basal and lower cauline leaves withered by anthesis; middle and upper leaves dense, gradually reduced upward, lanceolate-ovate to narrowly oblong or linear, 1–3 × 0.1–0.6 cm, both surfaces strigose, abaxially pale, adaxially dark green, base truncate, margin entire, apex obtuse, mucronate. Capitula solitary, 2.5–3 cm in diam. Involucres broadly campanulate; phyllaries 3-seriate, unequal; outer series green, short, oblong, strigose; inner series obovate-lanceolate, 5–7 mm, margin broadly scarious, fimbriate, apically green or purplish. Ray florets bluish, 5–7 mm; disk florets yellow, 3–5 mm, limb funnelform, lobes lanceolate. Achenes (immature) obovoid, slightly compressed, inconspicuously 2- or 3-ribbed. Pappus absent. Fl. Jul–Aug.

• 2600–2800 m. NC Sichuan (Barkam, Lixian).

Material of this species was not seen by us. The description is from the original Latin description and the illustration. This species is close to *Aster pseudosimplex*.

62. Aster sinoangustifolius Brouillet, Semple & Y. L. Chen, **nom. nov.**

狭叶裸菀 xia ye luo wan

Replaced synonym: *Aster angustifolius* C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 6: 43. 1935, not *Aster angustifolius* Jacquin, Pl. Hort. Schoenbr. 3: 63. 1798; *Asteromoea angustifolia* Handel-Mazzetti; *Gymnaster angustifolius* Y. Ling; *Kalimeris angustifolia* S. Y. Hu; *Miyamayomena angustifolia* Y. L. Chen.

Herbs, perennial, 30–50 cm tall, rhizomatous. Stems erect, simple, sometimes flexuous, sometimes branched in upper part, finely striate, glabrous or glabrate, sparsely minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green (spongelike), adaxially green, abaxially sparsely scabridulous, minutely stipitate glandular in pits, adaxially scabridulous, margin remotely serrate to serrulate, revolute, scabridulous, midvein prominent abaxially, apex acuminate, mucronate; lowest leaves withered by anthesis (not seen); lower to upper leaves winged petiolate (petiole to 2 cm); blade oblanceolate to narrowly lanceolate, (6–)10–13(–15) × 0.5–1.9 cm, base attenuate; synflorescence leaves sessile, linear-lanceolate, 2–4 × 0.3–0.4 cm, base cuneate, margin entire, grading upward into phyllaries. Capitula 1–3, terminal or axillary, overall forming corymbiform synflorescences; peduncles 60–90 mm, strigillose, minutely stipitate glandular; bracts linear-lanceolate, entire. Involucres hemispheric, 5–6 mm; phyllaries 3- or 4-seriate, unequal, green distally, glabrous, sometimes apically minutely stipitate glandular, margin scarious, erose, sometimes purplish, ciliate, midvein ± translucent, sometimes multiveined, apex rounded, erose, purplish, ciliate; outer phyllaries oblong, 3–4 × 1.2–2 mm; middle phyllaries obovate, 5–5.5 × 2–2.5 mm, base hardened; inner phyllaries oblanceolate, 6–7 × 1.1–1.5 mm. Ray florets 15–20, purple to lavender, veins prominent, tube and lamina base sparsely minutely stipitate glandular, lamina 6–7 × ca. 1.5 mm, glabrous; disk florets yellow, ca. 3.5 mm, veins prominent, tube base flared, tube and limb base glabrous, minutely stipitate glandular, limb broadly campanulate, ca. 2.5 mm, lobes spreading, narrowly triangular, 0.7–1 mm, glabrous, tip sparsely minutely stipitate glandular. Achenes narrowly obovoid, ca. 2.1 mm, glabrous, 4–6-ribbed. Pappus absent. Fl. and fr. Jul–Oct.

• Riverbanks in valleys and forest margins; ca. 600 m. Fujian, Zhejiang.

63. Aster lushiensis (J. Q. Fu) Brouillet, Semple & Y. L. Chen, **comb. nov.**

卢氏裸菀 lu shi luo wan

Basionym: *Gymnaster lushiensis* J. Q. Fu, Bull. Bot. Res., Harbin 3(1): 110. 1983.

Herbs, perennial, (size not given). Stems erect, terete, slightly flexuous, branched upward, densely white appressed villous. Leaves: lowest and lower cauline leaves (not seen) shortly narrowly winged petiolate or subsessile; middle and upper cauline leaves sessile, ovate, broadly elliptic, or obovate, 2–8 × 1–4 cm, abaxially gray-white appressed villous, adaxially dark green, white hispidulous, base attenuate, margin obscurely repand-crenate, lateral veins 3- or 4-paired, adaxially prominent, apex obtuse or rounded. Capitula 2–5 in loose corymbiform synflorescences, 2–3 cm in diam. Involucres campanulate; phyllaries 3-seriate, unequal, abaxially puberulent; outer phyllaries shorter, ovate; inner phyllaries longer, oblong, membranous, margin scarious, hyaline. Ray florets bluish purple, lamina 8–16 mm; disk florets numerous, yellow, 3–4 mm. Achenes

(immature) obovoid-oblong, 5- or multiribbed. Pappus absent. Fl. Oct.

• Path sides on mountain slopes; ca. 800 m. Henan (Lushi).

The description of *Aster lushiensis* is incomplete because no specimens were seen by us.

64. Aster verticillatus (Reinwardt) Brouillet, Semple & Y. L. Chen, **comb. nov.**

秋分草 qiu fen cao

Basionym: *Rhynchospermum verticillatum* Reinwardt, Syll. Pl. Nov. 2: 8. 1825; *Leptocoma racemosa* Lessing; *R. formosanum* Yamamoto; *R. verticillatum* var. *subsessile* Oliver ex Miquel; *Zollingeria scandens* Schultz Bipontinus.

Herbs, perennial, 5–150 cm tall, sometimes caespitose; rhizomes long, slender. Stems erect, simple, usually divaricately branched in distal half, finely striate, strigillose, minutely stipitate glandular. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, abaxially sparsely strigillose, more densely so on veins, minutely stipitate glandular in pits, adaxially scabridulous, eglandular, thin, margin sparsely ciliate, midvein prominent abaxially, apex acute to obtuse, mucronate; lowest leaves usually withered by anthesis, short, narrowly winged petiolate; blade obovate or ovate to lanceolate, 1.5–4.5 cm, base cuneate, margin crenate-serrate (teeth mucronulate); lower to upper leaves shortly petiolate (petiole to 0.6 cm); blade lanceolate to narrowly lanceolate, sometimes ovate, 3.5–14 × 0.4–5.5 cm, base attenuate, margin crenate-serrate to serrate or entire; synflorescence leaves shortly petiolate, lanceolate, 0.5–3 × 0.1–0.8 cm, base attenuate, margin 1–5-serrate or entire. Capitula 1–5 per branch, in terminal or axillary racemiform synflorescences, sometimes distributed along much of stem; peduncles 1–30 mm, sparsely to moderately strigillose; bracts absent or 1, oblanceolate, entire. Involucres broadly campanulate to hemispheric, 2–7 mm; phyllaries 3-seriate, unequal, green apically, ca. 1 mm wide, apically sometimes strigillose, sometimes minutely stipitate glandular, margin scarious, erose, ciliate, midvein more pronounced distally, ± translucent, apex rounded, erose, ciliate; outer phyllaries broadly ovate, ca. 1 mm; middle phyllaries oblong, 2–3 mm, base thin; inner phyllaries oblong, 4–5 mm. Ray florets 2- or 3-seriate, 10–40, white, tube (ca. 0.3 mm) and abaxial lamina minutely stipitate glandular, lamina ca. 1.2 × 0.3 mm, glabrous; disk florets yellow, ca. 2 mm, glabrous, minutely stipitate glandular, tube base flared, limb campanulate, ca. 1 mm, lobes spreading and reflexed, triangular, ca. 0.5 mm. Achenes purple proximally to mottled purple in proximal half (not purple above), obovoid, ca. 2 mm, glabrous, of ray compressed, distally minutely stipitate glandular, 2-ribbed, long beaked, of disk trigonous, eglandular, 3-ribbed, beakless or shortly beaked. Pappus 3-seriate, easily caducous and often absent (through loss), of mottled reddish brown, barbellulate bristles; outermost bristles 0–3, slender, ca. 0.1 mm; outer bristles absent or 1, slender, ca. 1.7 mm; innermost bristles 4 or 5, ca. 2 mm, slightly flattened distally. Fl. and fr. Aug–Nov.

Forest margins, shaded forests, disturbed forests, shaded streamsides, damp weedy places, open grassy or brushy slopes, roadsides, thickets; 400–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Vietnam].

65. Aster hunanensis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 611. 1937.

湖南紫菀 hu nan zi wan

Herbs, perennial, ca. 35 cm tall, rhizomatous and shortly stoloniferous. Stems erect, solitary, slender, glabrate, branched in upper part, loosely leafy. Leaves glabrous on both surfaces or abaxial veins sparsely strigillose, thick, margin slightly revolute, remotely serrate (teeth mucronate), sparsely scabrous, 3-veined, 2- or 3-paired lateral veins abaxially prominent, conspicuously reticulate veined; lower leaves (not observed) long broadly winged petiolate (petiole equaling blade); blade ovate or subelliptic, 6–7 × 3–4 cm, abruptly attenuate, apex acute or obtuse; middle leaves shortly petiolate, broadly winged and ± subclasping or not winged; blade oblong-lanceolate or elliptic, 4–7 × 1.5–2.5 cm, abruptly attenuate or rounded, apex acuminate; upper leaves gradually reduced, petiolate or base ± subclasping, margin shallowly serrate or entire. Capitula in axils of leaves or terminal, solitary and overall in paniculate-corymbiform synflorescences, 2–3.5 cm in diam.; peduncles 0.5–2.5 cm; bracts linear. Involucres campanulate, 5–7 mm in diam.; phyllaries 3- or 4-seriate, unequal, apex green, oblong, 3–4 × ca. 1 mm, abaxially glabrous, margin scarious, erose, ciliate, apex rounded or obtuse. Ray florets ?purplish (immature); disk florets (immature) 3.5–4 mm, tube ca. 1.5 mm, lobes ca. 0.8 mm. Achenes (immature) obovoid, ca. 2 mm, slightly compressed, 2–4-ribbed, with white short hairs. Pappus (immature) dirty white, of many unequal bristles 1.5–2 mm. Fr. Aug.

• 500–800 m. SW Hunan (Anhua).

The glabrate or glabrous stems and leaves are distinctive of *Aster hunanensis*.

66. Aster menelii H. Léveillé, Fl. Kouy-Tchéou, 87. 1914.

黔中紫菀 qian zhong zi wan

Herbs, perennial, ca. 70 cm tall; rhizomes procumbent, with long fibrous roots. Stems erect, slender, branched at middle, finely canaliculate, scabrous, densely leafy. Leaves abaxially pale green, adaxially brownish (when dry), both surfaces sparsely scabrous, 3-veined, midvein abaxially prominent, lateral veins parallel with margin; basal leaves few, rosulate, long petiolate; blade ovate-lanceolate, ca. 4.5 × 2.5 cm, base attenuate, margin sparsely shallowly toothed or subentire, apex acute; lower and middle leaves oblong-lanceolate, 4–10 × 1.5–2 cm, base gradually attenuate, margin 4- or 5-serrate or subentire, apex acuminate; upper leaves narrowed. Capitula in racemose-corymbiform synflorescences, ca. 2 cm in diam.; peduncles 2–3 cm; bracts linear-lanceolate, leaflike. Involucres hemispheric, ca. 8 mm in diam.; phyllaries 3-seriate, subequal, brown, oblong-lanceolate, abaxially puberulent, membranous, midvein herbaceous, apex acute or slightly acute. Ray florets ca. 10 or more, white, tube ca. 1.3 mm, lamina ca. 10 × 1.2 mm; disk florets yellow, 3–3.5 mm, tube ca. 1 mm, lobes ca. 0.5 mm. Achenes (immature) oblong, ca. 2 mm, strigillose. Pappus (immature) white, of 10–20 unequal bristles 1–1.5 mm. Fl. Jun.

• C Guizhou (Anshun).

Aster menelii is probably closely related to *A. hunanensis*. The structure of the phyllaries and pappus is similar, but the leaf shape is different.

67. Aster gracilicaulis Y. Ling ex J. Q. Fu, Bull. Bot. Res., Harbin 3(1): 116. 1983.

细茎紫菀 xi jing zi wan

Herbs, perennial, 30–60 cm tall. Stems 3–5-fascicled, erect or ascending, branched in upper part, shallowly canaliculate, red-brown in lower part, yellow villous-canescent or glabrescent, loosely leafy. Leaves abaxially pale green, sparsely hairy on veins, minutely stipitate glandular, adaxially scabrous, margin ± revolute, entire or remotely serrulate (teeth mucronulate), scabrous, midvein prominent, 3-veined, veins subparallel, reticulate veins lax, apex acute; lower leaves withered by anthesis, long petiolate, narrowly lanceolate; middle leaves shortly petiolate, linear-lanceolate, 5–9 × 0.4–0.7 cm, base attenuate, apex long acuminate, sometimes falcate; upper leaves reduced, linear to subulate. Capitula in corymbiform synflorescences, 2–2.5 cm in diam. Involucres campanulate, ca. 5 × 8–10 mm; phyllaries 3- or 4-seriate, unequal, margin scarious, erose, ciliate, midvein green, apex obtuse; outer phyllaries linear-oblong, 2–2.5 × ca. 0.7 mm, apically leaflike; inner phyllaries ca. 4.5 × 1 mm, apically purple-red. Ray florets to 20, blue-purple, tube ca. 2.5 mm, lamina oblong, ca. 9 × 2.5 mm; disk florets ca. 4 mm (immature). Achenes (immature) black, obovoid, ca. 2 × 1.5 mm, strigillose, 2- or 3-ribbed. Pappus (immature) white, 3.5–4 mm. Fl. Jul.

• Slopes, among shrubs, gullies; 1000–1300 m. S Gansu (Huixian, Qingyan).

68. Aster itsunboshi Kitamura, Acta Phytotax. Geobot. 3: 130. 1934.

大埔紫菀 da pu zi wan

Herbs, perennial, ca. 3 cm tall, scapiform; rhizomes slender and long, woody. Stems usually simple, erect, sometimes decumbent, laxly leafy. Leaves densely strigose; basal leaves rosulate, present at anthesis, winged petiolate, obovate or oblong, 1.5–2 × ca. 0.7 cm, thick, base gradually attenuate, margin serrate (teeth mucronulate), apex obtuse or ± acute; cauline leaves gradually smaller, shortly petiolate or subsessile, spatulate or lanceolate, base attenuate, apex acute. Capitula 1 or 2, shortly pedunculate, erect, ca. 8 mm in diam. Involucres hemispheric, 4–7 mm, tinged purple-red; phyllaries 2-seriate; outer phyllaries lanceolate, short, margin fimbriate-ciliate, scabrous, apex acuminate. Ray florets white, 7.5–7.7 mm, tube ca. 1.6 mm; disk florets ca. 3.6 mm, tube ca. 1.2 mm, limb campanulate, lobes lanceolate, ca. 2 mm, glabrous. Achenes (immature) strigose. Pappus (immature) dirty white, often tinged yellow, or reddish, ca. 2 mm.

• Stony mountains. Taiwan.

The original description of *Aster itsunboshi* was translated from Kitamura. The material seen at PE was damaged in the area of the capitula so some floral and achene characters could not be determined. According to Soejima and C. I Peng (Fl. Taiwan, ed. 2, 4: 855–857. 1998), citing Kitamura, this may be a juvenile form of *A. morrisonensis*. If this hypothesis were to prove incorrect, the species might be best treated in *A.* sect. *Alpigeni*.

69. Aster molliusculus (Lindley ex Candolle) C. B. Clarke, Compos. Ind. 45. 1876.

软毛紫菀 ruan mao zi wan

Diplopappus molliusculus Lindley ex Candolle, Prodr. 5: 277. 1836; *D. roylei* Lindley ex Candolle.

Herbs, perennial, 8–30(–40) cm tall, caespitose; caudex taprooted, sometimes thick and woody. Stems erect, simple, sometimes branched in upper part, sparsely villosulous, more densely so upward and below leaves, very sparsely to moderately minutely stipitate glandular, resinous. Leaves cauline, usually gradually increased upward, abaxially pale green (± spongelike), adaxially green, abaxially glabrous or sparsely strigose or villosulous, veins sparsely strigillose to strigose, sparsely minutely stipitate glandular in pits, adaxially glabrous, strigose, sparsely scabridulous, or sparsely villosulous, sometimes resinous, margin sparsely ciliate, midvein prominent abaxially, apex acute, mucronate; lowest leaves usually withered by anthesis, scaly, marcescent; lower to upper leaves shortly petiolate (petiole to 1 cm), oblanceolate to narrowly oblanceolate, 1–3.5 × 0.3–0.8 cm, base attenuate to cuneate, margin sometimes revolute, entire (lower) or 2–6-serrate (upper). Capitula terminal, solitary (rarely 2) on branches; peduncles 3–13 mm, sparsely to densely strigillose, sometimes minutely stipitate glandular; bracts linear-lanceolate, entire. Involucres campanulate, 7–10 mm; phyllaries 2- or 3-seriate, unequal, green distally, linear-lanceolate, 0.5–1.1 mm wide, glabrous or strigillose on midvein, eglandular, margin scarious, erose, eciliate, midvein swollen or ridged proximally, ± translucent, apex acuminate, erose, purplish, eciliate; outer phyllaries 4–5 mm; middle phyllaries 6–7 mm, base hardened; inner phyllaries 6–9 mm. Ray florets 15–25, white or pink, tube hairy, sometimes minutely stipitate glandular, lamina 5–9 × 1.5–2.1 mm; disk florets yellow, 5–6 mm, tube base flared, tube and limb base sometimes sparsely hairy, minutely stipitate glandular, limb ± campanulate, 3–3.5 mm, lobes spreading, narrowly triangular, 0.8–1 mm, glabrous, eglandular. Achenes oblong, slightly compressed, 3–4 mm, moderately to densely strigillose, eglandular, 4-ribbed. Pappus 4-seriate, dirty white; outermost series ± scaly, 0.5–1.5 mm; outer bristles few, slender, 2.5–3.5 mm; inner bristles 4.5–5 mm, acute; innermost bristles 5–6.5 mm, weakly clavate to clavate. Fl. May–Jun, fr. Jun–Sep. $2n = 18, 27$.

Alpine and subalpine stony slopes; 1800–3500 m. W Xizang [NW India, Kashmir, Pakistan].

70. Aster sikkimensis J. D. Hooker, Bot. Mag. 77: t. 4557. 1851.

锡金紫菀 xi jin zi wan

Subshrubs or herbs, perennial, 50–80 cm tall, rhizomatous. Stems erect, simple, stout, flexuous, ± woody at base, purplish, finely striate, strigillose, villosulous, sparsely minutely stipitate glandular, particularly below leaves. Leaves cauline, slightly reduced upward, abaxially pale green, glabrous, veins sparsely strigillose, minutely stipitate glandular, sometimes in pits, adaxially green, densely scabridulous, margin coarsely serrate, ciliate, veins prominent, apex long acuminate, mucronate; lowest leaves withered by anthesis (not seen), broadly winged peti-

olate, lanceolate, ca. 22 cm, base attenuate, apex acuminate; lower leaves (not seen) to upper leaves shortly broadly winged petiolate (base clasping) or sessile, lanceolate, (5–)6–17 × 1.5–5.5 cm, base attenuate or auriculate, clasping; synflorescence leaves sessile, lanceolate, 0.5–6 × 0.1–1.2 cm, base auriculate, clasping, margin serrate to serrulate, rapidly becoming bracts. Capitula 10–45 or more, in terminal corymbiform synflorescences, 10–12 mm in diam.; peduncles 6–50 mm, densely strigillose; bracts linear-lanceolate, entire. Involucres campanulate, 4–4.5 mm; phyllaries 2- or 3-seriate, subequal, sometimes squarrose, green distally, oblanceolate to lanceolate or linear-lanceolate (inner phyllaries), 3.5–4.5 × 0.5–1 mm, abaxially sparsely strigillose, mainly on veins, sparsely to moderately minutely stipitate glandular, margin scarious to narrowly scarious, erose, sparsely ciliate, midvein more pronounced distally, ± translucent, apex acuminate, purplish, sparsely ciliate. Ray florets 30–35(–60), white, rose, blue, or purple, tube apex sparsely stipitate glandular, lamina 4–5 × ca. 1 mm, glabrous; disk florets yellow, becoming purplish, 3.5–4 mm, tube base flared, limb campanulate, ca. 2 mm, glabrous, proximally sparsely stipitate glandular, lobes spreading, narrowly triangular, 0.8–1 mm, purplish. Achenes obovoid, slightly compressed, ca. 2.2 mm, sparsely strigillose, eglandular, 4-ribbed. Pappus 2- or 3-seriate, brownish; outer bristles 0–2, slender, 1.5–2 mm; inner bristles 2.5–3 mm, acute; innermost bristles 3.5–4 mm, slightly clavate. Fl. Aug–Oct.

2400–3600 m. S Xizang [India (Sikkim), Nepal].

Aster sikkimensis is related to *A. nigromontanus*, but it differs by its finely pubescent phyllaries and leaf shape.

71. Aster pycnophyllus Franchet ex W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 332. 1915.

密叶紫菀 mi ye zi wan

Aster harrowianus Diels var. *pycnophyllus* (Franchet ex W. W. Smith) H. Léveillé.

Herbs, perennial, rhizomatous. Stems erect, 30–60 cm tall, flexuous, reddish, glabrescent below, moderately to densely strigose-villous above, usually branched only at synflorescence, more densely leafy above. Leaves cauline, thin, abaxially villous on veins, adaxially scabrous, both surfaces stipitate glandular, midvein ± prominent abaxially, lateral veins in 4 or 5 pairs, distinct; lower leaves absent at anthesis; middle and upper leaves petiolate; petiole 1–2(–4) cm, rarely subsessile; blade ovate to lanceolate, 7–13 × 2–2.5 cm, base truncate, rounded, or somewhat cordate, or attenuate, margin coarsely serrate (teeth mucronate), apex long acuminate (sometimes falcate); uppermost leaves smaller, narrowly ovate to lanceolate or linear. Capitula numerous in corymbiform synflorescences, 1.5–2 cm in diam.; peduncles 1–1.5 cm; bracts linear. Involucres campanulate, 4–5 × 6–8 mm; phyllaries 3- or 4-seriate, unequal, lanceolate to oblong, 2.8–4 × 0.6–0.8 mm, abaxially villosulous, apex acuminate, outer phyllaries purple, inner phyllaries with margin scarious, erose-fimbriate. Ray florets 10–30, purplish blue to nearly white, tube 1.8–2 mm, hairy, lamina 4–7 × 0.7–1.2 mm; disk florets yellow or sometimes purplish tinged, 4.2–5 mm, tube 1.2–1.6 mm, limb funnelform, tube, limb, and lobes hairy, lobes lanceolate, 1–1.1 mm. Achenes lanceoloid, compressed, 1.7–2 × ca. 0.7 mm, strigose, 2-ribbed. Pappus 3-seriate, dirty white; outer bristles slender, ca. 2.7 mm; inner bristles ca. 3.8 mm, acute; innermost bristles clavate. Fl. Jun–Oct, fr. Sep–Dec.

Subalpine slopes, grasslands, thickets; 1000–3800 m. Sichuan, E and SE Xizang, NW Yunnan [India, N Myanmar].

72. Aster nigromontanus Dunn, J. Linn. Soc., Bot. 35: 501. 1903 [*"nigromontana"*].

黑山紫菀 hei shan zi wan

Herbs, perennial, 40–50 cm tall, rarely caespitose, rhizomatous. Stems erect, simple, stout, flexuous, shallowly striate, glabrous proximally, sparsely strigillose distally, eglandular. Leaves: basal leaves in a rosette, disappearing before stem elongation, winged long (petiole to 2.5 cm) or shortly petiolate; blade abaxially pale green, adaxially green, oblong, 4–6 × 1.5–2.5 cm, slightly reduced upward, abaxially glabrous, veins sparsely strigillose, very sparsely minutely stipitate glandular in pits, adaxially densely scabridulous, very sparsely minutely stipitate glandular in pits, base abruptly attenuate, margin coarsely serrate (teeth mucronate), ciliate, midvein prominent, apex acuminate, mucronate; lowest leaves withered by anthesis (not seen); lower leaves (not seen) to upper leaves shortly broadly winged petiolate (base clasping) or sessile, lanceolate, 11.5–17 × 2.8–6 cm, base attenuate; synflorescence leaves sessile, lanceolate, ca. 3.3 × 1 cm, base auriculate, clasping, rapidly becoming bracts. Capitula numerous, in terminal corymbiform synflorescences, 1.5–1.8 cm in diam.; peduncles 10–20 mm, densely strigillose, minutely stipitate glandular; bracts linear-lanceolate, entire. Involucres campanulate, 5–6 × 6–7 mm; phyllaries 2- or 3-seriate, subequal, green, lanceolate to oblong-lanceolate, 4–6 × 1–1.2 mm, abaxially sparsely strigillose proximally on veins, moderately to sparsely minutely stipitate glandular proximally, margin scarious or narrowly scarious, erose, sparsely ciliate, midvein more pronounced basally, ± translucent, apex acuminate, sometimes purplish, eciliate. Ray florets 25–30, white, tube hairy, stipitate glandular, lamina 5–7 × 1–1.2 mm, (2-veined), glabrous, eglandular; disk florets yellow, ca. 5 mm, tube base flared, veins prominent, translucent, limb campanulate, ca. 3.2 mm, hairy, very sparsely stipitate glandular, lobes spreading, narrowly triangular, ca. 1.2 mm. Achenes (immature) obovoid, slightly compressed, ca. 3 mm, sparsely strigillose, sparsely minutely stipitate glandular apically, 2-ribbed. Pappus 3- or 4-seriate, dirty white or slightly reddish; outermost bristles slender, ca. 0.5 mm; outer bristles few or none, slender, ca. 3 mm; inner bristles ca. 4.2 mm, acute; innermost bristles 4.6–4.7 mm, clavate. Fl. unknown, fr. Nov.

• Grasslands on slopes; 1500–3000 m. Yunnan (Jingdong, Mengzi).

The above description of *Aster nigromontanus* is based on the cotype at MO.

73. Aster falcifolius Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 610. 1937.

镰叶紫菀 lian ye zi wan

Aster brachyphyllus C. C. Chang (1935), not (Sonder) F. Mueller (1865).

Herbs, perennial, 30–55 cm tall; rhizomes long, slender. Stems erect, simple, shortly branched in upper part, finely striate, shiny, resinous, leafy, sparsely to densely villosulous to strigillose, sparsely or densely minutely stipitate glandular. Leaves cauline, slightly reduced upward, abaxially pale green, glabrous, veins sparsely strigillose, minutely stipitate glandular in pits, adaxially green, scabridulous, sparsely minutely stipitate glandular on veins, ± resinous, margin serrate to remotely serrate, ciliate, midvein prominent abaxially, sometimes 3-veined, reticulate venation prominent, apex acuminate to falcate-acuminate, mucronate; lowest leaves withered by anthesis, shortly winged petiolate; blade obovate to oblanceolate, 0.7–9 cm, base tapering; lower to upper leaves shortly petiolate (petiole to 0.3 cm); blade broadly to narrowly lanceolate, sometimes falcate, 2.7–7 × 0.6–1.7 cm, base rounded. Capitula 6–20 in terminal or axillary, racemiform synflorescences, sometimes distributed along much of stem, 2.5–3 cm in diam., sessile or peduncles 0.1–20 mm, densely strigillose, minutely stipitate glandular, resinous; bracts linear-oblanceolate, entire, sometimes crowded below head, often grading into phyllaries. Involucres campanulate, 6–8 × 8–12 mm; phyllaries 4- or 5-seriate, unequal, green apically, often squarrose, falcate, 0.7–1 mm wide, margin narrowly scarious, erose, ciliate (outer phyllaries) to densely villous-ciliate (inner phyllaries) distally, midvein more pronounced distally, plus 3–7 dark green striae, apex obtuse to rounded, tip purplish (sometimes whole apex purplish), eciliate, ?minutely stipitate glandular, thinly to thickly resinous; outer phyllaries lanceolate, 1.5–3 mm; middle phyllaries oblong, 4–7 mm, base hardened; inner phyllaries oblong to linear-oblong, 6–9 mm. Ray florets 30–35, white or lavender, tube apex and lamina base sparsely hairy, lamina 6–8 × 1–1.5 mm, eglandular; disk florets yellow, ca. 6 mm, tube base flared, tube apex and limb base hairy, limb campanulate, ca. 4 mm, lobes spreading, triangular, ca. 1 mm, glabrous, eglandular. Achenes oblong, compressed, 2.7–3 mm, strigillose, sparsely stipitate glandular, 2-ribbed. Pappus 4-seriate, white or ± reddish, outermost slender bristles 0.4–0.8 mm; outer bristles few, slender, 2–3.5 mm; inner bristles ca. 5 mm, acute; innermost bristles ca. 5.5 mm, weakly clavate. Fl. Aug–Oct, fr. Oct–Nov.

• Slopes, roadsides, stream banks, rock outcrops; 600–1800 m. S Gansu, W Hubei, S Shaanxi, NW and W Sichuan.

74. Aster turbinatus S. Moore, J. Bot. 16: 132. 1878.

陀螺紫菀 tuo luo zi wan

Herbs, perennial, 60–100 cm tall, rhizomatous. Stems erect, simple, sometimes long branched in upper part, finely striate, villous, sparsely minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, adaxially green, both surfaces moderately scabrous, more densely so adaxially, very sparsely minutely stipitate glandular, margin serrate to serrulate (teeth mucronulate), scabrous, midvein prominent abaxially, apex acute to acuminate, mucronate; lowest leaves (partly observed) withered by anthesis, narrowly winged petiolate; lower to upper leaves shortly winged petiolate (lower leaves), pandurate or ovate to ovate-lanceolate, 3.5–10.5(–15) × 0.8–2.8 cm, base truncate or rounded or auriculate-clasping; synflorescence leaves sessile, lanceolate to ovate, 0.8–3 × 0.4–0.8 cm, base rounded, ± clasping. Capitula 1–10 in terminal racemiform synflorescences; peduncles 2–15 mm, strigillose; bracts numerous, sometimes overlapping, lowest bracts leaflike, ciliate, middle and upper bracts phyllary-like. Involucres campanulate, 10–12 × 10–18 mm; phyllaries 5- or 6-seriate, unequal, green apically, abaxially glabrous, eglandular, margin scarious, erose, purplish, ciliate, midvein somewhat more pronounced distally, ± translucent, apex obtuse, erose, purplish, ciliate; outer phyllaries broadly ovate, ca. 3 × 2.5–3 mm; middle phyllaries ovate to oblanceolate, 5–7 × 2–3 mm, base ± hardened; inner phyllaries oblong to narrowly oblong, 8–12 × 1.2–1.8 mm. Ray florets 20–27, white or purple, lamina 10–11(–14) × 1.5–1.8(–3) mm, glabrous, eglandular; disk florets yellow, ca. 6 mm, tube base flared, limb campanulate, ca. 3.5 mm, lobes spreading, tip recurved, narrowly triangular, ca. 1.5 mm, glabrous, eglandular. Achenes mottled red, narrowly obovoid, slightly compressed, ca. 3 mm, strigillose, apically sparsely minutely stipitate glandular, 4- or 5-ribbed. Pappus 4-seriate, white; outermost bristles few, slender, 0.5–0.7 mm; outer bristles slender few, 3.5–4 mm; inner bristles 4.1–4.9 mm, tapering; innermost bristles 6–6.2(–6.5) mm, ± clavate. Fl. Aug–Oct, fr. Oct–Nov.

• Open forests, thickets, grasslands, hillsides, stream banks, shaded places; 200–800 m. Anhui, Fujian, Jiangsu, Jiangxi, Zhejiang.

The distinction between the two varieties of *Aster turbinatus* needs to be investigated.

1a. Lower leaf blade ovate or ovate-lanceolate, base truncate or rounded; ray floret lamina purple, ca. 14 × 2.5–3 mm ..... 74a. var. *turbinatus*

1b. Lower leaf blade pandurate, base deeply auriculate-clasping; ray floret lamina white, smaller .... 74b. var. *chekiangensis*

74a. Aster turbinatus var. **turbinatus**

陀螺紫菀(原变种) tuo luo zi wan (yuan bian zhong)

Lower leaf blade ovate or ovate-lanceolate, base truncate or rounded. Ray floret lamina purple, ca. 14 × 2.5–3 mm.

• Hillsides, stream banks, shaded places; 200–800 m. Anhui, Fujian, Jiangsu, Jiangxi, Zhejiang.

74b. Aster turbinatus var. **chekiangensis** C. Ling ex Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

仙白草 xian bai cao

Lower leaf blade pandurate, base deeply auriculate-clasping. Ray floret lamina white, smaller.

• Open forests, thickets, grasslands. Zhejiang.

Aster turbinatus var. *chekiangensis* is used medicinally for treating snakebites.

75. Aster baccharoides (Bentham) Steetz, Bot. Voy. Herald, 385. 1857.

白舌紫菀 bai she zi wan

Diplopappus baccharoides Bentham, London J. Bot. 1: 487. 1842; *Aster brevipes* Bentham.

Low shrubs or perennial herbs, 15–150 cm tall, basally woody, rhizomatous. Stems erect, branched or sometimes simple (herb), finely striate, densely strigose, minutely stipitate glandular. Leaves cauline, slightly reduced upward, abaxially pale green, moderately strigose, moderately to densely minutely stipitate glandular, adaxially green, densely scabridulous, minutely stipitate glandular, margin serrate to serrulate (teeth mucronulate), scabrous, midvein prominent abaxially, apex acute, mucronate; lowest leaves withered by anthesis (herb), lower to upper leaves shortly winged petiolate; blade narrowly ovate to lanceolate, 1.3–7.5 × 0.4–1.8 cm, base attenuate to rounded; synflorescence leaves shortly petiolate, broadly lanceolate to oblanceolate, 0.7–3 × 0.3–0.8 cm, base cuneate to rounded, margin entire. Capitula numerous, in terminal or axillary corymbiform to paniculiform synflorescences, 1.5–2 cm in diam.; peduncles 2–8 mm, strigillose; bracts oblanceolate, margin entire, becoming phyllary-like distally. Involucres campanulate, 6–7 × ca. 7 mm; phyllaries 5–7-seriate, unequal, narrowly green apically, sometimes distally purplish, abaxially moderately to densely strigose, more so distally, sparsely to moderately minutely stipitate glandular, margin scarious (more broadly so in inner phyllaries), erose, villous-ciliate, midvein somewhat more pronounced distally, ± translucent, sometimes 3-veined, apex acute to obtuse or rounded, erose, sometimes mucro or tip purplish, ciliate; outer phyllaries broadly lanceolate to lanceolate, 1.5–2 × 0.7–1 mm; middle phyllaries lanceolate-oblong, 3–5 × 1–1.2 mm, base ± hardened; inner phyllaries oblong, 6–7 × 1–1.5 mm. Ray florets 8–18, white, lamina ca. 6 × 1.2–1.7 mm, glabrous, eglandular; disk florets yellow, 4.5–6.5 mm, tube base flared (veins marked), limb campanulate, 2.5–3.5 mm, glabrous, minutely stipitate glandular proximally, lobes spreading, tip recurved, narrowly triangular, 1.2–2 mm, glabrous, eglandular. Achenes dark purple, oblong, slightly compressed, ca. 3.5 mm, strigillose, apically sparsely minutely stipitate glandular, 2-ribbed. Pappus 4-seriate, white, of slender bristles; outermost bristles 1–3, 0.5–1.2 mm; outer bristles absent or 1, ca. 3 mm; inner bristles 4–5 mm, acute; innermost bristles 5–6 mm, clavate. Fl. Jul–Oct, fr. Aug–Nov.

• Slopes, grasslands, shrublands, sandy areas, sea bluffs, roadsides; sea level to 1000 m. Fujian, Guangdong, E Guangxi, Hunan, Jiangxi, Zhejiang.

Aster baccharoides is closely related to *A. turbinatus* but differs in having basally woody stems, narrow leaves, small capitula and florets, and white ray floret lamina.

76. Aster sinianus Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 609. 1937.

岳麓紫菀 yue lu zi wan

Herbs, perennial, rhizomatous. Stems erect, 40–60 cm tall, slender, canaliculate, woody at base, covered with spreading or crisped short hairs, shortly branched at middle part, with scattered leaves. Leaves abaxially sparsely hispidulous, rarely sparsely hispidulous on veins, adaxially sparsely puberulent, glabrescent, sometimes glandular, margin ciliate, midvein abaxially prominent, lateral veins indistinct; basal leaves absent at anthesis; lower cauline leaves broadly winged petiolate; blade oblong or narrowly elliptic, 3–7 × 0.7–1.5 cm, base attenuate, margin entire or sparsely serrate (teeth mucronate), apex obtuse or acute; upper leaves often sessile, 0.5–2.5 mm, margin entire, apex rounded. Capitula 1–3, axillary at short branches and arranged in paniculate corymbs, ca. 1.5 cm in diam.; peduncles to 2 cm; bracts few, lanceolate, leaflike. Involucres campanulate or obconic, 4–5 × 5–6 mm; phyllaries ca. 4-seriate, unequal; outer phyllaries dark brown, ovate, 1–2 × ca. 1 mm, pubescent, apex mucronate; inner phyllaries oblong, ca. 4 × 1.2 mm, margin shortly ciliate, apex hairy. Ray florets ca. 10, white, tube ca. 3 mm, lamina ca. 4 × 1.5–2 mm; disk florets ca. 4 mm, tube ca. 1.5 mm, sparsely hairy, lobes ca. 1.5 mm. Achenes oblong, ± compressed, 1.5–2 mm, strigose. Pappus white, bristles to 4 mm. Fr. Jul–Sep.

• Roadsides on slopes; 600–900 m. Hunan, Jiangxi.

No specimens of *Aster sinianus* were seen by one of us (Brouillet).

77. Aster velutinosus Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

毡毛紫菀 zhan mao zi wan

Herbs, perennial, ca. 50 cm tall (lower part not seen). Stems slender above middle, branched, puberulent, upper part white velutinous, densely or loosely leafy in upper part. Leaves abaxially gray-green, adaxially somewhat shiny, (lower leaves not seen); middle leaves sessile or shortly petiolate (petiole ca. 1.5 mm); blade lanceolate, 4–7.5 × 0.9–1.6 cm, abaxially densely velutinous, adaxially glabrous, villosulous at base and on veins, thin, base slightly rounded or subcuneate, margin slightly revolute, entire, scabrous, triplinerved, veins ± prominent abaxially, lateral veins 6 or 7 pairs, apex acuminate, sometimes falcate, mucronate. Capitula 2 or 3 at ends of branches, in ± corymbiform synflorescences; shortly pedunculate. Involucres campanulate, 4–5 mm; phyllaries 4- or 5-seriate, unequal; outer phyllaries ovate, ca. 1.5 mm, abaxially puberulent; inner phyllaries oblong, ca. 4 mm, margin narrowly scarious, apex rounded to obtuse, thick. Ray florets not seen; disk florets yellow, 3.4–3.8 mm, tube 1.2–1.3 mm, limb narrowly campanulate, lobes lanceolate, 1.1–1.2 mm, apically glandular and villous. Achenes brown, narrowly oblong, slightly compressed, ca. 2.9 mm, sparsely strigose, moderately so distally, pale 5- or 6-ribbed. Pappus reddish brown, 2-seriate; inner series ca. 3 mm, acute; innermost series 3.3–3.6 mm, clavate. Fl. Jul.

• Thickets on mountains; ca. 200 m. Guangxi.

Ray florets were not observed by us on the available specimens of *Aster velutinosus*; the capitula on the type specimen are too immature. On the fruiting specimen, however, there is no sign of ray florets, including on a head that was not fully opened; only disk florets were seen there.

78. Aster ovalifolius Kitamura, Acta Phytotax. Geobot. 1: 289. 1932.

卵叶紫菀 luan ye zi wan

Herbs, perennial, 40–100 cm tall. Stems sparsely branched, tomentose above. Leaves: basal leaves withered at anthesis;

cauline leaves crowded, sessile or shortly petiolate (petiole ca. 2 mm), adaxially pale green, ovate, 3.5–5.5 × 1.5–2.5 cm, slightly papery, both surfaces hispidulous, abaxially gland-dotted, base rounded, margin subentire or sparsely serrate at middle part, basally 3-veined, apex acute; upper leaves smaller, few near synflorescence, 0.8–1.5 cm. Capitula numerous, in paniculate-corymbiform synflorescences, 0.6–1.5 cm in diam.; peduncles 0.5–1.6 cm, erect or spreading, ± strict, densely pubescent, sometimes with a bract ca. 1 mm. Involucres campanulate, 6–7 × ca. 7 mm; phyllaries 4- or 5-seriate, ?unequal, oblong-lanceolate, margin entire, ciliate, apex brown, obtuse to rounded; outer phyllaries 1.5–2 mm; inner phyllaries gradually longer, 4–4.5 mm. Ray florets white, tube ca. 3 mm, lamina 7–8 × ca. 1.5 mm; disk florets yellow, 4–4.5 mm, tube ca. 2.5 mm, limb ca. 2.8 mm. Achenes oblong, slightly compressed, ca. 2 × 0.8 mm, strigose, 4–6-ribbed. Pappus dirty white or reddish brown, of unequal bristles ca. 4.5 mm. Fl. Aug.

• Sea level to low elevations. Taiwan.

No specimens of *Aster ovalifolius* were seen by us. The description is partly based on the treatment by Soejima and C. I Peng (Fl. Taiwan, ed. 2, 4: 859–861. 1998).

79. Aster sampsonii (Hance) Hemsley, J. Linn. Soc., Bot. 23: 415. 1888 [*"Sampsoni"*].

短舌紫菀 duan she zi wan

Herbs, perennial, 30–97 cm tall, basally woody, rhizomatous. Stems erect, simple, finely striate (reddish or white), sparsely to densely villosulous, sparsely minutely stipitate glandular below leaves. Leaves cauline, gradually reduced upward, abaxially pale green, moderately scabridulous, strigose, minutely stipitate glandular, adaxially green, densely scabridulous, margin revolute, serrate to serrulate (teeth mucronulate), villosulous-ciliate, midvein prominent abaxially, apex acute, mucronate; lowest leaves (partly observed) withered by anthesis, sometimes marcescent, narrowly winged petiolate, smaller; lower to upper leaves long to shortly winged petiolate; blade ovate to linear-oblanceolate, 2–9.5 × 0.4–3.3 cm, base attenuate to cuneate; synflorescence leaves shortly winged petiolate, lanceolate, 0.9–2.5 × 0.3–0.5 cm. Capitula 7–38 in terminal, open corymbiform synflorescences, 0.8–1.5 cm in diam.; peduncles 9–45 mm, densely strigillose; bracts linear-lanceolate, entire, sometimes grading into phyllaries. Involucres campanulate, 4–6 mm; phyllaries 5- or 6-seriate, unequal, green apically, oblong, abaxially sparsely to moderately strigillose, apically minutely stipitate glandular, margin scarious, erose, purplish, villous-ciliate, midvein more pronounced distally, translucent, apex acute to obtuse, sometimes apiculate, erose, sometimes purplish; outer phyllaries 2–3 × 0.3–0.9 mm; middle phyllaries 4–5 × 1–1.1 mm, base ± hardened; inner phyllaries 6–7 × 0.5–1 mm. Ray florets 15–20, white or purplish, lamina 6–9 × 1.5–12 mm, glabrous, eglandular; disk florets yellow, ca. 6 mm, tube base flared (veins slightly marked), limb campanulate, ca. 3.5 mm, sparsely hairy, eglandular, lobes spreading, tip recurved, narrowly triangular, ca. 1.2 mm, glabrous, minutely stipitate glandular. Achenes narrowly obovoid, slightly compressed, 1.8–2 mm, sparsely strigillose, sparsely minutely stipitate glandular, 2-ribbed. Pappus 3-seriate, orangish; outermost series of scales few, whitish, linear, 0.3–1.2 mm; inner bristles 3–4 mm, acute; innermost bristles 4.5–5 mm, ± clavate. Fl. and fr. Jul–Oct.

• Grasslands or meadows on slopes, thickets; 500–1000 m. Guangdong, Guangxi, Hunan.

1a. Pappus absent in ray florets ..... 79a. var. *sampsonii*
1b. Pappus present in ray florets and disk florets ..... 79b. var. *isochaetus*

79a. Aster sampsonii var. **sampsonii**

短舌紫菀(原变种) duan she zi wan (yuan bian zhong)

Heteropappus sampsonii Hance, J. Bot. 5: 370. 1867; *Erigeron hirsutus* Loureiro.

Pappus of ray florets absent.

• Guangdong, Hunan.

79b. Aster sampsonii var. **isochaetus** C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 7: 162. 1936.

等毛短舌紫菀 deng mao duan she zi wan

Pappus of ray florets present.

• N Guangdong, Guangxi, S Hunan.

7. Aster sect. **Alpigeni** Nees, Gen. Sp. Aster. 24. 1832.

山菀组 shan wan zu

Chlamydites J. R. Drummond; *Wardaster* J. Small.

Herbs, perennial, usually simple, erect. Leaves basal (persistent or deciduous by anthesis) and cauline; blade spatulate or oblanceolate to ovate, oblong, or lanceolate to linear-lanceolate, margin flat, entire or serrate to coarsely serrate, rarely deeply pinnatifid, 1-veined. Capitula radiate, terminal, solitary at ends of scapiform stems, rarely 2–8 in corymbiform synflorescences. Involucres hemispheric to broadly campanulate; phyllaries 2- or 3-seriate, equal or subequal (outer sometimes shorter), rarely unequal, leaflike or upper part leaflike, not keeled, margin sometimes scarious. Receptacles flat or ± convex. Ray florets 1-seriate, 10–60(–100), purple, reddish, mauve, lavender, lilac, blue, pink, or white; disk floret limb funnelform to narrowly funnelform, sometimes campanulate, lobes equal. Achenes broadly to narrowly obovoid or oblong to oblanceoloid, ± compressed, 2(–4)-ribbed. Pappus of ray and disk florets 1–4-seriate, of persistent, rarely caducous, numerous free bristles, innermost series clavate, outermost series of short bristles, sometimes scales.

About 50 species: C, NE, and SW Asia, Europe, and North America; 44 species (28 endemic) in China.

1a. Outer phyllary margin broadly scarious.
2a. Phyllaries linear to obovate-oblong; capitula 2–8, in corymbiform synflorescences ..... 121. *A. senecioides*
2b. Phyllaries lanceolate to linear-lanceolate; capitula terminal, solitary.
3a. Phyllaries 6–12 mm; plants 3–15 cm tall ..... 122. *A. batangensis*
3b. Phyllaries 5–7 mm; plants ca. 45 cm tall ..... 123. *A. rockianus*
1b. Outer phyllary margin leaflike or hardened basally, sometimes narrowly or broadly scarious.
4a. Pappus 3- or 4-seriate, inner series of bristles equaling disk corollas, white, whitish, or somewhat tinged red, outermost series of scales.
5a. Phyllaries unequal, outer shorter than inner ones; leaf margin pinnatisect ..... 120. *A. bipinnatisectus*
5b. Phyllaries subequal or equal; leaf margin entire or remotely serrate to serrulate.
6a. Ray floret lamina linear-lanceolate.
7a. Plants with tuberoid roots.
8a. Involucres 6–9 mm in diam., phyllaries 1–1.5 mm wide; disk florets orange-yellow, lobes minutely purple stipitate glandular ..... 109. *A. asteroides*
8b. Involucres 6–7 mm in diam., phyllaries 1.5–3 mm wide; disk florets yellow, purplish brown distally, lobes sparsely minutely stipitate glandular ..... 110. *A. likiangensis*
7b. Plants long rhizomatous.
9a. Involucres 2–3 cm in diam.; disk florets yellow or purplish tinged ..... 113. *A. tsarungensis*
9b. Involucres 1.5–2(–3) cm in diam.; disk florets orange to yellow.
10a. Plants densely or sparsely villous, usually also glandular, or leaves glabrate; involucres 1.5–2(–3) cm in diam., phyllaries 1–2 mm wide ..... 111. *A. flaccidus*
10b. Plants densely white hirsute or villous or tomentose; involucres ca. 1.5 cm in diam., phyllaries ca. 1 mm wide ..... 112. *A. hololachnus*
6b. Ray floret lamina linear.
11a. Stems 5–12 cm ..... 119. *A. brevis*
11b. Stems 13–75 cm.
12a. Phyllaries linear-lanceolate, 1–1.5 mm wide, apex acuminate to long acuminate.
13a. Inner phyllary margin scarious, abaxially brown stipitate glandular ..... 117. *A. lipskii*
13b. Phyllary margin narrowly scarious, villous, eglandular, inner series often glabrate ..... 118. *A. farreri*
12b. Phyllaries (1–)2–5 mm wide, apex acute or acuminate.
14a. Phyllaries dark colored stipitate glandular, ± villous along veins; disk florets orange to yellow, apex blackish or brownish purple ..... 114. *A. diplostephioides*
14b. Phyllaries white villous, sometimes glandular; disk florets yellow to orange.
15a. Middle and upper cauline leaves lanceolate or oblong to oblanceolate; involucres 1.5–2.5 cm in diam., phyllaries 0.8–4(–5) mm wide ..... 115. *A. yunnanensis*
15b. Middle and upper cauline leaves lanceolate to linear; involucres 0.8–0.9 cm in diam., phyllaries 1.5–2 mm wide ..... 116. *A. setchuenensis*
4b. Pappus 2–4-seriate, of barbellate bristles, sometimes outer series of few slender bristles or scales.
16a. Phyllaries lanate.
17a. Disk corolla tube and limb sparsely villosulous, lobes lanate ..... 107. *A. prainii*
17b. Disk corolla tube and limb without long hairs ..... 108. *A. neolanuginosus*
16b. Phyllaries abaxially pilose, pilosulose, scabridulous, strigillose, strigose, hirsute-villous, hirsutulous, hispidulous, villous or villosulous to lanate, glabrate, or glabrous, sometimes glandular.
18a. Phyllaries leaflike at least apically, apex acute or acuminate.
19a. Pappus brown, purplish, or reddish brown, sometimes also yellowish at base.
20a. Achenes not winged.
21a. Pappus 3-seriate, outermost series of short bristles or scales, inner series of distally brown bristles; achenes oblanceolate, sparsely strigose; ray florets 25–30, lamina 10–20 mm ..... 101. *A. latibracteatus*
21b. Pappus 2–4-seriate, outermost series of scales or slender bristles, inner series of reddish brown or brown bristles; achenes obovoid; ray florets 44–100, lamina 20–30 mm.
22a. Pappus 3- or 4-seriate, outermost series of few slender bristles or none, inner series of barbellate bristles; achenes glabrous or distally glabrate, minutely stipitate glandular ..... 103. *A. bietii*
22b. Pappus 2-seriate, outermost series of narrow to broad scales, inner series of barbellate bristles; achenes sparsely strigillose, eglandular ..... 102. *A. bulleyanus*
20b. Achenes winged.
23a. Basal leaves present at anthesis, middle and upper cauline leaves oblong to linear-lanceolate .... 106. *A. jeffreyanus*
23b. Basal leaves withered at anthesis, middle and upper cauline leaves ovate, oblong, or ovate-lanceolate.
24a. Capitula 3.5–4 cm in diam.; outer phyllaries 5–7 mm wide, hispidulous; lamina ca. 14 × 0.7 mm; pappus longer than tube of disk florets ..... 104. *A. platylepis*

24b. Capitula 3–7.5 cm in diam.; outer phyllaries 1–4 mm wide, sparsely pilose to glabrate; lamina 15–35 × 1–3 mm; pappus 1–4 mm ..... 105. *A. brachytrichus*

19b. Pappus white or whitish, reddish, yellowish, or straw-colored to brownish.

25a. Stems erect ..... 100. *A. retusus*

25b. Stems ascending.

26a. Plants with long slender stolons (to 30 cm) ..... 99. *A. stracheyi*

26b. Plants without stolons or with short stolons.

27a. Plants eglandular; pappus straw-colored to brownish reddish brown.

28a. Phyllaries leaflike, margin broadly scarious; ray florets 11–30; achenes strigose distally ..... 95. *A. salwinensis*

28b. Phyllaries membranous, apex leaflike in outer series, inner bristles with broadly scarious margins; ray florets 13–17; achenes densely strigose ..... 96. *A. tientschwanensis*

27b. Plants minutely stipitate glandular; pappus whitish to straw-colored or reddish based.

29a. Pappus whitish to straw-colored; phyllaries 2.5–3.5 mm wide; ray florets 40–70 ..... 97. *A. himalaicus*

29b. Pappus reddish based, whitish above; phyllaries 3–5 mm wide; ray florets 80 or more ..... 98. *A. techinensis*

18b. Phyllaries of outer series leaflike or leaflike above, often hardened at base, apex rounded, obtuse, acute or acuminate.

30a. Pappus purplish to reddish- or purplish brown, or brown, equaling or shorter than disk florets, rarely somewhat longer.

31a. Pappus reddish brown or yellowish, of many bristles; capitula terminal, solitary, or 2–4, solitary at ends of stem and branches.

32a. Capitula terminal, solitary; phyllaries densely pilose; ray florets 11–13(–15), white; plants 4–7 cm tall, without stolons ..... 93. *A. fanjingshanicus*

32b. Capitula 1–4, solitary at ends of stems and branches; phyllaries abaxially sparsely scabridulous; ray florets 12–20, blue-purple; plants 24–40 cm tall, with stolons ..... 94. *A. giraldii*

31b. Pappus purplish to reddish- or purplish brown, or brown, of few bristles; capitula terminal, solitary, rarely solitary at ends of branches.

33a. Phyllaries squarrose, both surfaces densely hirsutulous; ray florets ca. 100 ..... 92. *A. megalanthus*

33b. Phyllaries appressed or sometimes squarrose, ± hairy or glabrous abaxially; ray florets 30–70.

34a. Rhizomes slender, often with stolons; leaves scabridulous or hirsute, phyllaries villosulous ..... 90. *A. tongolensis*

34b. Rhizomes robust; leaves glabrate to sparsely pilosulose, phyllaries abaxially sparsely to densely pilosulose distally or glabrous, margin densely pilose-ciliate or eciliate ..... 91. *A. souliei*

30b. Pappus white, dirty white, straw-colored, purplish, or buff, ± equaling or longer, rarely shorter, than disk florets, often with outer series of few short, slender bristles.

35a. Pappus purplish straw-colored; leaf surfaces strigose ..... 89. *A. handelii*

35b. Pappus white or dirty white, reddish, purplish, buff, or straw-colored; leaf surfaces ± villous, hirsute-villous, pilose, scabrous, strigose, or strigillose.

36a. Phyllaries oblong or lanceolate, apex acute, 1–1.5 mm wide; involucre 0.7–1.5 cm in diam.

37a. Basal leaves withered and lower cauline withered or present at anthesis; stems 15–45 cm tall; pappus straw-colored or sometimes purplish ..... 86. *A. lingulatus*

37b. Basal and lower cauline leaves present at anthesis; stems 40–75(–100) cm tall; pappus whitish ..... 88. *A. neoelegans*

36b. Phyllaries lanceolate to oblong or oblanceolate, spatulate, oblong, or linear, apex obtuse, rounded, acute, or sometimes acuminate, 1.3–3 mm wide, involucres 0.6–2 cm in diam.

38a. Cauline leaves rather similar in size and ± evenly distributed on stem; involucre 2–2.8 cm in diam.; phyllaries oblanceolate, 2–3 mm wide, glabrate (margin ciliate) ..... 87. *A. tricephalus*

38b. Cauline leaves reduced upward; involucres 0.6–2 cm in diam.; phyllaries 1.3–2.5 mm wide, densely or sparsely hairy.

39a. Basal leaves withered at anthesis ..... 85. *A. ionoglossus*

39b. Basal leaves present or withered and marcescent at anthesis.

40a. Pappus reddish or buff, barbellate above ..... 84. *A. barbellatus*

40b. Pappus white, dirty white, barbellate throughout.

41a. Disk floret lobes unequal ..... 83. *A. takasagomontanus*

41b. Disk floret lobes equal.

42a. Phyllaries unequal ..... 82. *A. heterolepis*

42b. Phyllaries equal or subequal.

43a. Involucres 0.6–1 cm in diam.; outer phyllaries lanceolate to oblong or oblanceolate, apex rounded or obtuse to acute or acuminate; capitula solitary, terminal ..... 80. *A. alpinus*

43b. Involucres 1–1.2 cm in diam.; outer phyllaries oblanceolate or spatulate, apex rounded or acute; capitula 2–30 in terminal corymbiform synflorescences, rarely solitary ..... 81. *A. oreophilus*

80. Aster alpinus Linnaeus, Sp. Pl. 2: 872. 1753.

高山紫菀 gao shan zi wan

Herbs, perennial, 10–35 cm tall, caespitose; rhizomes robust. Stems erect, simple, sparsely to densely villous, sparsely to moderately minutely stipitate glandular. Leaves basal and cauline, rosette marcescent at anthesis; cauline leaves much reduced upward, sparsely to moderately villous, sometimes sparsely minutely stipitate glandular, 3-veined, main veins ± prominent; basal leaves rosulate, petiolate, obovate to spatulate; lower cauline leaves with petiole winged, sometimes slender, up to 11 cm; blade linear-oblong, 1–10 × 0.4–1.5 cm, base attenuate, margin entire, sometimes undulate, apex rounded; middle cauline leaves sessile, oblong-lanceolate to linear, base attenuate. Capitula solitary, terminal, 3–3.5(–5.5) cm in diam.; bracts linear to linear-lanceolate, 1-veined. Involucres hemispheric, 1.5–2 × 0.6–1 cm; phyllaries 2- or 3-seriate, equal or subequal, rarely unequal, lanceolate to oblong or oblanceolate, 7–10 × 1.5–2.2 mm, abaxially sparsely villous to densely lanate (crosswalls sometimes purple to black), sometimes minutely stipitate glandular, margin sparsely to densely ciliate, apex rounded or obtuse to acute or acuminate; outer phyllaries leaflike or base sometimes hardened; inner phyllaries leaflike distally, margin whitish, sometimes purple-red. Ray florets 26–60, purple to blue or reddish, tube glabrous, sometimes sparsely minutely stipitate glandular near junction with lamina, lamina 10–15 × 2–2.5 mm, glabrous, eglandular; disk florets yellow, 5.5–8.5 mm, limb funnelform, 4.5–6.5 mm, proximally sparsely hairy, sparsely minutely stipitate glandular, lobes spreading, equal, narrowly triangular, 1–1.5 mm. Achenes obovoid, compressed, ca. 3 mm, 2–4-ribbed, moderately to densely strigillose, distally sparsely to moderately minutely stipitate glandular. Pappus 4-seriate, white, barbellate throughout; outermost bristles few, slender, 0.5–1.8 mm; outer bristles slender, 3–4 mm; inner bristles 5–5.5 mm, acute; innermost bristles 6.5–7 mm, weakly clavate. Fl. Jun–Aug, fr. Jul–Sep. $2n = 18, 27, 35+1$ fragm., 36, 37.

Gansu, Hebei, Heilongjiang, Nei Mongol, Qinghai, Shaanxi, Shanxi, Xinjiang [Mongolia, Russia, Tajikistan; SW Asia, Europe, W North America].

This species is very variable. Many subspecies and varieties have been recognized by previous authors. Specimens from Xiaowutai Shan (Hebei) and Taibai Shan (Shaanxi) that were identified by Handel-Mazzetti and Onno as *Aster alpinus* var. *dolomiticus* (Beck) Onno do not match the type of that name from Europe. The typical variety appears to be European and does not reach Siberia; specimens identified as *A. alpinus* var. *alpinus* in China belong to *A. alpinus* var. *vierhapperi*, the variety widespread from Siberia to North America.

1a. Phyllaries unequal, apex rounded ..... 80d. var. *diversisquamus*
1b. Phyllaries subequal, apex obtuse or rounded.
2a. Leaves abaxially ± densely glandular ..... 80c. var. *fallax*
2b. Leaves sometimes ± glandular.
3a. Leaves densely to sparsely villous or subglabrous, lower leaves spatulate or oblong-spatulate ..... 80a. var. *vierhapperi*
3b. Leaves densely pubescent or densely villous, lower leaves linear-oblong ..... 80b. var. *serpentimontanus*

80a. Aster alpinus var. **vierhapperi** (Onno) Cronquist, Vasc. Pl. Pacific NorthW. 5: 76. 1955.

空秆高山紫菀 kong gan gao shan zi wan

Aster alpinus subsp. *vierhapperi* Onno, Biblioth. Bot. 26(Heft 106): 25. 1932; *A. culminis* A. Nelson; *Diplactis alpinus* (Linnaeus) Semple subsp. *vierhapperi* (Onno) Semple.

Stems 10–20(–30) cm tall. Lower leaves spatulate or oblong-spatulate, densely to sparsely villous or subglabrous, sometimes ± glandular. Capitula 3–3.5 cm in diam. Phyllaries subequal, 1.5–2 mm wide, apex obtuse or rounded.

Hebei, Heilongjiang, Nei Mongol, Shanxi, N Xinjiang [E Russia; W North America].

80b. Aster alpinus var. **serpentimontanus** (Tamamschjan) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 204. 1985.

蛇岩高山紫菀 she yan gao shan zi wan

Aster serpentimontanus Tamamschjan, Fl. URSS 25: 108. 1959; *A. alpinus* subsp. *serpentimontanus* (Tamamschjan) Á. Löve & D. Löve.

Stems 10–20(–35) cm tall. Lower leaves linear-oblong, 3–10 × 0.2–0.5 cm, densely pubescent or densely villous, sometimes ± glandular. Capitula 3.5–5.5 cm in diam. Phyllaries subequal, linear, 1–1.5 mm wide, apex obtuse or rounded.

2300–2500 m. N and W Xinjiang [Mongolia, Russia (W Siberia), Tajikistan (Pamirs)].

80c. Aster alpinus var. **fallax** (Tamamschjan) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 205. 1985.

伪形高山紫菀 wei xing gao shan zi wan

Aster fallax Tamamschjan, Fl. URSS 25: 580. 1959; *A. flaccidus* Bunge var. *atropurpureus* Onno.

Stems to 35 cm tall. Lower leaves oblong-spatulate, 1.5–8 cm, sparsely puberulent, abaxially ± densely glandular. Capitula ca. 4 cm in diam. Phyllaries subequal, linear, ca. 10 × 1.5 mm, sparsely puberulent, apex obtuse or rounded.

1500–2100 m. N Heilongjiang, Nei Mongol [Russia (SE Siberia)].

80d. Aster alpinus var. **diversisquamus** Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

异苞高山紫菀 yi bao gao shan zi wan

Stems 20–25 cm tall. Lower leaves ± erect, oblong-spatulate, 2–7 × 0.4–0.8 cm, sparsely or densely pubescent, sparsely glandular. Capitula 3–3.5 cm in diam. Phyllaries unequal, oblong-spatulate, 1.5–2.3 mm wide, outer series ca. 3/4 length of inner, blade reddish, apex rounded.

• About 1700 m. N Xinjiang (Tacheng).

This variety has unequal phyllaries, similar to *Aster heterolepis*, but its other features differ from the latter. It might be better treated as a species.

81. Aster oreophilus Franchet, J. Bot. (Morot) 10: 378. 1896.

石生紫菀 shi sheng zi wan

Aster tricapitatus Vaniot; *A. vaniotii* H. Léveillé.

Herbs, perennial, 20–60 cm, caespitose; rhizomes procumbent or ascending; new rosettes sometimes present. Stems erect or ascending, simple, leafy, moderately to densely strigose and villosulous. Leaves basal and cauline; cauline leaves gradually reduced upward, sparsely to densely hispidulous, eglandular or sometimes sparsely minutely stipitate glandular, 3-veined, main veins abaxially prominent; basal leaves withered by anthesis, long winged petiolate, narrowly spatulate to obovate or oblanceolate, 2.5–8 × 0.5–1.5 cm, base attenuate, margin shallowly serrate distally, apex rounded or obtuse to acute; lower cauline leaves often marcescent, winged petiolate; blade lanceolate, base attenuate; middle and upper leaves erect; blade oblong to lanceolate, base attenuate, subclasping, margin serrate distally or entire, apex rounded to obtuse, mucronulate. Capitula 2–30 in terminal corymbiform synflorescences, sometimes terminal, solitary, 2.5–3.5 cm in diam.; peduncles 2–10 cm or more, densely strigillose and villosulous, sparsely to moderately minutely stipitate glandular; bracts linear-oblong or linear-lanceolate. Involucres hemispheric, 0.6–0.7(–0.8) × 1–1.2 cm; phyllaries 3-seriate, subequal, abaxially moderately strigillose, sparsely to moderately minutely stipitate glandular proximally; outer phyllaries oblanceolate, sometimes spatulate, 5–7 × 1.3–2 mm, leaflike, margin narrowly scarious, ciliate, midvein brownish, translucent, apex rounded or acute, sometimes purplish; inner phyllaries lanceolate, leaflike distally, purplish distally, margin ciliate, apex obtuse or acute. Ray florets 21–34, blue-purple to pink or pinkish white, tube glabrous, lamina 11–17 × 1–2 mm, glabrous, eglandular; disk florets yellow, 4–5 mm, tube ca. 1.7 mm, limb funnelform, 3–3.5 mm, glabrous, minutely stipitate glandular proximally, lobes spreading, triangular, equal, 0.7–1 mm. Achenes broadly obovoid, compressed, ca. 2 mm, densely strigillose, eglandular, margin 2-ribbed, densely strigillose-ciliate. Pappus 4-seriate, dirty white, barbellate throughout, sometimes outermost bristles few, slender, 0.5–0.7 mm; outer bristles few, slender, 2–3 mm; inner bristles 3.5–4 mm, acute; innermost bristles 4–4.5 mm, weakly clavate. Fl. and fr. Aug–Oct.

• Alpine and subalpine forest margins, grasslands, pastures, open slopes, roadsides; 2000–4000 m. SW Sichuan, Xizang, N and NW Yunnan.

The flowering capitula of *Aster oreophilus* are used medicinally to alleviate pain and as an antiphlogistic.

82. Aster heterolepis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 614. 1937.

异苞紫菀 yi bao zi wan

Herbs perennial, 14–45 cm tall, ± caespitose; rhizomes robust; new rosettes sometimes present. Stems often with marcescent leaf remains, erect, branched upward or simple, villous-strigose, with sessile glands, loosely leafy above. Leaves ± thick, strigose, with dense sessile glands, triplinerved, midvein abaxially prominent; basal leaves rosulate and lower cauline leaves present at anthesis, winged petiolate, petiole base clasping; blade spatulate or oblanceolate, 3–9 × 0.5–1.5 cm, base attenuate, margin entire, scabrous, apex rounded or obtuse; middle leaves sessile, oblong to oblanceolate; upper leaves ± linear-oblanceolate, small. Capitula solitary at ends of 2–4 branches, 3.5–5(–6) cm in diam. Involucres hemispheric, 0.8–1 × 1–1.5 cm; phyllaries 3-seriate, unequal; outer phyllaries spatulate, 4–7 × 1.5–2.5 mm, abaxially densely strigillose, with sessile glands, base hardened, distally leaflike, margin ciliate, apex rounded; inner phyllaries oblong to linear-oblong, ca. 10 × 2 mm, densely strigillose distally, ± membranous, margin scarious, erose-fimbriate, ciliate, apex acute or acuminate, purplish. Ray florets 30, bluish, tube 2.5–2.8 mm, sparsely hairy distally, lamina 15–18 × 2–2.5 mm; disk florets ca. 5.8 mm, tube ca. 2.2 mm, hairy distally onto limb base, limb funnelform, lobes lanceolate, ca. 1.3 mm, equal, tip revolute, with sessile glands. Achenes pale brown, obovoid, compressed, ca. 3 mm, strigillose, glandular apically, 2-ribbed. Pappus whitish, 3-seriate, bristles barbellate throughout; outermost bristles few, ca. 0.4 mm; inner bristles ca. 5 mm, acute; innermost bristles ca. 6.2 mm, clavate. Fl. and fr. Jun–Sep.

• Stony slopes; 1500–2500 m. S Gansu.

Aster heterolepis is closely related to *A. oreophilus*; it differs mainly in habit, the larger capitula, and phyllary shape.

83. Aster takasagomontanus Sasaki, Trans. Nat. Hist. Soc. Formosa 21: 151. 1931 [*"Takasago-montanus"*].

山紫菀 shan zi wan

Herbs, perennial, 8–20 cm tall; rhizomes thickened. Stems erect, simple, moderately strigillose, sparsely minutely stipitate glandular. Leaves basal and cauline; basal leaves rosulate, cauline leaves gradually reduced upward, densely hairy, sparsely to moderately minutely stipitate glandular, rarely eglandular; basal leaves present at anthesis, ascending, narrowly winged petiolate (petiole 0.9–4 cm); blade abaxially paler, ovate to broadly ovate or spatulate, 0.7–2 × 0.5–1.4(–1.9) cm, base attenuate, midvein conspicuous, margin entire or sparsely serrate, apex rounded to obtuse, mucronulate; cauline leaves petiolate, few; blade ovate to lanceolate, 2–3 cm, base attenuate to cuneate, margin serrate, apex obtuse to acute; uppermost leaves sessile, narrowly ovate to lanceolate, 2–2.5 cm, serrate. Capitula solitary or 2–5 in terminal corymbiform synflorescences, 3–3.5 cm in diam.; peduncles slender, 2–6 cm; bract 1 or absent, linear-oblanceolate, densely strigillose, eglandular. Involucre hemispheric, 0.7–1 × 1.5–1.7 cm; phyllaries 3-seriate, subequal, densely strigillose, adaxially strigillose at apex; outer phyllaries oblong to lanceolate, 6–9 × 1–2 mm, leaflike, margin narrowly scarious, ciliate, apex obtuse to acute, tinged reddish purple; inner phyllaries linear-lanceolate, 6–9 × 1–1.2, ± leaflike distally, margin scarious, erose, ciliate distally, acute. Ray florets 13–22, white, tube minutely hairy, minutely stipitate glandular, lamina ca. 7 × 2 mm, glabrous, eglandular; disk florets yellow, 3.5–4 mm, tube and proximal limb sparsely to moderately hairy, eglandular, limb funnelform, 2.5–2.8 mm, lobes spreading, triangular, unequal, 1–1.5 mm. Achenes narrowly obovoid, ± compressed, 3–4 mm, 2-ribbed, moderately to densely strigillose, densely mi-

nutely stipitate glandular. Pappus 4-seriate (unclearly), dirty white, bristles barbellate throughout; outermost bristles few, slender, ca. 1 mm; outer bristles few, slender, 2–2.5 mm; inner bristles ca. 3 mm, acute; innermost bristles 3.5–4.5 mm, weakly clavate. Fl. Jul–Sep. $2n = 18$*.

• Among exposed rocks on slopes, alpine regions; 3400–3700 m. Taiwan.

84. Aster barbellatus Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 119. 1964.

髯毛紫菀 ran mao zi wan

Herbs, perennial, 20–40 cm tall; rhizomes stout, stoloniferous. Stems erect, simple, sparsely or moderately hirsute, with sessile glands above, with marcescent leaf remains at base. Leaves basal and cauline, cauline leaves reduced upward, densely to moderately strigose, sometimes upper leaves glandular, midvein abaxially somewhat prominent, triplinerved, veins inconspicuous; basal leaves usually persistent, broadly winged petiolate; blade spatulate to oblanceolate, ca. 2.5 × 0.6–1 cm, base attenuate, margin entire or sparsely serrulate, densely strigose-ciliate, apex obtuse or rounded; middle leaves oblong to oblanceolate, 2–3.5 × 0.4–0.7 cm, base subclasping; upper leaves small, apex acute. Capitula terminal, solitary, 4–5 cm in diam. Involucres hemispheric, 0.6–0.7 × 1.5–1.7(–2) cm; phyllaries 3-seriate, spatulate-oblong to oblong or linear, 9–10 × 1.5–2.5 mm, abaxially sparsely strigose, leaflike, margin strigose-ciliate, inner phyllaries with margin scarious, erose-fimbriate, purplish, apex acute or obtuse, purplish. Ray florets 30–40, blue or purplish, tube 2–2.2 mm, hairy; disk florets yellow, 3.5–5 mm, tube ca. 1.3 mm, distal tube and limb base hairy, limb narrowly funnelform, lobes lanceolate, 1.2–1.5 mm, often purple. Achenes brown, obovoid, compressed, ca. 3 mm, densely strigose, sparsely glandular apically, 2-ribbed. Pappus reddish or buff, 3-seriate, bristles barbellate above; outermost bristles ca. 0.9 mm; inner bristles ca. 4.7 mm, acute; innermost bristles 5.1–5.5 mm (reaching base of disk corolla lobes), ± clavate. Fl. Jul–Aug.

Open grassy slopes, field margins, sometimes among dwarf shrubs; 3000–4000 m. S Xizang [Bhutan, India (Sikkim), Nepal].

85. Aster ionoglossus Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 87. 1981.

堇舌紫菀 jin she zi wan

Herbs, perennial, 35–40 cm tall; rhizomes stout, somewhat woody. Stems erect, thick, shallowly canaliculate, simple, base with marcescent leaf remains, hirsute-villous, short-stipitate glandular. Leaves basal and cauline; cauline leaves sparse, densely hirsute-villous, often short-stipitate glandular, ± thick, margin entire, midvein abaxially prominent, 3-veined, veins subparallel; basal and lower cauline leaves crowded, winged petiolate; blade oblong-spatulate to oblanceolate, 4–6.5 × 0.6–1.2 cm, base attenuate, apex rounded or obtuse, rarely ± acute; middle leaves oblong to lanceolate, 3–5 × 0.6–0.8 cm, base often cuneate or subrounded, subclasping; upper leaves small, lanceolate to linear, apex acute. Capitula terminal, solitary, 4.5–5.5 cm in diam. Involucres not described; phyllaries 2- or 3-seriate, equal, purple tipped, oblong or oblanceolate, 9–10 × ca. 2 mm, abaxially densely hirsute-villous, margin ciliate; outer phyllaries leaflike, apex obtuse or rounded; inner phyllaries with margin scarious, erose, apex acute. Ray floret 30–40, blue-purple, tube 1.1–2 mm, lamina 15–20 mm; disk florets yellow, 5–7 mm, tube 1.1–1.4 mm, tube and limb hairy, limb funnelform, lobes lanceolate, 1.1–1.5 mm, glabrous, often purple. Achenes (immature) ca. 2.5 mm, strigillose. Pappus 3-seriate, reddish; outer bristles slender, ca. 1 mm; inner bristles ca. 4 mm, acute; innermost bristles 4.5–5.5 mm, clavate. Fl. Jul.

• Alpine open slopes; 3100–3800 m. S Xizang (Yadong).

86. Aster lingulatus Franchet, J. Bot. (Morot) 10: 377. 1896.

舌叶紫菀 she ye zi wan

Herbs, perennial, (15–)30–45 cm tall; rhizomes procumbent or ascending, stout. Stems erect or ascending, simple, leafy, moderately strigose and villosulous, eglandular. Leaves basal and cauline; cauline leaves slightly reduced upward, both surfaces scabrous, abaxially sparsely to moderately minutely stipitate glandular, adaxially eglandular, thick; basal leaves withered at anthesis, ascending, narrowly winged petiolate (petiole to 7 cm); blade oblanceolate or spatulate, 0.5–7 × 0.4–2.3 cm, base attenuate, margin serrate, apex obtuse to acute; lower cauline leaves withered or persistent at anthesis; cauline leaves petiolate to sessile, oblanceolate to lanceolate, 4–7 × 0.8–1.3 cm, base attenuate, often semiamplexicaul, margin serrate or entire, apex obtuse or rounded to acute; uppermost leaves erect or ± spreading, lanceolate to narrowly lanceolate, 2–5 × 0.5–1.5 cm, base amplexicaul, margin slightly sinuate, entire, sometimes few serrate, apex obtuse or rounded. Capitula 2–5 in terminal corymbiform synflorescences, rarely solitary, 2–3 cm in diam.; peduncles 1–3 cm; bract 1 or absent, linear-lanceolate, densely strigillose and villosulous, eglandular. Involucres hemispheric, 0.7–1.2 cm in diam.; phyllaries 3-seriate, subequal, middle area green, 7–8 × 1–1.5 mm, densely pilose, ± ?leaflike, margin scarious, slightly erose, sparsely ciliate, midvein inconspicuous, apex acute, dark purple, ciliate; outer phyllaries oblong; inner phyllaries lanceolate. Ray florets 22–28, blue-purple, tube glabrous, eglandular, lamina 15–18 × 2.2–2.5 mm, glabrous, eglandular; disk florets yellow, 5–6 × 3.5–4.5 mm, proximally sparsely hairy, lobes spreading, triangular, 1.2–2 mm. Achenes broadly obovoid, ± compressed, ca. 3 × 2 mm, moderately strigillose, sparsely minutely stipitate glandular distally, margin densely strigillose-ciliate, 2-ribbed. Pappus 4-seriate, straw-colored or sometimes purplish, bristles barbellate throughout; outermost bristles few, slender, ca. 1 mm; outer bristles few, slender, 2–2.5 mm; inner bristles 4–4.5 mm, acute; innermost bristles ca. 5 mm, ± clavate. Fl. Aug–Oct.

• Alpine or subalpine grassy slopes; 2600–3600 m. W Sichuan, NW Yunnan.

87. Aster tricephalus C. B. Clarke, Compos. Ind. 43. 1876.

三头紫菀 san tou zi wan

Herbs, perennial, 30–40 cm tall, rhizomatous, often with robust stolons bearing rosettes. Stems erect, simple below, sparsely pilose. Leaves basal and cauline, pilose, glandular, basal leaves (flowering stems) absent or withered by anthesis; blade spatulate, ca. 6.5 × 2 cm; cauline leaves ± evenly distributed

and similar in size, usually overlapping, sessile, oblanceolate, elliptic, or lanceolate, 3.5–6.5 × 0.6–2.1 cm, base subclasping, margin entire or 2- or 3-serrulate, apex obtuse or acute; upper leaves often surrounding capitula. Capitula 1–3 (rarely more), 2–2.8 cm in diam. Involucres not described; phyllaries 1- or 2-seriate, leaflike, oblanceolate, 12–14 × 2–3 mm, glabrate, midvein brownish, ciliate, apex acute or obtuse. Ray florets 50–60, white or blue, tube ca. 0.2 cm, lamina ca. 18 mm; disk florets yellow, 4.5–5.5 mm, hairy, tube 1.5–2 mm, lobes ca. 1.5 mm. Achenes brown, obovoid, 3.4–4 mm, strigillose, apically glandular, 2-ribbed. Pappus whitish or buff, 5–5.5 mm. Fl. Aug–Oct.

3600–4000 m. S Xizang [India (Sikkim), Nepal].

Aster tricephalus is similar in height to *A. barbellatus* and *A. neoelegans* but differs in its flowering stems without basal leaves, the basal leaves being present only on well-developed stolons, its capitula usually 3, and its ray florets 50–60.

88. Aster neoelegans Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 118. 1964 [*"neo-elegans"*].

新雅紫菀 xin ya zi wan

Aster elegans J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 44. 1876, not Willdenow (1803), nor Nees (1818), nor (Nuttall) Torrey & A. Gray (1841).

Herbs, perennial, 40–75(–100) cm tall, rhizomatous, stoloniferous. Stems simple, strigillose. Leaves strigillose, margin entire, scabrous; basal leaves persistent, winged petiolate, oblanceolate to spatulate, 5–7 × 0.8–1 cm, base attenuate, apex rounded; cauline leaves gradually reduced upward, sessile or broadly winged shortly petiolate; blade oblong to oblanceolate, base cuneate, subclasping, apex acute or obtuse; upper leaves remote, sessile, linear, apex acute. Capitula 3–6 in open corymbose synflorescences, 2–2.5 cm in diam. Phyllaries 3-seriate, oblong, 4–8 × 1–1.5 mm, abaxially strigillose, leaflike above, margin narrowly scarious, erose-fimbriate, ± purplish, villous-ciliate (red crosswalls), apex acute, purple-tipped. Ray florets 35–40, white, mauve, or blue-violet, tube ca. 1.5 mm, sparsely hairy, lamina 7–12 mm; disk florets yellow, hairy, ca. 4 mm, tube ca. 1.5 mm, limb funnelform, lobes lanceolate, ca. 1 mm. Achenes light brown, obovoid, compressed, 2.5–3 mm, sparsely strigose, glandular distally, 2-ribbed. Pappus whitish, 3-seriate, bristles barbellate throughout; outermost bristles ca. 0.6 mm; inner bristles ca. 3 mm, acute; innermost bristles ca. 3.5 mm, clavate. Fl. Jul–Sep.

Forest clearings, often on marshy ground; 2700–3000 m. S Xizang (Yadong) [Bhutan, India (Sikkim)].

89. Aster handelii Onno, Biblioth. Bot. 26(Heft 106): 52. 1932.

红冠紫菀 hong guan zi wan

Herbs, perennial, 9–35 cm tall, sometimes caespitose; rhizomes stout, often with stolons bearing rosettes. Stems erect or ascending, simple, sparsely to moderately strigose and/or villous, eglandular. Leaves basal and cauline; cauline leaves gradually reduced upward, both surfaces strigose, sometimes sparsely to moderately minutely stipitate glandular, abaxial veins moderately to densely villous, sometimes ± thick, margin villous-ciliate, midvein abaxially ± prominent (some basal leaves abaxially ± 3-veined); basal rosette present at anthesis; basal and lower cauline leaves winged petiolate; blade spatulate to oblanceolate, 0.7–4 × 0.4–1.4 cm, base attenuate, margin entire, sometimes sinuate, apex rounded to obtuse; middle cauline leaves oblong to lanceolate, 1.8–4 × 0.2–0.8 cm, base subclasping, apex acute or obtuse. Capitula terminal, solitary, 4–5.5 cm in diam. Involucres hemispheric, 5–7 mm; phyllaries 2-seriate, equal, squarrose, oblong-linear, 7.5–9 × 1.2–2 mm, abaxially sparsely to moderately villosulous proximally, adaxially distally moderately to densely villosulous, leaflike, margin narrowly scarious, villous-ciliate, midvein inconspicuous, apex obtuse to acute, tip purplish. Ray florets 28–40, bluish purple to lavender blue, lamina 12–23 × 2.5–3 mm; disk florets orange, ca. 6 mm, limb funnelform, ca. 4.5 mm, proximally moderately hairy, lobes spreading, triangular, ca. 1.2 mm, abaxially minutely stipitate glandular. Achenes broadly obovoid, ± compressed, 2.6–3 mm, densely strigillose, margin 2-ribbed (ribs distally reddish brown), strigillose-ciliate (sometimes rib completely strigillose). Pappus 4-seriate, purplish straw-colored, bristles barbellate throughout; outermost bristles few, slender, ca. 0.5 mm; outer bristles slender, ca. 4 mm; inner bristles few, ca. 5 mm, acute; innermost bristles ca. 5.5 mm, slightly clavate. Fl. and fr. Jul–Sep.

• Alpine or subalpine grasslands and dry grasslands, pastures, wet meadows, mixed shrublands, clearings in *Quercus* forests; 3000–3500 m. SW Sichuan, NW Yunnan.

Aster handelii is similar to *A. tongolensis* but differs in the pappus structure.

90. Aster tongolensis Franchet, J. Bot. (Morot) 10: 376. 1896.

东俄洛紫菀 dong e luo zi wan

Aster subcaerulea S. Moore; *A. tongolensis* f. *glabratus* Diels; *A. tongolensis* f. *humilis* Diels.

Herbs, perennial, 14–47 cm tall, sometimes caespitose; rhizome slender, procumbent or ascending, often with stolons bearing rosettes. Stems erect, simple, somewhat slender, sparsely strigose or strigillose, villous or villosulous, sometimes sparsely minutely stipitate glandular. Leaves basal and cauline; cauline leaves gradually or sometimes abruptly reduced upward, both surfaces scabridulous or hirsute, margin ciliate, 3-veined, veins conspicuous; basal leaves winged petiolate, petiole base subclasping; blade spatulate or obovate to oblanceolate, 0.5–5 × 0.3–2 cm, base attenuate, margin entire or remotely serrulate in upper half, apex obtuse to rounded, sometimes acute; lower cauline leaves sessile, oblong to linear-lanceolate, base subclasping; middle and upper cauline leaves 1–5 × 0.1–0.7 cm, apex acute. Capitula terminal, solitary (rarely 2), 3–5(–6.5) cm in diam. Involucres hemispheric, 5–7 mm; phyllaries 2- or 3-seriate, subequal, appressed or often squarrose, oblong-linear, 5–8 × 0.8–1.5 mm, abaxially villosulous, hardened below, leaflike above, apex acute. Ray florets 30–70, blue or lavender to purplish, tube sparsely hairy, lamina 15–20 × 1–2 mm, glabrous, eglandular; disk florets orange, 3.5–4.5 mm, limb funnelform, 2.5–3 mm, proximally hairy, lobes

spreading to reflexed, narrowly triangular, 1–1.5 mm, abaxially sparsely hairy. Achenes broadly obovoid, ca. 2 mm, densely strigillose, 2-ribbbed (ribs sparsely strigillose, densely so apically). Pappus 4-seriate, purple-brown to brown, of few bristles; outermost bristles slender, 0.2–0.7 mm; outer bristles slender, 0.7–1 mm; inner bristles 1.2–1.6 mm, acute; innermost bristles 1.5–2 mm, slightly to distinctly clavate. Fl. Jun–Aug, fr. Jul–Sep. $2n = 18$*.

• Alpine and subalpine open forests, stream banks, grasslands, boggy margins of lakes, rocky or grassy slopes, pastures, shrub thickets, wet places; 2500–4000 m. S Gansu, Qinghai, NW and SW Sichuan, Xizang, NW Yunnan.

Aster tongolensis is frequently cultivated as an ornamental.

91. Aster souliei Franchet, J. Bot. (Morot) 10: 372. 1896.

缘毛紫菀 yuan mao zi wan

Herbs, perennial, 2–45 cm tall, sometimes caespitose; rhizomes robust, woody. Stems solitary, erect, simple, finely striate, sparsely to moderately pilose. Leaves basal and cauline, glabrate to sparsely pilosulose (more so toward apex), margin entire, sometimes remotely serrulate, eciliate to ± densely ciliate, midvein abaxially prominent, pilose; basal leaves present at anthesis, broadly winged petiolate, petiole base subclasping; blade spatulate or obovate to oblanceolate, 0.7–5 × 0.3–1.9 cm, base attenuate, apex obtuse to acute; cauline leaves abruptly reduced, narrowly lanceolate, 1–5 × 0.2–0.8 cm, base clasping, apex acute. Capitula terminal, solitary, 3–4(–6) cm in diam. Involucres hemispheric, 6–8 mm; phyllaries 3-seriate, subequal, appressed or sometimes squarrose, oblong, 6–11 × 1.5–2 mm, abaxially sparsely to densely pilosulose distally or glabrous, base ± hardened, leaflike above, margin scarious, sometimes purplish distally, densely pilose-ciliate or eciliate, midvein glabrous or pilose, apex obtuse to slightly acute. Ray florets 25–55, blue-purple to violet, tube glabrous, lamina 12–25 × 2–3 mm, glabrous, eglandular; disk florets yellow, 3–5 mm, limb funnelform, 2–3 mm, proximally sparsely puberulent, lobes spreading, narrowly triangular, 1–2 mm. Achenes obovoid, ± compressed, 2.5–3 × ca. 1.5 mm, densely strigillose. Pappus (2 or)3-seriate, of few purplish- to reddish brown or brown, sometimes straw-colored bristles; bristles barbellate; outermost bristles few, slender, 0.1–0.3 mm; outer bristles 1–1.2 mm; inner bristles 1–2 mm. Fl. May–Jul, fr. Aug. $2n = 18$*.

Alpine *Pinus* forest margins, open alpine coniferous forests, thickets and grasslands on slopes; 2700–4600 m. S Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan [Bhutan, N Myanmar].

Aster souliei is sometimes cultivated as an ornamental.

This species is variable in size, leaf shape, involucre, and indumentum. The varieties may represent extremes in a continuum of variation.

1a. Phyllaries abaxially glabrous, margin ciliate or eciliate ..... 91a. var. *souliei*
1b. Phyllaries abaxially sparsely or densely pilosulose, margin ciliate ..... 91b. var. *limitaneus*

91a. Aster souliei var. **souliei**

缘毛紫菀(原变种) yuan mao zi wan (yuan bian zhong)

Aster ganlun Kitamura.

Phyllaries abaxially glabrous, margin densely pilose-ciliate or eciliate.

W Sichuan, Xizang, NW Yunnan [Bhutan, N Myanmar].

91b. Aster souliei var. **limitaneus** (W. W. Smith & Farrer) Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 620. 1937.

毛背缘毛紫菀 mao bei yuan mao zi wan

Aster limitaneus W. W. Smith & Farrer, Notes Roy. Bot. Gard. Edinburgh 9: 80. 1916; *A. forrestii* Stapf; *A. tongolensis* Franchet subsp. *forrestii* (Stapf) Onno.

Phyllaries abaxially hairy, margin densely pilose-ciliate.

S Gansu, W Sichuan, NW Yunnan [Bhutan, N Myanmar].

92. Aster megalanthus Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

大花紫菀 da hua zi wan

Herbs perennial, 35–45 cm tall; rhizomes robust (to 6 mm in diam.); roots dense, fibrous, bearing rosulate phyllome. Stems single, erect, stout (5–7 mm in diam.), purple-red above, angled and finely canaliculate, hirsute (hairs ca. 4 mm) below, densely leafy below, densely pilose above. Leaves: both surfaces densely pilose, margin hirsute-ciliate, midvein stout, hirsute, abaxially triplinerved, veins prominent, lateral veins fine; basal leaves withered or present at anthesis, broadly winged petiolate; blade oblong-spatulate, 7–12 cm, base attenuate, margin subentire toward middle, apex obtuse or rounded; middle cauline leaves sessile, oblong or oblong-lanceolate, smaller, apex obtuse or acute. Capitula terminal, solitary, ca. 6.5 cm in diam. Involucres hemispheric, ca. 2 cm in diam.; phyllaries 3-seriate, squarrose, oblong or linear-lanceolate, ca. 10 × 1.5–2 mm, leaflike, base hardened, outer phyllaries densely hirsutulous, inner phyllaries pilose distally, margin ± reddish, apex obtuse or ± acute. Ray florets ca. 100, purple-red, lamina 25–30 × ca. 3.4 mm; disk florets yellow, ca. 6 mm, sparsely hairy. Achenes (immature) ± compressed, ca. 2 mm, densely strigose. Pappus purplish brown, of few unequal bristles, barbellate throughout, bristles shorter than disk florets. Fl. Aug.

• Slopes; ca. 4000 m. W Sichuan (Zhegu Shan).

Aster megalanthus is closely related to *A. tongolensis* but differs by being taller and in having more ray florets with broader laminae and longer disk florets.

93. Aster fanjingshanicus Y. L. Chen & D. J. Liu, Bull. Bot. Res., Harbin 8(3): 11. 1988.

梵净山紫菀 fan jing shan zi wan

Herbs, perennial, 4–7 cm tall; rhizomes short or long, woody, without stolons, collar clad with marcescent petiole remains, fibrous rooted. Stems slender, erect, simple, finely striate, densely or sparsely white pilose, glandular. Leaves basal and cauline; basal leaves rosulate, present at anthesis, winged petiolate; petiole equaling blade; blade oblanceolate-spatulate or spatulate, 8–15 × 3–5 mm, abaxially pale green, sparsely pilose on veins, adaxially dark green, densely strigose, base cu-

neate-attenuate, margin ciliate, entire, midvein and lateral veins abaxially distinctly prominent, lateral veins 2- or 3-paired, apex rounded, inconspicuously mucronulate; cauline leaves (3 or)4 or 5, sessile or subsessile, lanceolate, spatulate, or rarely linear-oblong, 5–15 × 2–3 mm, apex obtuse or acuminate. Capitula terminal, solitary. Involucres campanulate, 0.4–0.5 × 0.6–0.8 cm; phyllaries 2- or 3-seriate, subequal, leaflike; outer phyllaries oblong-lanceolate, 1–1.5 mm wide, abaxially densely pilose, apex acuminate or ± acute; inner phyllaries linear or linear-lanceolate, glabrous or apically sparsely puberulent, margin narrowly scarious. Ray florets 11–13(–15), white, tube ca. 2 mm, lamina oblong, 6–7 × ca. 1 mm; disk florets yellow, ca. 3 mm, tube ca. 1 mm, lobes ovate-lanceolate. Achenes oblong, ± compressed, 1.5–2 mm, sparsely strigose. Pappus (?3- or 4-seriate), reddish brown; bristles many, barbellate throughout, ± equaling disk corollas. Fl. Jun–Jul.

• Grasslands on slopes, rocky areas; 2000–2400 m. Guizhou (Fanjing Shan).

No specimens of *Aster fanjingshanicus* were seen by one of us (Brouillet).

94. Aster giraldii Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 103. 1905.

秦中紫菀 qin zhong zi wan

Herbs, perennial, 24–40 cm tall; rhizomes slender; stolons present. Stems erect, slender, solitary or fascicled, sparsely strigillose, simple or ± branched. Leaves basal and cauline, thin, abaxially sparsely scabridulous, veins scabrous, adaxially scabrous, margin scabrous, midvein ± prominent, lateral veins 3- or 4-paired; basal leaves withered at anthesis; lower cauline leaves long petiolate; blade oblong-spatulate to oblanceolate, 4–7 × 1–1.3 cm, base attenuate, margin serrate (teeth mucronulate); middle leaves sessile or shortly petiolate; blade oblong or lanceolate, 3–5 × 1(–2) cm, base cuneate, apex acute to acuminate; upper leaves small, lanceolate, base often rounded, subclasping. Capitula terminal, solitary or 2–4, terminal at ends of stem and branches, 2–3 cm in diam. Involucres hemispheric-campanulate, 6–7 × 7–10 mm; phyllaries 3-seriate, base hardened, leaflike above, margin scarious, erose-fimbriate, ± acute; outer phyllaries 3–4 × 1–1.5 mm, abaxially sparsely scabridulous; inner phyllaries ca. 4.5 × 1.5–2 mm. Ray florets 12–20, blue-purple, tube ca. 1 mm, glabrous, lamina 10–15 × 2–2.5 mm; disk florets 2.8–4 mm, tube 1–1.5 mm, glabrous, limb campanulate, enlarged, lobes lanceolate, 0.7–1 mm, recurved. Achenes purple, obovoid, slightly compressed, ± trigonous, 2.5–3 × ca. 1.5 mm, sparsely strigose, 4-ribbed. Pappus (?3- or 4-seriate), reddish brown or yellowish; bristles many, stout, barbellate throughout, 0.9–2 mm. Fl. and fr. Aug–Dec.

• Ravines, open forests; 1800–2600 m. Shaanxi (Huxian, Taibai Shan).

95. Aster salwinensis Onno, Biblioth. Bot. 26(Heft 106): 74. 1932.

怒江紫菀 nu jiang zi wan

Herbs, perennial, 4–24 cm tall; rhizomes long, slender, sometimes with short stolons. Stems ascending, rarely erect, sparsely to moderately villous, eglandular. Leaves basal and cauline; cauline leaves reduced upward, sometimes abruptly so, thin, glabrous, eglandular, abaxial veins sparsely pilose, adaxial veins also moderately pilosulose, margin serrate to serrulate or entire (uppermost leaves), midvein abaxially prominent, ciliate, apex mucronate; basal leaves present at anthesis, sometimes marcescent; basal and lower cauline leaves broadly to narrowly winged petiolate (petiole to 2 cm); blade obovate to oblanceolate, 0.5–4 × 0.3–1.5 cm, base attenuate, apex rounded; cauline leaves ± erect, sessile, obovate to ovate or ovate-lanceolate, 1–2.5 × 0.9–3 cm, base rounded or cuneate, subclasping, apex rounded to acute. Capitula terminal, solitary, often subtended by a leaflike bract, 2–3 cm in diam. Involucres hemispheric, 5–9 mm; phyllaries 2- or 3-seriate, subequal, often squarrose, linear-lanceolate, 8–10 mm, leaflike, margin broadly scarious, erose, eciliate, midvein conspicuous proximally, apex acuminate, purplish distally; outer phyllaries 1–1.8 mm wide, abaxially villous proximally to sparsely to moderately so distally, eglandular; inner phyllaries 0.6–1 mm wide, sparsely villous. Ray florets 11–30, blue to blue-purple, rarely white, tube sparsely hairy apically, lamina 7–12 × 1–2.3 mm, glabrous, eglandular; disk florets yellow, 4.5–5.5 mm, limb funnelform, 3–3.5 mm, glabrous, lobes spreading, narrowly triangular, 1–1.3 mm, often tinged purple-brown, glabrate. Achenes brown, narrowly obovoid, compressed, ca. 4 mm, strigose distally, eglandular, 3- or 4-ribbed. Pappus 4-seriate, straw-colored to brownish, with few bristles barbellate throughout; outermost series of slender bristles or narrow scales 0.7–1 mm; outer series of slender bristles, 2–3.5 mm; inner bristles 3.5–4 mm, acute; innermost bristles 4–4.5(–5) mm, weakly clavate. Fl. Jul–Sep, fr. Aug–Oct.

Alpine meadows on slopes or on rocks, openings in *Rhododendron*-bamboo thickets; 3300–4600 m. SW Sichuan, E Xizang, NW Yunnan [NE Myanmar].

96. Aster tientschwanensis Handel-Mazzetti, Oesterr. Bot. Z. 89: 819. 1940.

天全紫菀 tian quan zi wan

Herbs, perennial, 7–18 cm tall; rhizomes robust, without stolons. Stems ascending, simple, slender, sparsely villous, often glabrescent below. Leaves crowded below and scattered above, glabrate, rather thick, margin villous-ciliate, midvein abaxially prominent, lateral veins 2- or 3-paired and obliquely ascending; basal leaves winged petiolate; blade spatulate, 2–7 × 0.5–1.5 cm, base attenuate, margin 2–5-crenate-serrate, apex obtuse or rounded; lower cauline leaves present at anthesis, sessile or shortly winged petiolate, spatulate to oblanceolate, 1–1.5 × ca. 0.3 cm, apically 3-serrate or entire; upper leaves small, oblong or linear, margin entire. Capitula terminal, solitary, 2–2.7 cm. Involucres hemispheric-campanulate, ca. 7 × 6–10 mm; phyllaries 3-seriate, subequal, or outer phyllaries somewhat shorter, linear-lanceolate or linear-oblanceolate, 6–7.2 × ca. 1 mm, abaxially glabrous or sparsely villous, membranous, margin villous-ciliate, margin of inner phyllaries ± broadly scarious, erose-fimbriate, apex acute to acuminate, ± leaflike, purplish. Ray florets 13–17, white, tube ca. 1.5 mm, hairy, lamina 10–11 × ca. 2 mm; disk florets ca. 4.5 mm, tube 1–1.2 mm, hairy, limb funnelform, glabrous, lobes lanceolate, ca. 0.8 mm. Achenes (immature) narrowly oblong, ± compressed, ca. 2.5

mm, densely strigose, 2-ribbed. Pappus (immature) 3-seriate, reddish, bristles barbellate throughout; outer bristles short; inner bristles 3.5–4.5 mm. Fl. May–Jul.

• Mountain forest margins and thickets; ca. 3300 m. C and NC Sichuan (Lixian, Tianquan).

Aster tientschwanensis is similar to *A. salwinensis* but differs from it by its thick, glabrate leaves, densely strigose achenes, and reddish pappus.

97. Aster himalaicus C. B. Clarke, Compos. Ind. 42. 1876.

须弥紫菀 xu mi zi wan

Aster mekongensis Onno, p.p.

Herbs, perennial, 8–25 cm tall; rhizomes robust, without stolons, collar clad with marcescent leaf remains. Stems ascending, simple, proximally villosulous, distally sparsely so, minutely stipitate glandular, more densely so distally. Leaves basal and cauline, thin, sparsely villosulous, more densely so on veins, moderately to densely minutely stipitate glandular, margin villous-ciliate, veins abaxially prominent, apices with purple mucro; basal leaves withered at anthesis, marcescent, broadly winged petiolate (petiole to 2 cm); blade oblanceolate, 0.9–2.5(–4.5) × 0.5–2.5 cm, base attenuate, margin serrulate (teeth mucronate), apex rounded to acute; lower cauline leaves oblong or obovate to oblanceolate, 1.5–4 × 0.5–1.2 cm, base rounded, subclasping, margin entire or dentate to serrulate; upper leaves approaching capitulum. Capitula terminal, solitary, 4–4.5 cm in diam. Involucres hemispheric, 11–13 × 13–14 mm, often overtopping disk; phyllaries 2- or 3-seriate, subequal, apex slightly spreading, oblong-lanceolate to lanceolate, 13–14 × 2.5–3.5 mm, abaxially sparsely villosulous to glabrate, tip densely minutely stipitate glandular, membranous, margin scarious, ciliate, multiveined, apex acuminate, ?leaflike, purplish. Ray florets 40–50(–70), blue-purple, lamina 12–15(–17) × 0.5–0.7 mm; disk florets purple-brown or yellow, ca. 5 mm, tube and proximal limb hairy, limb funnelform, ca. 4 mm, lobes erect, triangular, ca. 1 mm, tips sparsely minutely stipitate glandular. Achenes brown, narrowly obovoid, compressed, 2.5–3 mm, strigillose, minutely stipitate glandular, more densely so distally, 2-ribbed. Pappus 4-seriate, whitish to straw-colored; outermost series of few tiny scales 0.3–0.5 mm; bristles barbellate throughout; outer bristles slender, 2–3 mm; inner bristles 4–4.5 mm, acute; innermost bristles ca. 5 mm, weakly clavate. Fl. Jul–Aug, fr. Sep–Oct. $2n = 10$.

Alpine meadows, *Pinus* forests; 3600–4800 m. Sichuan, S Xizang, NW Yunnan [Bhutan, India (Sikkim), N Myanmar, Nepal].

98. Aster techinensis Y. Ling, Fl. Reipubl. Popularis Sin. 74: 359. 1985.

德钦紫菀 de qin zi wan

Herbs, perennial, 15–25 cm tall, caespitose; rhizomes robust, without stolons. Stems ascending, simple, proximally villosulous, distally sparsely so, densely minutely stipitate glandular, more densely so distally. Leaves basal and cauline, thin, sparsely villous to glabrate, more densely villous on veins, minutely stipitate glandular, margin serrate to serrulate (teeth mucronate), villous-ciliate, 3-veined, veins abaxially prominent, apex rounded to acute, mucronate; basal leaves withered at anthesis, marcescent, broadly winged petiolate (petiole to 4 cm); blade oblanceolate, 1.5–4.5 × 0.5–2 cm, base attenuate; lower cauline leaves winged petiolate to sessile, oblanceolate to lanceolate, 1.5–4.4 × 0.5–1.5 cm, base cuneate or attenuate to rounded, clasping; upper leaves sessile, lanceolate, base rounded, clasping. Capitula terminal, solitary, 3.5–4.5 cm in diam. Involucres hemispheric, 1.3–1.4 × 1.8–2.5 cm, often overtopping disk; phyllaries 2-seriate, unequal, multiveined, margin ciliate, apex slightly spreading, both surfaces densely minutely stipitate glandular; outer phyllaries oblong-lanceolate to lanceolate, 13–16 × 3–5 mm, abaxially sparsely villosulous on veins, leaflike, apex acuminate, green or purple tinged, tip villosulous; inner phyllaries narrowly lanceolate, 9–15 × 1.2–1.5 mm, membranous, margin broadly scarious, glabrate. Ray florets ca. 80 or more, blue-purple, tube hairy, lamina 15–18 × 1–1.5 mm, eglandular; disk florets yellow, ca. 7 mm, tube and basal limb hairy, limb funnelform, ca. 4 mm, lobes erect to spreading, purple-black, triangular, ca. 1 mm, glabrous, tip sparsely minutely stipitate glandular. Achenes (immature) oblanceolate, compressed, ca. 2.5 mm, sericeous, densely minutely stipitate glandular, 2-ribbed. Pappus 4-seriate, reddish based, whitish above, bristles few, barbellate throughout; outermost series of slender bristles or scales 0.5–1 mm; outer bristles slender, 2–5 mm; inner bristles 5–5.5 mm, acute; innermost bristles 6–7 mm, weakly clavate. Fl. Aug.

• About 3500 m. NW Yunnan (Dêqên).

Aster techinensis is closely related to *A. himalaicus* but differs in its stems, leaves, and phyllaries sparsely villosulous and its pappus reddish.

99. Aster stracheyi J. D. Hooker, Fl. Brit. India 3: 250. 1881.

匍生紫菀 fu sheng zi wan

Herbs, perennial, 3–15 cm tall; rhizomes procumbent, with several long, slender stolons (to 30 cm) with rosettes. Stems ascending or erect, reddish, sparsely to moderately villous, eglandular. Leaves basal and cauline, sparsely to moderately pilose to glabrate, margin revolute, ciliate, apex obtuse, sometimes acute, mucronulate; basal leaves withered by anthesis, winged petiolate (petiole to 6.5 cm); blade spatulate or elliptic, 0.7–3.5 × 0.5–1.3 cm, thick, base attenuate, margin serrate, midvein pronounced; cauline leaves abruptly reduced, few, sessile or (lower leaves) shortly petiolate; blade linear or oblong to oblanceolate or obovate, 0.5–2.5 × 0.1–0.8 cm, 3-veined, base attenuate, margin entire or 1- or 2-denticulate or -serrate, apex acute or obtuse. Capitula terminal, solitary, ca. 2.5 cm in diam. Involucres hemispheric, 13–18 × 8–12 mm; phyllaries 3-seriate, equal, sometimes squarrose, lanceolate or oblanceolate, 8–12 × 1.5–3.5 mm, abaxially glabrous, membranous, shiny, margin scarious, ciliate, purplish, midvein apparent, sometimes strigillose, apex acuminate, purplish. Ray florets 29–42, violet, lamina 8–10 × 1.5–2 mm, tube and abaxial lamina base strigillose, eglandular; disk florets yellow (anther appendages bluish), 4–5 mm, limb funnelform, 2.5–3.5 mm, base sparsely hairy, lobes spreading, triangular, ca. 1 mm. Achenes (imma-

ture) obovoid, 2.2–3 mm, strigillose, minutely stipitate glandular, 2-ribbed. Pappus 3- or 4-seriate, white or whitish; outermost series of narrow scales, 0.3–0.8 mm; outer bristles slender, 3.5–4 mm; inner bristles 5.5–6 mm, acute; innermost bristles 6–6.5 mm, clavate. Fl. and fr. Jul–Sep.

Rocks near streamsides, among boulders in alpine tundra; 3300–4800 m. S Xizang (Tingri) [Bhutan, India, Nepal].

100. Aster retusus Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 69. 1956.

凹叶紫菀 ao ye zi wan

Herbs, perennial, 2–8 cm tall; rhizomes often vertical, stout, with stolons (to 2–4 cm), collar with marcescent leaf remains. Stems erect, simple, usually purple-brown, sparsely villous at base, more densely so above (hairs with purple crosswalls). Leaves glabrous, triplinerved, with fine 1-paired marginal veins; basal leaves rosulate, present at anthesis, shortly and broadly or narrowly winged petiolate; blade spatulate to oblanceolate, 1–3 × 0.3–0.5 cm, margin entire, eciliate or sparsely ciliate, base gradually attenuate, apex rounded to obtuse, retuse, 3-mucronulate; cauline leaves 3 or 4, oblanceolate, 1–2 × 0.2–0.4 cm, sessile or rarely petiolate. Capitula terminal, solitary, 2–2.5 cm in diam. Involucres hemispheric, ca. 1 cm in diam.; phyllaries 3-seriate, subequal, lanceolate, 6.5–9 × 1.5–2.5 mm, abaxially glabrous, ± leaflike at least above, margin villous-ciliate (purple crosswalls), of inner phyllaries broadly scarious, erose-fimbriate, apex acute or acuminate, recurved, margin and apex purplish. Ray florets 16–25, purplish mauve, tube ca. 2.5 mm, hairy distally, lamina 10–18 × ca. 1.5 mm; disk florets yellow and purplish in distal 1/2, 3.5–6 mm, tube 2–2.5 mm, limb narrowly funnelform, lobes lanceolate, ca. 0.8 mm, ± recurved. Achenes (immature) ovoid, compressed, ca. 2 mm, strigose, 2-ribbed. Pappus 4-seriate, yellowish; outermost bristles 0.5–1 mm; outer bristles slender, ca. 2 mm; inner bristles ca. 4.5 mm, acute; innermost bristles ca. 5.5 mm, clavate. Fl. Jul–Aug.

• Alpine meadows or on rocks; 4000–4300 m. SE Xizang.

Aster retusus resembles *A. batangensis* in leaf shape but differs in habit and leaf surface pubescence.

101. Aster latibracteatus Franchet, J. Bot. (Morot) 10: 371. 1896.

宽苞紫菀 kuan bao zi wan

Herbs, perennial, 5–20(–60) cm tall; rhizomes robust, collar clad by marcescent leaf remains. Stems erect or ascending, ± stout, densely villous (hairs with purple crosswalls), densely leafy. Leaves basal and cauline, thin, villous (crosswalls yellow in basal leaves, purple in upper leaves), margin sparsely mucronulate, entire in upper leaves, densely villous; basal and lower cauline leaves broadly winged petiolate; blade spatulate or oblanceolate, 2–5 × 0.6–1.7 cm, base attenuate, apex rounded; upper leaves oblanceolate, oblong, lanceolate, or ovate, 1.5–4 × 0.7–1.3 cm, base rounded, apex obtuse to acute, mucronate; uppermost leaves dense, surrounding capitula. Capitula terminal, solitary, 5–6 cm in diam. Involucres 1.5–2.5 cm in diam.; phyllaries 3-seriate, subequal, leaflike, abaxially sparsely villous, margin sparsely to densely villous-ciliate (purple to brown crosswalls); outer phyllaries ovate to lanceolate, 10–12 × 3–6 mm; inner phyllaries lanceolate to oblong, 2–3 mm wide. Ray florets 25–30, blue or purplish, tube ca. 2.5 mm, lamina 10–20 × 1–2 mm; disk florets yellow, 5.7–7.5 mm, tube 1.8–2.4 mm, distal tube and limb base hairy, limb narrowly funnelform, lobes lanceolate, 1–1.5 mm, tip purple. Achenes pale brown, oblanceolate, compressed, 3–3.2 × ca. 1.5 mm, sparsely strigose, not winged, 2-ribbed. Pappus 3-seriate, yellowish at base, brown distally; bristles barbellate throughout, stout; outermost series of short bristles or scales ca. 0.3 mm; inner bristles 3–4 mm, acute; innermost bristles ca. 5.5 mm, clavate. Fr. Aug–Oct.

Stony alpine pastures, slopes; 2800–4000 m. NW Yunnan (Dali, Dêqên, Gongshan) [N Myanmar].

102. Aster bulleyanus Jeffrey ex Diels, Notes Roy. Bot. Gard. Edinburgh 5: 184. 1912.

扁毛紫菀 bian mao zi wan

Herbs, perennial, 15–40 cm tall, sometimes caespitose; rhizome robust. Stems erect or ascending, simple, slender, finely striate, leafy, sparsely to moderately villous, minutely stipitate glandular. Leaves basal and cauline; cauline leaves gradually reduced distally, abaxially sparsely pilosulose, veins villous, sparsely minutely stipitate glandular, adaxially sparsely pilosulose, veins sparsely villous, margin serrate, ciliate, 3–5-veined, veins abaxially prominent; basal leaves sometimes withered at anthesis, long petiolate (petiole to 8 cm); blade ovate to obovate, 1.5–6 × 0.7–2 cm, apex rounded to obtuse or acute, mucronate; cauline leaves shortly and broadly winged petiolate or sessile, ovate, 1.5–8 × 0.6–3.5 cm, base attenuate, clasping, apex acute. Capitula solitary, terminal, 7–9 cm in diam. Involucre hemispheric, 2–2.3 cm in diam.; phyllaries 3-seriate, subequal, squarrose to reflexed, lanceolate to linear-lanceolate, 9–10 mm, leaflike, margin villous-ciliate, apex acuminate, tip purplish, proximally white villous, moderately to densely minutely stipitate glandular; outer phyllaries 2–3 mm wide; inner phyllaries ca. 1.5 mm wide. Ray florets 44–51(–100), purplish, tube ca. 1 mm, lamina 20–30 × 1.5–2 mm, glabrous, eglandular; disk florets purplish brown, ca. 5 mm, limb funnelform, ca. 3.5 mm, glabrous, lobes spreading, narrowly triangular, ca. 1 mm. Achenes obovoid, compressed, 3–4 mm, sparsely strigillose, densely so distally, eglandular, not winged, 4-ribbed. Pappus 2-seriate, brown, few; outer series of narrow to broad, erose scales 1–1.5 mm; inner series of stout, flat bristles barbellate throughout, 3–4 mm, long acute. Fl. and fr. Aug–Sep.

• Alpine or subalpine meadows, streamsides; 2800–4300 m. NW Yunnan.

103. Aster bietii Franchet, J. Bot. (Morot) 10: 373. 1896.

线舌紫菀 xian she zi wan

Aster mekongensis Onno, p.p.

Herbs, perennial, 14–45 cm tall, sometimes caespitose; rhizomes robust, sometimes with short stolons. Stems erect or

ascending, simple, sparsely villous (crosswalls purple), distally minutely stipitate glandular. Leaves basal and cauline; cauline leaves gradually reduced, thin, abaxially sparsely villous to pilosulose, adaxially glabrate or sparsely pilosulose, margin entire or remotely serrate to serrulate, apex mucronate; basal leaves withered at anthesis, sometimes marcescent, long winged petiolate (petiole to 10 cm); blade oblong to spatulate, 2–10 × 1–3.5 cm, base attenuate, apex acute or acuminate; lower to middle cauline leaves sessile, obovate to lanceolate, 3–9 × 1–2.8 cm, base cuneate to rounded, subclasping, apex acute to obtuse; upper cauline leaves 1.5–3 × 0.8–1.2 cm, apex acute. Capitula terminal, solitary, 7–8 cm in diam. Involucres hemispheric, 1.5–2.5 cm in diam.; phyllaries 2-seriate, equal, lanceolate to narrowly lanceolate, 15–20 mm, abaxially sparsely villous, densely minutely purple stipitate glandular, leaflike, margin long ciliate, apex long acuminate, often purplish; outer phyllaries 2–5 mm wide, proximally lanate and distally so on midvein, sometimes lanate more distally; inner phyllaries 2–3 mm wide. Ray florets 50–70, purplish blue, tube sparsely strigillose, lamina 30–40 × 1–1.5 mm, glabrous, eglandular; disk florets yellow, 7–9 mm, limb funnelform, 4–6 mm, sparsely strigillose proximally, lobes spreading, narrowly triangular, 1.8–2.3 mm, minutely stipitate glandular, tip purple. Achenes obovoid, compressed, 4–4.5 mm, glabrous or distally glabrate, moderately to densely minutely stipitate glandular, not winged, 2-ribbed. Pappus 3- or 4-seriate, reddish brown, bristles barbellate throughout; outermost bristles very few or none, slender, ca. 0.7 mm; outer bristles few, slender, 2–4 mm; inner bristles 5–5.5 mm, acute; innermost bristles ca. 6 mm, weakly clavate. Fl. Jul–Aug, fr. Aug–Nov.

• Alpine and subalpine meadows and screes, ledges of cliffs; 3300–4600 m. E Xizang, NW Yunnan.

104. Aster platylepis Y. L. Chen, Kew Bull. 39: 159. 1984.

阔苞紫菀 kuo bao zi wan

Doronicum latisquamatum C. E. C. Fischer, Bull. Misc. Inform. Kew 1937: 98. 1937, not *Aster latisquamatus* (Maximowicz) Handel-Mazzetti (1938).

Herbs, perennial, 20–30 cm tall. Stems erect, slender, brown or purplish, gray hairy. Leaves: basal withered at anthesis (not seen); cauline leaves oblong or somewhat obliquely ovate, 1.6–4.2 × 0.8–2.2 cm, membranous, abaxially pubescent, adaxially hispidulous, eglandular, base subcordate or rounded, clasping, margin ± sinuate-crenate, 5–7-veined from base, apex obtuse. Capitula terminal, solitary, 3.5–4 cm in diam. Involucres campanulate; phyllaries 2- or 3-seriate, abaxially hispidulous; outer phyllaries lanceolate to ovate-lanceolate, 13–19 × 5–7 mm, margin purplish, apex subacute, purplish; innermost phyllaries usually shorter, narrower. Ray florets ?30–60, 1–3-seriate, purplish, tube ca. 2 mm, lamina ca. 14 × 0.7 mm; disk florets yellow-brown, ca. 4.5 mm, lobes triangular, short, acute. Achenes narrowly oblong ?when mature, sparsely hairy, ?winged, 2-ribbed. Pappus longer than tube of disk florets. Fl. Aug.

Rocky soils; 3000–4000 m. S Xizang (Tsampo Lake) [India].

No specimens of *Aster platylepis* were seen by one of us (Brouillet).

105. Aster brachytrichus Franchet, J. Bot. (Morot) 10: 372. 1896.

短毛紫菀 duan mao zi wan

Aster bodinieri H. Léveillé.

Herbs, perennial, 10–50 cm tall, sometimes caespitose; rhizomes robust, woody. Stems erect, simple, densely pilose proximally and apically, sparsely to moderately so at midstem, moderately to densely minutely stipitate glandular, usually regularly leafy. Leaves basal and cauline; cauline leaves slightly and gradually reduced upward, sparsely to moderately pilose or glabrous, veins villous abaxially, margin sparsely shallowly serrate or serrulate, sometimes entire, pilose-ciliate, triplinerved abaxially, veins slightly prominent; basal leaves usually withered at anthesis, long petiolate (petiole to 4 cm); blade spatulate to obovate or oblanceolate, 1–6 × 0.6–3.5 cm, base attenuate, apex rounded to obtuse; lower and middle cauline leaves sessile, ovate or ovate-lanceolate to oblong, 2–7 × 0.5–3 cm, base rounded or attenuate, subclasping, apex rounded to acute; upper leaves ovate to linear-lanceolate, 1–3.5 × 0.2–1.8 cm. Capitula terminal, solitary, 3–7.5 cm in diam. Involucres hemispheric, 1–2 cm in diam., overtopping disk florets; phyllaries 2- or 3-seriate, subequal, squarrose, 10–13 × 1–4 mm, sparsely pilose to glabrate, sometimes inner phyllaries sparsely minutely stipitate glandular distally, margin whitish, pilose-ciliate; outer phyllaries linear-lanceolate to oblong, leaflike, apex acute to obtuse; inner phyllaries linear-lanceolate to linear, apex long acuminate. Ray florets 30–60, blue to purplish, tube less than ca. 1 mm, lamina 15–35 × 1–3 mm, glabrous, eglandular; disk florets orange becoming reddish, 3.5–5 mm, limb funnelform becoming ± campanulate distally, 2.5–4 mm, glabrous, lobes spreading, narrowly triangular, 0.8–1.5 mm. Achenes obovoid, ± compressed, 2.5–4 mm, glabrous, sparsely minutely stipitate glandular apically, margin winged, 2-ribbed, plus sometimes 2- or 3-ribbed on each side. Pappus series reduced, indistinguishable, sometimes basally fused, purple brown to brown; bristles flattened, barbellate throughout, 1–4 mm, acute. Fl. Jun–Aug, fr. Aug–Oct.

Alpine meadows, mountain slopes, alpine coniferous forests, *Pinus* forests, thickets, pastures; 2500–4900 m. Guizhou, SW Sichuan, N and NW Yunnan [N Myanmar].

Aster brachytrichus is difficult to distinguish from *A. jeffreyanus*.

Leaf shape and vestiture and capitula size are variable within the species and have been used as the basis for the varieties recognized in the species. However, there seems to be a continuum in all the features used to partition the variation, and phenotypic plasticity could account for some of it. A thorough morphometric analysis would be needed to determine which varieties deserve recognition. The four varieties recognized are distinguished as follows.

Aster brachytrichus var. *tenuiligulatus* Y. Ling (Fl. Reipubl. Popularis Sin. 74: 360. 1985; 细舌短毛紫菀 xi she duan mao zi wan; 2600–3500 m. NW Guizhou, SW Sichuan) has oblong leaves densely hispidulous adaxially, with rounded apex, and smaller capitula (3–3.5 cm in diam.), with involucres ca. 1 cm in diam. and ray floret lamina ca. 15 × 1 mm. The other three varieties have leaves adaxially glabrous or sparsely hispidulous and larger capitula (4–7.5 cm in diam.), with involucres 1.5–2 cm in diam. and ray floret lamina 15–35 × 1–3 mm. *Aster brachytrichus* var. *angustisquamus* Y. Ling (Fl. Reipubl. Popularis Sin. 74: 360. 1985; 狭苞短毛紫菀 xia bao duan mao zi wan; ca. 2700 m;

NW Yunnan: Zhongdian) has linear phyllaries 1.5–2 mm wide, while *A. brachytrichus* var. *brachytrichus* and *A. brachytrichus* var. *latifolius* have linear-lanceolate phyllaries 2.3–4 mm wide. *Aster brachytrichus* var. *brachytrichus* (短毛紫菀(原变种) duan mao zi wan (yuan bian zhong); 2500–3500 m) has middle cauline leaves 2–6 × 0.5–2.5 cm, with a rounded or somewhat acute apex, but leaf shape is variable; plants with a remotely serrate leaf margin have sometimes been segregated as *A. brachytrichus* var. *oreaster* Onno. *Aster brachytrichus* var. *latifolius* Y. Ling (Fl. Reipubl. Popularis Sin. 74: 360. 1985; 宽叶短毛紫菀 kuan ye duan mao zi wan; ca. 3000 m; NW Yunnan: Lijiang, Yulong Shan) has middle cauline leaves 7–9 × 2.5–4.5 cm, with a rounded apex.

106. Aster jeffreyanus Diels, Notes Roy. Bot. Gard. Edinburgh 5: 185. 1912.

滇西北紫菀 dian xi bei zi wan

Herbs, perennial, 10–30 cm tall, sometimes caespitose; rhizomes robust, with rosettes. Stems erect, simple, sparsely to densely villous, eglandular. Leaves basal and cauline; cauline leaves gradually reduced distally, abaxially sparsely pilose, villous, veins villous, adaxially glabrate proximally to villous apically, eglandular, margin remotely serrulate or entire (upper leaves), villous-ciliate, 3-veined, veins prominent; basal leaves usually present at anthesis, shortly petiolate; blade obovate to oblanceolate, 1.6–4 × 1–1.3 cm, base abruptly attenuate to attenuate, apex obtuse or rounded; middle cauline leaves ± erect, sessile, oblong to linear-lanceolate, base subclasping; upper leaves linear-lanceolate, 1–3.5 × 0.1–0.6 cm, base clasping. Capitula terminal, solitary, 3.5–5 cm in diam. Involucres hemispheric, 0.5–0.8 cm in diam.; phyllaries 2- or 3-seriate, subequal, sometimes squarrose, ovate-lanceolate, 7–8.5 × 2.5–3 mm, leaflike, margin broadly scarious, remotely erose; outer phyllaries 2.5–3 mm wide, sparsely villous proximally, glabrous distally; inner phyllaries 1.5–2 mm wide, glabrate, margin ciliate, vein sparsely villous. Ray florets 30–50, blue to purple, lamina 15–20 × ca. 2 mm, glabrous, eglandular; disk florets 3.5–4 mm, limb funnelform, ca. 2.5 mm, glabrous, lobes spreading, narrowly triangular, ca. 1 mm. Achenes broadly obovoid, compressed, ca. 2 mm, glabrous, distally strigillose and minutely stipitate glandular, margin winged, wings strigillose-ciliate apically, 4-ribbed. Pappus 2- or 3-seriate, purplish brown, bristles few, barbellate; outermost bristles 0.2–0.5 mm; inner bristles 0.8–1.2 mm, acute; innermost bristles 1.2–1.4 mm, slightly clavate. Fl Jun–Jul.

• Alpine or subalpine open slopes, meadows; 2800–3800 m. Guizhou, SW Sichuan (Muli), NW Yunnan (Lijiang, Zhongdian).

107. Aster prainii (J. R. Drummond) Y. L. Chen, Geol. Ecol. Stud. Qinghai-Xizang Plateau 2: 1314. 1981.

厚棉紫菀 hou mian zi wan

Chlamydites prainii J. R. Drummond, Bull. Misc. Inform. Kew 1907: 91. 1907.

Herbs, perennial, 4–10 cm; rhizomes creeping or ascending, caudices stout, multibranched, sometimes with long, slender stolons bearing rosettes. Stems erect or ascending, simple, densely white lanate, sparsely minutely stipitate glandular, collar with marcescent leaf petioles. Leaves basal and cauline; cauline leaves abruptly reduced, densely white lanate, margin entire; basal leaves present at anthesis, long petiolate (petiole to 2 cm); blade spatulate, 0.6–1.5 × 0.4–0.8 cm, base attenuate, midvein visible, inconspicuously 3-veined, apex rounded to obtuse; middle cauline leaves spatulate, 0.6–0.8 cm; upper cauline leaves linear, often surrounding involucre. Capitula terminal, solitary, ca. 4.5 cm in diam. Involucres broadly campanulate, 12–15 mm; phyllaries 3-seriate, oblong-lanceolate, densely lanate; outer phyllaries sometimes squarrose, 8–12 × 1.5–2 mm, multiveined, apex acuminate, tip purplish; inner phyllaries 10–12 × ca. 1.5 mm. Ray florets 38–40, deep blue, tube and lamina base hairy, eglandular, lamina 10–16 × ca. 2 mm; disk florets orange becoming purplish, 6.5–7 mm, limb funnelform, ca. 5 mm, sparsely villosulous, lobes erect, triangular, ca. 1 mm, lanate. Achenes (immature) narrowly obovoid, compressed, ca. 3 mm, densely strigillose, 4-ribbed. Pappus 4-seriate, straw-colored, sometimes apically reddish, bristles barbellate; outermost series of numerous, white scales 0.7–1 mm; outer bristles slender, 4–5 mm; inner bristles 6–7 mm, acute; innermost bristles 7–8 mm, weakly clavate. Fl. Aug–Sep.

Slopes above snowline, stony grounds; 4200–5400 m. Sichuan, S Xizang [Bhutan].

108. Aster neolanuginosus Brouillet, Semple & Y. L. Chen, **nom. nov.**

棉毛紫菀 mian mao zi wan

Replaced synonym: *Wardaster lanuginosus* J. Small, Trans. & Proc. Bot. Soc. Edinburgh 29: 230. 1926; *Aster lanuginosus* (J. Small) Y. Ling in Y. Ling & Y. L. Chen, Fl. Reipubl. Popularis Sin. 74: 234. 1985, not *Aster lanuginosus* H. L. Wendland in Bartling & H. L. Wendland, Beitr. Bot. 2: 9. 1825.

Herbs, perennial, subscapiform. Stems solitary or 2. Basal leaves crowded; cauline leaves few. Capitula terminal, solitary. Involucres broadly campanulate; phyllaries 3-seriate, unequal, ca. 10 mm, densely lanate. Ray florets 20–30, purple, lamina ca. 15 mm; disk florets yellow, limb campanulate, ca. 7 mm, without long hairs. Achenes compressed, 2.5–3 mm, hairy, 2-ribbed. Pappus brownish, numerous, unequal, of barbellate bristles.

• About 5000 m. SW Sichuan (Muli).

The anthers of *Aster neolanuginosus* are described as having an apiculate base.

Specimens were not seen by us; the description is from the protologue.

109. Aster asteroides (Candolle) Kuntze, Revis. Gen. Pl. 1: 315. 1891 [*"asterodes"*].

星舌紫菀 xing she zi wan

Heterochaeta asteroides Candolle, Prodr. 5: 282. 1836; *Aster hedinii* Ostenfeld; *A. heterochaeta* Bentham ex C. B. Clarke, nom. illeg. superfl.; *A. likiangensis* Franchet subsp. *hedinii* (Ostenfeld) Onno; *Erigeron heterochaeta* Botschantzev.

Herbs, perennial, 2–15(–30) cm tall; rhizomes short; roots tuberoid, near ground surface. Stems erect, solitary, scapiform, purplish or green below, base without marcescent leaf remains, basally densely to distally sparsely villous, densely minutely glandular pubescent. Leaves basal and cauline; cauline leaves abruptly reduced, villous, sparsely minutely stipitate

glandular, margin entire (basal leaves rarely serrulate), ciliate, 3–5-veined; basal leaves present at anthesis, shortly petiolate, ovate to oblong, 0.5–2 × 0.4–1.3 cm, base rounded to ± attenuate, apex obtuse to acute; middle cauline leaves sessile, oblong to lanceolate, apex obtuse to acuminate; upper leaves subsessile, linear to linear-lanceolate. Capitula terminal, solitary. Involucres hemispheric, 6–9 mm in diam.; phyllaries 2- or 3-seriate, subequal, oblanceolate-oblong to oblong-lanceolate, 5.5–7 × 1–1.5 mm, villous, densely minutely purplish stipitate glandular, more so distally, membranous, margin scarious, densely purplish villous-ciliate, multiveined, apex acuminate, leaflike, tip recurved, purplish. Ray florets 35–60, bluish purple to deep mauve, lamina linear-lanceolate, 10–15 × 1–2 mm; disk florets orange-yellow, 3–3.5 mm, limb funnelform, ca. 2.5 mm, base minutely purple stipitate glandular, lobes erect, triangular, 0.6–0.8 mm, abaxially sparsely hairy, minutely purple stipitate glandular. Achenes narrowly obovoid, ca. 2 mm, strigillose, eglandular, 3- or 4-ribbed. Pappus 2-seriate, straw-colored; outermost series of few broad scales 0.7–1 mm; inner series of few clavate, barbellate bristles ca. 3 mm. Fl. and fr. Jun–Aug.

Alpine thickets, damp grasslands, marshy areas; 3200–4600 m. Gansu, E Qinghai, W Sichuan, C and S Xizang, NW Yunnan [Bhutan, India (Sikkim), Kashmir, Nepal].

Aster asteroides somewhat resembles *A. flaccidus* but is easily distinguished from it by its tuberous roots and purplish glandular disk floret lobes.

110. Aster likiangensis Franchet, J. Bot. (Morot) 10: 370. 1896.

丽江紫菀 li jiang zi wan

Aster asteroides (Candolle) Kuntze subsp. *costei* (H. Léveillé) Grierson; *A. costei* H. Léveillé; *A. likiangensis* subsp. *costei* (H. Léveillé) Onno.

Herbs, perennial, 3–20 cm tall, scapiform, sometimes caespitose; rhizomes short, thick; roots tuberoid near ground surface. Stems erect, simple, usually ± purplish, villosulous to villous (crosswalls often purple), proximally sparsely to distally densely minutely purplish stipitate glandular. Leaves basal and cauline; cauline leaves abruptly reduced, sparsely to moderately villosulous, sparsely minutely purple stipitate glandular, margin entire or remotely serrate to serrulate, ciliate, often 3-veined; basal leaves present at anthesis, long (petiole to 4 cm) or shortly petiolate; blade ovate to oblong or oblanceolate, 0.5–3.5 × 0.2–2.2 cm, base attenuate, apex acute to obtuse; middle cauline leaves sessile, ovate or obovate to linear-lanceolate, 0.8–2 × 0.1–0.6 cm. Capitula terminal, solitary. Involucres hemispheric, 6–7 mm in diam.; phyllaries 2- or 3-seriate, subequal, oblong to lanceolate or linear-lanceolate, 8–12 × 1.5–3 mm, abaxially densely purple villous proximally to sparsely so distally, sparsely proximally to densely distally minutely purplish stipitate glandular, membranous, margin narrowly scarious, purple apically, purple villous-ciliate, purple minutely stipitate glandular, multiveined, apex acute to acuminate, tip twisted, purple. Ray florets 12–55, bluish to lavender-purple, lamina 11–21 × 1.5–3 mm, glabrous, eglandular; disk florets yellow, sometimes purplish brown distally, 4–5 mm, tube 1–1.5 mm, glabrate, limb funnelform, 3.5–4 mm, lobes erect, triangular, 0.5–1 mm, glabrous, sparsely minutely stipitate glandular. Achenes (immature) narrowly obovoid, ca. 3 mm, sparsely strigillose, eglandular, 2-ribbed. Pappus (immature) 2-seriate, straw-colored; outermost series of few broad scales ca. 1 mm; inner series of sometimes purplish, barbellate bristles 3.5–4 mm. Fl. and fr. Jun–Aug.

Alpine meadows, wet open slopes, valleys, mixed shrubs, marshy places; 3500–4500 m. SW Sichuan, SE Xizang, NW Yunnan [Bhutan].

Aster likiangensis is closely related to *A. asteroides* and has been regarded as a subspecies of it by Grierson (Notes Roy. Bot. Gard. Edinburgh 26: 67–163. 1964). It is distinguished by the purple disk floret lobes that are stipitate glandular.

111. Aster flaccidus Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 2: 599. 1835.

萎软紫菀 wei ruan zi wan

Herbs, perennial, 3–30(–40) cm tall, often scapiform; rhizome long, slender, sometimes stoloniferous. Stems erect, simple, white (sometimes purple) villous, more densely so upward (sometimes also basally), sparsely to densely minutely stipitate glandular. Leaves basal and cauline; cauline leaves reduced upward, thin, sparsely to moderately villous, sometimes glabrate, sparsely to moderately minutely stipitate glandular, margin entire or remotely serrulate (basal), ciliate, finely 3-veined; basal leaves present, sometimes withered or absent at anthesis, short or long (petiole to 7 cm) petiolate; blade spatulate to oblong to oblanceolate, 1–9.5 × 0.5–1.6 cm, base attenuate, apex rounded or obtuse to acute; cauline leaves usually sessile, oblong or oblong-lanceolate, 1.5–9 × 0.2–1.5 cm, base attenuate to cuneate or ± rounded, usually subclasping; upper cauline leaves lanceolate to lanceolate-linear. Capitula terminal, solitary, 3.5–5(–7) cm in diam.; peduncles sparsely to densely villous, sometimes more densely so below capitula, sparsely to densely glandular. Involucres hemispheric, (1.2–)1.5–2(–3) cm in diam.; phyllaries 2-seriate, subequal, lanceolate, 7–13 × 1–2 mm, abaxially basally densely white lanate to sparsely white villous, usually less so upward, sparsely to densely minutely stipitate glandular, margin scarious, sometimes purple tinged, ciliate, membranous, multiveined, apex acuminate, tip sometimes spreading, often densely villous. Ray florets 31–67, blue or mauve, lavender-blue, rarely pink or pinkish white, lamina linear-lanceolate, 9–25 × 1–2.5 mm, abaxially proximally hairy (crosswalls purple) or glabrous, eglandular; disk florets orange to yellow, 4.5–7 mm, limb funnelform, 3.5–5 mm, proximally sparsely hairy, lobes erect, triangular, 0.7–1.5 mm. Achenes brownish, narrowly obovoid, compressed, 2.5–3.5 mm, sparsely strigillose, sparsely to moderately (apically) minutely stipitate glandular, rarely glabrous and eglandular, margin strigillose-ciliate, 2-ribbed, ribs pronounced. Pappus 4-seriate, whitish (sometimes purplish), bristles barbellate; outermost series of narrow scales 0.6–1.5 mm; outer bristles few, slender, 3.5–5 mm; inner bristles 6–6.5 mm, acute; innermost bristles 6.5–7.5 mm, weakly clavate. Fl. and fr. Jun–Nov. $2n = 54$.

Damp alpine grasslands, alpine and subalpine pastures, meadows, thickets, screes, fallow fields, forests; 1800–5100 m. S Gansu, N Hebei, E Qinghai, S Shaanxi, Shanxi, W Sichuan, Xinjiang, Xizang, NW Yunnan [Afghanistan, Bhutan, India, Kashmir, Kazakhstan, Mongolia, Nepal, Pakistan, Russia (E Siberia), Uzbekistan; SW Asia (Iran)].

Aster flaccidus is used medicinally to treat pulmonary abscesses, tuberculosis, and pertussis.

Three forms have been recognized in China: *Aster flaccidus* f. *flaccidus* with leaves ± villous, stem apex and involucre base more densely white villous and inconspicuously glandular, involucres 1.5–2(–3) cm in diam.; *A. flaccidus* f. *glabratus* Y. Ling (Fl. Reipubl. Popularis Sin. 74: 239. 1985; NE Xizang) with leaf surfaces glabrous or sparsely villous on abaxial veins only, margin ciliate or not, involucres 2–2.5 cm in diam., phyllaries to 12 mm, abaxially or on veins villous, eglandular; and *A. flaccidus* f. *griseobarbatus* Grierson (Notes Roy. Bot. Gard. Edinburgh 26: 131. 1964; 3200–4900 m; S and E Xizang, NW Yunnan [Bhutan, NE India]) with upper stems and involucres purplish brown or gray-brown hairy.

1a. Stems 3–15(–40) cm, sparsely glandular; leaf surfaces sparsely to densely villous or at least veins villous; involucres 1.5–2(–3) cm in diam.; outer phyllary base densely lanate or villous, abaxially sparsely glandular ..... 111a. subsp. *flaccidus*

1b. Stems 3–15 cm, densely glandular upward; leaf surfaces glabrate or abaxial veins sparsely villous; involucres 1.2–1.8 cm in diam.; outer phyllary base sparsely villous, abaxially densely glandular ..... 111b. subsp. *glandulosus*

111a. Aster flaccidus subsp. **flaccidus**

萎软紫菀(原亚种) wei ruan zi wan (yuan ya zhong)

Aster flaccidus subsp. *fructuglandulosus* (Ostenfeld) Onno; *A. flaccidus* var. *fructuglandulosus* Ostenfeld; *A. flaccidus* f. *stolonifer* Onno; *A. glarearum* W. W. Smith & Farrer; *A. kansuensis* Farrer; *A. tibeticus* J. D. Hooker; *Erigeron flaccidus* (Bunge) Botschantzev.

Stems 3–15(–40) cm, sparsely glandular. Leaf surfaces sparsely to densely villous or at least veins villous. Involucres 1.5–2(–3) cm in diam.; outer phyllary base densely lanate or villous, abaxially sparsely glandular.

Alpine and subalpine pastures, thickets, screes; 1800–5100 m. S Gansu, N Hebei, E Qinghai, S Shaanxi, Shanxi, W Sichuan, NW Xinjiang, Xizang, NW Yunnan [Bhutan, NW India, Kashmir, Kazakhstan, Mongolia, Nepal, Pakistan, Russia (E Siberia), Uzbekistan; SW Asia (Iran)].

111b. Aster flaccidus subsp. **glandulosus** (Keissler) Onno, Biblioth. Bot. 26(Heft 106): 66. 1932.

腺毛萎软紫菀 xian mao wei ruan zi wan

Aster flaccidus var. *glandulosus* Keissler, Ann. K. K. Naturhist. Hofmus. 22: 26. 1907; *A. glandulosus* (Keissler) Handel-Mazzetti (1930), not Labillardière (1806).

Stems 3–15 cm, densely glandular upward. Leaf surfaces glabrate or abaxial veins sparsely villous. Involucres 1.2–1.8(–2) cm in diam.; outer phyllary base sparsely villous, abaxially densely glandular.

Damp alpine grasslands; 4000–5000 m. S Xinjiang, S Xizang [NW India, Kashmir].

112. Aster hololachnus Y. Ling ex Y. L. Chen, S. Yun Liang & K. Y. Pan, Acta Phytotax. Sin. 19: 88. 1981.

全茸紫菀 quan rong zi wan

Herbs, perennial, 4–6 cm tall, caespitose; rhizomes procumbent or ascending, branched, collar clad with marcescent leaf remains. Stems erect, slender, densely white hirsute or villous. Leaves: basal leaves narrowly winged petiolate, base attenuate, apex rounded; middle cauline leaves few, spreading or erect, oblong-lanceolate, 1.7–2.2 × 0.4–0.6 cm, base subclasping, apex somewhat acute; upper leaves linear-lanceolate, acuminate, gray-white thickly tomentose, triplinerved, veins abaxially somewhat prominent. Capitula solitary, ca. 2.5 cm in diam. Involucre hemispheric, ca. 1.5 cm in diam., thickly gray-white tomentose; phyllaries 2- or 3-seriate, linear-lanceolate, ca. 8 mm, herbaceous, acuminate; outer phyllaries ca. 1 mm wide; inner phyllaries narrower to ca. 0.5 mm wide, with narrowly membranous margin, hairy above. Ray florets ca. 50, lamina (not open) linear-lanceolate, ca. 10 × 1 mm; disk florets yellow, ca. 6 mm, tube ca. 1 mm, puberulent, lobes glandular. Ovary oblong, sparsely pubescent or subglabrous. Pappus 2-seriate, white; outer bristles very short, paleaceous; inner bristles ca. as long as disk corolla.

• Glacier areas; 5300–5400 m. S Xizang (Tingri).

Aster hololachnus is closely related to *A. flaccidus*, from which it differs mainly in having densely gray-white tomentose leaves and narrower phyllaries and ray florets.

113. Aster tsarungensis (Grierson) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 241. 1985.

察瓦龙紫菀 cha wạ long zi wan

Aster flaccidus Bunge subsp. *tsarungensis* Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 133. 1964.

Herbs, perennial, 6–45 cm tall, sometimes caespitose; rhizomes long, slender. Stems erect, simple, striate, purplish brown, moderately to densely villous, moderately to densely minutely purple stipitate glandular, sparsely leafy. Leaves basal and cauline; cauline leaves gradually reduced upward, thin, villous, sparsely stipitate glandular, margin remotely serrulate, villous-ciliate, prominently 3-veined, apex acute, tip blunt; basal leaves present at anthesis, long winged petiolate (petiole to 2.5 cm); blade spatulate to ovate or lanceolate, 0.5–5 × 0.2–1.8 cm, base attenuate; lower and middle cauline leaves broadly winged petiolate or sessile, lanceolate, 2.5–9.5 × 0.5–2.3 cm, base attenuate, sometimes subclasping (upward); upper cauline leaves (when present) sessile, linear. Capitula terminal, solitary, 4–6 cm in diam. Involucres broadly hemispheric, 2–3 cm in diam.; phyllaries 2-seriate, subequal, squarrose or spreading, oblong-lanceolate to lanceolate, 6–10 × 1.5–2.5 mm, densely villous (inner phyllaries sparsely so), distally minutely stipitate glandular, membranous, margin scarious, ciliate distally, multiveined, apex shortly acuminate, purple. Ray florets 2-seriate, 60–85, bluish purple, tube and basal lamina sparsely hairy, eglandular, lamina linear-lanceolate, 13–15(–20) × 1.6–1.8 mm; disk florets yellow or purplish tinged, 4.5–5.5 mm, limb funnelform, 3–4 mm, lobes erect, triangular, 0.5–0.6 mm. Pappus 4-

seriate, dirty white; outermost series of white, broad scales 0.6–0.8 mm; bristles barbellate; outer bristles few, slender, 3.1–4.5 mm; inner bristles few, 5–6.5 mm, acute; innermost bristles 6–6.5 mm, weakly clavate. Fl. and fr. Jun–Oct.

• Alpine and subalpine meadows, valley slopes, *Rhododendron* thickets, limestone scree slopes; 2600–4800 m. W Sichuan, SE Xizang, NW Yunnan.

Aster tsarungensis is closely related to and usually regarded as a subspecies of *A. flaccidus*. However, its densely purplish brown glandular, villous stems and yellow disk florets distinguish it from that species.

114. Aster diplostephioides (Candolle) Bentham ex C. B. Clarke, Compos. Ind. 45. 1876.

重冠紫菀 chong guan zi wan

Heterochaeta diplostephioides Candolle, Prodr. 5: 282. 1836; *Aster delavayi* Franchet; *A. diplostephioides* var. *delavayi* (Franchet) Onno; *A. vilmorinii* Franchet, p.p.; *Erigeron delavayi* (Franchet) Botschantzev; *E. diplostephioides* (Candolle) Botschantzev.

Herbs, perennial, 13–57 cm tall, often caespitose; rhizomes robust, branched; roots long, thick, collar clad with marcescent basal leaf bases. Stems erect, simple, sparsely to moderately villous, sparsely to densely minutely stipitate glandular, leafy or sometimes scapiform. Leaves basal and cauline; cauline leaves gradually reduced, thin, sparsely to moderately villous, sparsely to moderately minutely stipitate glandular, margin remotely serrate to serrulate or entire, villous-ciliate, midvein prominent; basal leaves withered at anthesis; basal and lower cauline leaves long (petiole to 10 cm) or narrowly winged petiolate; blade oblong to oblanceolate, 1.3–15 × 0.8–2.3(–4) cm, base attenuate, apex acute to obtuse or rounded, sometimes mucronate; middle cauline leaves oblong to linear-lanceolate, base auriculate, subclasping; upper cauline leaves 1.4–8.5 × 0.2–1.3 cm. Capitula terminal, solitary, 6–9 cm in diam. Involucres hemispheric, 2–2.5 cm in diam.; phyllaries 2- or 3-seriate, linear-lanceolate, 9–16 × 1–1.5 mm, longer than disk, abaxially sparsely or sometimes moderately villous along veins, densely or sometimes sparsely, dark colored, and minutely stipitate glandular, membranous, margin narrowly scarious, ciliate, multiveined, apex acuminate, spreading. Ray florets 2-seriate, 45–93, mauve to purple or lilac-blue, lamina linear, 18–25 × 1–2 mm, glabrous, eglandular; disk florets 5–6 mm, orange to yellow, apex blackish or brownish purple externally, tube and proximal limb hairy, limb narrowly funnelform, 3.5–4 mm, lobes erect, triangular, ca. 1 mm. Achenes narrowly obovoid, 3–4 × 1–1.5 mm, sparsely strigillose, minutely stipitate glandular, more densely so distally, 4–6-ribbed. Pappus 3-seriate, white; outermost series of few white becoming straw-colored, broad scales 0.8–1.2 mm; bristles barbellate; inner bristles 3.5–6 mm, acute; innermost bristles 4–7 mm, weakly clavate. Fl. Jul–Sep, fr. Sep–Dec. $2n = 18$.

Alpine and subalpine grasslands, rich or wet alpine meadows, scrub, boggy areas, stream banks, floodplains, seepage areas in coniferous or mixed forests; 2700–4600 m. W Gansu, E Qinghai, SW and W Sichuan, S Xizang, NW Yunnan [Bhutan, India, Kashmir, Nepal, N Pakistan].

115. Aster yunnanensis Franchet, J. Bot. (Morot) 10: 375. 1896.

云南紫菀 yun nan zi wan

Herbs, perennial, 30–75 cm tall, often caespitose; rhizomes robust, branched; roots long, thick, collar clad with marcescent leaf bases. Stems erect, simple or branched, sparsely to sometimes moderately villous, moderately to densely minutely stipitate glandular, leafy. Leaves basal and cauline; cauline leaves gradually reduced, abaxially sparsely villous or glabrous, moderately to densely minutely stipitate glandular, adaxially sparsely villosulous or sometimes villous, moderately to densely minutely stipitate glandular, margin entire or serrate to serrulate, sparsely to moderately villosulous-ciliate, densely minutely stipitate glandular, midvein abaxially prominent, veins conspicuous; basal leaves withered at anthesis; basal and lower cauline leaves ± broadly winged petiolate (petiole to 6 cm) or lower leaves sessile; blade ovate to oblanceolate, (5–)7–18 × 1–4 cm, base attenuate, apex acute to obtuse; middle cauline leaves sessile, lanceolate or oblong to oblanceolate, 5–16 × 0.8–6 cm, base rounded or cordate to auriculate, semiamplexicaul, apex acute, sometimes obtuse. Capitula terminal, solitary or 2–9 in lax corymbiform synflorescences, 4–8.5 cm in diam.; peduncles 4–16 cm, sparsely to moderately villous, densely minutely stipitate glandular. Involucres hemispheric, 1.5–2.5 cm in diam.; phyllaries 3-seriate, subequal, ovate-lanceolate to linear-lanceolate, 10–16 × 0.8–4(–5) mm, densely white villous basally and glabrate above or sparsely villous distally, or sparsely villous along veins, or glabrate, moderately to densely minutely purple stipitate glandular, membranous, margin narrowly scarious, erose, purple, distally ciliate, multiveined, apex acute to acuminate, purple-tipped. Ray florets 65–125, pale purple to purple-blue, tube apex and lamina base minutely stipitate glandular, tube 1.6–2 mm, lamina linear, 20–30 × 1–2.5 mm, glabrous; disk florets yellow to orange, 5–5.6 mm, tube 1.8–2 mm, tube apex and base of limb minutely stipitate glandular, limb narrowly funnelform, ca. 3.5 mm, lobes erect, triangular, 1–1.2 mm. Achenes (immature) narrowly obovoid, compressed, 3–4 mm, sparsely strigillose, sparsely minutely stipitate glandular distally, 4-ribbed. Pappus 3-seriate; outermost series of broad scales 1–1.2 mm, white or straw-colored; bristles barbellate; inner bristles acute; innermost bristles ca. 6.5 mm, weakly clavate. Fl. Jul–Sep, fr. Sep–Oct.

• Alpine and subalpine grasslands or meadows, forest margins, slopes, seepage areas, cutover mixed forests, scrub, pastures; 2300–4500 m. Gansu, Qinghai, Sichuan, E and S Xizang, Yunnan.

Aster yunnanensis is closely related to *A. diplostephioides* but differs in having usually branched stems, usually broader phyllaries (rarely somewhat narrow), and disk florets apically yellow, not purple. Based on variations in width and indumentum of the phyllaries, this species can be divided into the following varieties. Grierson (Notes Roy. Bot. Gard. Edinburgh 26: 67–163. 1964) did not segregate *A. yunnanensis* var. *angustior* and *A. yunnanensis* var. *labrangensis*.

1a. Phyllaries ovate-lanceolate, 3–4(–5) mm wide, often pubescent in lower part only; ray floret lamina 1.5–2.5 mm wide ..... 115a. var. *yunnanensis*

1b. Phyllaries linear-lanceolate, 0.8–2 mm wide, abaxially densely villous at least at base; ray floret lamina 1–2 mm wide.
2a. Leaves abaxially villous on veins, margin villous; phyllaries abaxially densely villous at base or throughout ..... 115b. var. *angustior*
2b. Leaves densely yellow villous with glandular hairs, margin villous; phyllaries villous ..... 115c. var. *labrangensis*

115a. Aster yunnanensis var. **yunnanensis**

云南紫菀(原变种) yun nan zi wan (yuan bian zhong)

Aster diplostephioides (Candolle) C. B. Clarke var. *yunnanensis* (Franchet) Onno.

Stems 2–8-branched, rarely simple. Leaves: margin entire or serrulate, villous, lower cauline leaves 17–18 × 2–4 cm, middle leaves abaxially villous on veins, adaxially sparsely villosulous, and glandular, base rounded or auriculate. Capitula 5–8.5 cm in diam. Involucres 2–2.5 cm in diam.; phyllaries ovate-lanceolate, 3–4(–5) mm wide, densely villous basally, sparsely villous and purplish glandular above. Ray floret lamina 25–35 × 1.5–2.5 mm.

• Alpine and subalpine grasslands; 2500–4500 m. SW and W Sichuan, NW Yunnan.

115b. Aster yunnanensis var. **angustior** Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 622. 1937.

狭苞云南紫菀 xia bao yun nan zi wan

Aster vilmorinii Franchet; *Erigeron vilmorinii* (Franchet) Botschantzev.

Stems 2- or 3-branched or simple. Leaves: margin sparsely serrate or subentire, villous, lower cauline leaves 7–15 × 1–2.5 cm, middle leaves somewhat narrow or broader, abaxially villous at least at base, veins villous, adaxially sparsely villosulous, glandular, base rounded or cordate. Capitula 4–6 cm in diam. Involucres 1.5–2 cm in diam.; phyllaries linear-lanceolate, 0.8–1.5 mm wide, abaxially densely villous at base or throughout, glandular. Ray floret lamina 20–25 × 1–2 mm.

• Alpine and subalpine forest margins and open grasslands; 2300–4100 m. SW and W Sichuan, NW Yunnan.

115c. Aster yunnanensis var. **labrangensis** (Handel-Mazzetti) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 246. 1985.

夏河云南紫菀 xia he yun nan zi wan

Aster labrangensis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 621. 1937; *A. kawaguchii* Kitamura.

Stems 2–5 branched. Leaf margin serrulate or entire, villous, lower and middle cauline leaves 5–10 × 1.5–2.8 cm, densely villous, glandular, base truncate or cordate. Capitula 4–6 cm in diam. Involucre 1.5–2 cm in diam.; phyllaries linear-lanceolate, 10–13 × 1–2 mm, villous, glandular. Ray floret lamina 20–25 × 1–1.5 mm. $2n = 18$*.

• Alpine and subalpine open slopes and grasslands; 3600–4300 m. S Gansu, E and S Qinghai, W Sichuan, E and S Xizang.

116. Aster setchuenensis Franchet, J. Bot. (Morot) 10: 377. 1896.

四川紫菀 si chuan zi wan

Herbs, perennial, 20–50 cm tall, sometimes caespitose; rhizomes slender. Stems erect, simple, striate, glabrate, densely minutely reddish stipitate glandular, leafy. Leaves basal and cauline; cauline leaves reduced upward, thin, abaxially pale green, glabrous, eglandular, adaxially scabrous distally, margin sparsely serrulate, scabrous-ciliate, midvein prominent, apex acuminate, tip rounded; basal leaves withered or present at anthesis, sessile or shortly petiolate, oblanceolate, 3–14.5 × 0.4–1.5 cm; middle cauline leaves sessile, lanceolate, 2.5–6 × 0.4–0.9 cm, base rounded-auriculate, subclasping; upper leaves linear, acute. Capitula terminal, 4–6 in lax corymbiform synflorescence, 2–4 cm in diam.; peduncles 1.5–13 cm; bracts linear, densely minutely stipitate glandular. Involucres 8–9 mm; phyllaries 3-seriate, subequal, membranous, apex acute to acuminate, reddish purple; outer phyllaries lanceolate, ca. 6 × 1.5–2 mm, abaxially densely minutely stipitate glandular; inner phyllaries linear-lanceolate, ca. 7 × 0.9 mm, minutely stipitate glandular distally, margin scarious, erose, purplish distally, ciliate distally. Ray florets 25–40, bluish mauve to purple, tube distally hairy and minutely stipitate glandular, lamina 10–12 × ca. 1.5 mm; disk florets yellow, ca. 6 mm, tube ca. 2 mm, limb funnelform, 4–4.5 mm, proximally hairy, lobes erect, triangular, 0.7–0.8 mm. Achenes narrowly obovoid, 3–4 mm, sparsely to moderately strigillose, minutely stipitate glandular distally, margin 6-ribbed. Pappus 4-seriate, white; outermost series of scales linear, 0.7–1 mm; bristles barbellate; outer bristles few, slender, 2–2.5 mm; inner bristles 5–5.5 mm, acute; innermost bristles 5.7–6 mm, weakly clavate. Fl. Aug–Sep.

• Mountain forests or streamsides, disturbed damp shrublands; 3100–3500 m. NC Sichuan (Barkam, Lixian).

Aster setchuenensis is distinguished by its scabrous leaves and capitula in lax corymbiform synflorescences.

117. Aster lipskii Komarov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 2: 8. 1921.

青海紫菀 qing hai zi wan

Herbs, perennial, ca. 50 cm tall, rhizomes robust. Stems erect, sparsely short villous. Leaves: basal and lower cauline leaves long petiolate, lanceolate, shortly villous, abaxial midvein densely villous, base attenuate, margin entire, shortly villous-ciliate; upper cauline leaves sessile, base clasping; uppermost leaves small, linear-lanceolate. Capitula terminal, solitary, 5–6 cm in diam. Involucres not visible; phyllaries subequal, (not fully visible) to 1.5 mm wide, abaxially brown stipitate glandular, margin of inner phyllaries scarious, ciliate, apex long acuminate. Ray florets dark purple, ca. 25 mm, tube ca. 2 mm, lamina linear, 10–15 mm; disk florets yellow, ca. 4.4 mm, tube ca. 1.1 mm, upper tube and limb base hairy, lobes lanceolate, ca. 0.7 mm. Achenes (immature) oblanceolate, compressed, 2-ribbed, strigose. Pappus (immature) whitish, 3-seriate; outermost series of scales 0.5–0.7 mm; inner series of bristles 4.1–4.7 mm, acute; innermost bristles ca. 6 mm, ± clavate. Fl. Jul.

• About 3800 m. E Qinghai (near Qinghai Hu).

The type of *Aster lipskii* has not been seen. The original description was based on seeds collected from near Qinghai Hu and cultivated at the Komarov Botanical Gardens. This species differs from *A. diplostephioides* in its narrower phyllaries (to 1.5 mm).

118. Aster farreri W. W. Smith & Jeffrey, Notes Roy. Bot. Gard. Edinburgh 9: 78. 1916.

狭苞紫菀 xia bao zi wan

Aster diplostephioides (Candolle) C. B. Clarke subsp. *farreri* (W. W. Smith & Jeffrey) Onno; *A. nigrotinctus* Y. Ling; *A. vilmorinii* Franchet var. *nigrotinctus* (Y. Ling) Y. Ling; *Erigeron farreri* (W. W. Smith & Jeffrey) Botschantzev.

Herbs, perennial, 30–60 cm tall, sometimes caespitose; rhizome long, slender, sometimes adjacent rosettes present, sometimes collar clad in basal marcescent leaves. Stems erect, simple, sparsely to moderately villous, sparsely minutely stipitate glandular, densely so upward, leafy. Leaves basal and cauline, sparsely villous, eglandular, margin entire or sparsely serrulate, villous-ciliate, midvein abaxially prominent; basal leaves absent at anthesis; basal and lower cauline leaves long petiolate (petiole to 7 cm); blade oblanceolate to narrowly oblanceolate, 1.5–16(–22) × 0.7–2.3 cm, base attenuate, apex acute; middle cauline leaves linear-lanceolate, 7–13 × 0.7–2 cm, base rounded, subclasping to clasping, apex acuminate; upper leaves linear, ca. 2 × 0.1 cm, apex acute. Capitula terminal, solitary, 5–8 cm in diam. Involucres hemispheric, 2–2.4 cm in diam.; phyllaries 3-seriate, subequal, linear-lanceolate, 10–16 × 1–1.5 mm, often surpassing disk florets, membranous, margin narrowly scarious, erose, ciliate, multiveined, apex acuminate, spreading; outer phyllaries abaxially villous, eglandular; innermost phyllaries colorless, glabrate, tip villous. Ray florets 75–121, purplish blue or lilac, tube distally sparsely minutely stipitate glandular, lamina 17–30 × 1–1.2 mm; disk florets yellow, 6.5–7 mm, tube and proximal limb minutely stipitate glandular, limb narrowly funnelform, ca. 5 mm, sometimes sparsely hairy proximally, lobes erect, triangular, 0.7–1 mm. Achenes narrowly obovoid, 3–4 mm, sparsely to moderately strigillose, eglandular, 4-ribbed. Pappus 4-seriate; outermost series of few white scales 0.3–1 mm; bristles dirty white, barbellate; outer bristles slender, 2–4 mm; inner bristles 5–5.5 mm, acute; innermost bristles 6–8 mm, weakly clavate. Fl. Jul–Aug, fr. Aug–Sep.

• Subalpine grasslands or meadows, open slopes, open *Picea* woodlands, forest margins, *Rhododendron* and shrub thickets, roadsides; 1300–4100 m. SE Gansu, N Hebei, E Qinghai, Shanxi, W Sichuan.

Aster farreri is distinguished from *A. diplostephioides* by its narrow, eglandular phyllaries, often overtopping the disk florets, and very narrow leaves.

119. Aster brevis Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 625. 1937.

短茎紫菀 duan jing zi wan

Aster flaccidus Bunge f. *tunicatus* Onno.

Herbs, perennial, 5–12 cm, subcaespitose; rhizome thick, clad in hard, fibrous marcescent leaf remains; roots simple. Stems strigose, with densely long-stipitate glandular leaves. Leaves 4–7, ± equidistant, margin revolute, scabrous; basal leaves long petiolate, petiole base clasping; blade spatulate-lanceolate, 1–4 × 0.5–1 cm, thick, glabrous, base attenuate, margin serrulate, apex acute to rounded; cauline leaves sessile, oblong, 1.2–2 cm, abaxially ± hairy, midvein scabrous, adaxially glabrous, base clasping, apex obtuse (lower cauline leaves sometimes glabrous). Capitula terminal, solitary, 3.5–4 cm in diam. Involucres hemispheric, up to 1 cm; phyllaries equal, leaflike, lanceolate, ca. 2 mm wide, strigose, eglandular, apex acuminate, purplish tinged. Ray florets dark blue, tube ca. 2.3 mm, hairy, lamina linear, 10–12 × 1–1.2 mm; disk florets orange-yellow, ca. 5.3 mm, tube ca. 1.5 mm, tube and limb hairy, limb cylindric-funnelform, lobes narrowly triangular, ca. 0.9 mm, glabrous, somewhat purplish when dry. Achenes (immature) compressed, sparsely strigose, 2-ribbed. Pappus (immature) 3-seriate, yellowish; outer series of scales ca. 0.6 mm; bristles rigid, barbellate; inner series of bristles ca. 5 mm, acute; innermost bristles ca. 5.6 mm, slightly clavate. Fl. Jul.

• Alpine slopes; ca. 3900 m. NW Yunnan (Zhongdian).

According to Onno, *Aster brevis* is distinguished from *A. flaccidus* by its stout rhizomes and roots.

No specimens were seen by us.

120. Aster bipinnatisectus Ludlow ex Grierson, Notes Roy. Bot. Gard. Edinburgh 26: 144. 1964.

重羽紫菀 chong yu zi wan

Herbs, perennial, 2–8 cm tall, sometimes caespitose; rootstock woody, collar densely clad by marcescent leaf remains. Stems 2 or 3 or many, pilose. Leaves white villous; basal leaves dense, rosulate, petiolate, petiole 1–2 cm, base clasping; blade 1–2 cm, bipinnatisect; lobes 3–5 pairs, 5–7 mm, each with 3–8 pairs of secondary segments, 1–3 cm; cauline leaves 3 or 4, similar to but smaller than basal leaves, pinnatisect. Involucres 2.5–3.5 cm in diam.; phyllaries unequal, purplish at tips, villous; outer phyllaries 6–7 × ca. 0.75 mm; inner phyllaries 9–10 × 0.8–1 mm. Ray florets 20–35, pale mauve, tube 2.5–3 mm, lamina 1.3–1.5 × ca. 0.2 cm; disk florets yellow, 5.5–6 mm, tube ca. 1.6 mm, lobes ca. 1 mm. Achenes ca. 1.5 × 0.5 mm. Pappus: outer bristles ca. 1 mm; inner bristles slender. Fl. Jul.

• Rock faces; ca. 3200 m. SE Xizang (Xoka).

Specimens of *Aster bipinnatisectus* were not seen by us; the description is based on the protologue by Grierson.

This species is distinguished from all other species of the genus by its bipinnatisect, villous leaves. Rosettes at the base of woody stems are also a distinguishing character.

121. Aster senecioides Franchet, J. Bot. (Morot) 10: 381. 1896.

狗舌草紫菀 gou she cao zi wan

Aster senecioides var. *latisquamus* Y. Ling.

Herbs, perennial, 16–50 cm tall; rhizomes robust. Stems erect, often single, slender to robust, densely hirsute-villous, densely strigillose below capitula. Leaves: both surfaces densely strigose, abaxial veins densely strigose-villous, thick, midvein slightly prominent, lateral veins 4–6 pairs; basal and lower cauline leaves similar, present at anthesis; basal leaves long winged

petiolate; lower cauline leaves shortly winged petiolate; blade elliptic or oblong-spatulate, 4–18 × 1.4–4 cm, base attenuate, margin coarsely serrate, apex obtuse or rounded; middle and upper cauline leaves sessile, oblong or lanceolate, 2–6 × 0.3–2 cm, base attenuate or rounded-subclasping, margin sparsely serrate or entire, apex acute to rounded. Capitula 2–6(–8) in corymbiform synflorescences, 2–3 cm in diam.; peduncles 1.5–7 cm; bracts linear to linear-lanceolate. Involucres hemispheric, 1–1.2 × 1–1.5 cm; phyllaries 3-seriate, linear to obovate-oblong, apex obtuse or acute to acuminate; outer phyllaries 7–10 mm, margin broadly scarious, sparsely strigose-villous; inner phyllaries 10–11 × 2–3.5 mm, glabrous or strigose-villous on midvein and at tip, margin scarious, erose or not. Ray florets 16–20, purplish, tube 2–3.7 mm, hairy, lamina 12–14 × 2–4 mm; disk florets yellow-green, 5–6 mm, tube 1.2–2.5 mm, sparsely hairy, limb funnelform, lobes ovate, ca. 1 mm. Achenes oblanceolate, ± compressed, 3–3.5 × ca. 1 mm, strigose, 5-ribbed. Pappus yellowish, 3-seriate, stout, outer bristles ca. 1.2 mm; inner bristles ca. 4.2 mm, acute; innermost bristles ca. 5.5 mm, clavate. Fl. Aug–Sep, fr. Sep–Oct.

• Alpine valleys, coniferous forests, rocky slopes; 2000–3000 m. SW Sichuan, N and NW Yunnan.

Two varieties of *Aster senecioides* have been recognized. However, upon examination of specimens, the width of the scarious phyllary margin is identical, and phyllary width and ray floret lamina width overlap significantly. Varieties would need a morphometric study before they can be accepted.

122. Aster batangensis Bureau & Franchet, J. Bot. (Morot) 5: 50. 1891.

巴塘紫菀 ba tang zi wan

Herbs, perennial, 3–15 cm tall, caespitose; rhizome procumbent, caudex thick, branched, woody; taproot thick, woody. Stems ascending, sometimes erect, simple, slender, reddish brown striate, villosulous, sometimes sparsely so, sparsely to densely (distally) minutely stipitate glandular, scapiform. Leaves basal and cauline, both surfaces sparsely strigillose or glabrous or sometimes distally sparsely to moderately strigillose and veins sparsely to densely strigillose, margin entire, strigillose-ciliate, midvein prominent abaxially; basal leaves present at anthesis, marcescent, long winged petiolate (petiole to 2 cm); blade obovate to oblanceolate, 0.2–6 × 0.1–0.9 cm, base attenuate, apex rounded or retuse to obtuse, largest mucronulate; cauline leaves subpetiolate or sessile, narrowly oblong-oblanceolate to narrowly lanceolate, 0.9–3.5 × 0.2–0.4(–0.7) cm, abruptly reduced and gradually smaller distally, base cuneate to rounded, apex obtuse to acuminate, mucronulate. Capitula terminal, solitary, 3–4.5 cm in diam. Involucres broadly campanulate, 0.5–1(–1.5) cm in diam.; phyllaries 3-seriate, subequal, spreading to squarrose, lanceolate to linear-lanceolate (some inner phyllaries), 6–12 × 0.5–2 mm, abaxially strigillose, basally more so, or glabrous, minutely stipitate glandular, membranous, margin narrowly to broadly scarious, erose, eciliate, sometimes purplish, few veined, midvein prominent, apex acute to acuminate, tip sometimes purplish. Ray florets 12–26, purple to lavender or lavender-blue, tube ca. 3 mm, lamina 12–22 × 1–2.5 mm, glabrous, eglandular; disk florets yellow to yellow-orange, 4.6–5 mm, tube ca. 1.5 mm, limb narrowly funnelform, 3.2–3.5 mm, base sparsely hairy, lobes spreading, triangular, ca. 1 mm, eglandular. Achenes narrowly obovoid, ± compressed, 3.5–4 mm, strigillose, eglandular, margin 3-ribbed. Pappus 4-seriate, white; outermost series of few white scales 0.5–1 mm; bristles barbellate; outer bristles few, slender, 2–3 mm; inner bristles 4–4.5 mm, acute; innermost bristles faintly reddish, 5–5.5 mm, weakly clavate. Fl. May–Sep, fr. Sep–Oct.

• Forest and thicket margins, open grasslands, meadows, pastures, open slopes, stony or scree slopes, cliff faces, stream banks; 2500–4600 m. SW and W Sichuan, E Xizang, NW Yunnan.

1a. Leaves sparsely strigillose; phyllaries strigillose, minutely stipitate glandular; stems villosulous ..... 122a. var. *batangensis*

1b. Leaves glabrous or sometimes distally strigillose, veins strigillose; phyllaries glabrous, minutely stipitate glandular; stems sparsely villosulous ..... 122b. var. *staticifolius*

122a. Aster batangensis var. **batangensis**

巴塘紫菀(原变种) ba tang zi wan (yuan bian zhong)

Stems villosulous. Leaves sparsely strigillose. Phyllaries strigillose, basally more so, minutely stipitate glandular.

• Forest and thicket margins, open grasslands, meadows, pastures, stony or scree slopes, cliff faces, stream banks; 3400–4600 m. SW and W Sichuan, E Xizang, NW Yunnan.

122b. Aster batangensis var. **staticifolius** (Franchet) Y. Ling, Fl. Reipubl. Popularis Sin. 74: 253. 1985 [*"staticefolius"*].

匙叶巴塘紫菀 shi ye ba tang zi wan

Aster staticifolius Franchet, J. Bot. (Morot) 10: 370. 1896.

Stems sparsely villosulous. Leaves glabrous or sometimes distally strigillose, veins strigillose. Phyllaries glabrous, minutely stipitate glandular.

• Open slopes, gravelly cliffs, forest margins, pastures; 2500–4000 m. SW Sichuan, NW Yunnan (Lijiang).

123. Aster rockianus Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 613. 1937.

腾越紫菀 teng yue zi wan

Herbs, perennial, ca. 45 cm tall; rhizomes short, multibranched. Stems simple, bearing fascicled leaves and lateral stems at ends of branches, canaliculate, appressed shortly hairy, glabrate below, densely leafy. Leaves thin, lower leaves withered at anthesis, basal leaves (non-reproducing rosettes) petiolate, petiole longer than blade; blade lanceolate, 2–4 × ca. 1 cm, veins on both surfaces sparsely shortly hairy, base attenuate, apex acute or rounded, mucronate, margin sparsely serrate (teeth mucronulate); cauline leaves shortly winged petiolate, narrowly lanceolate, 3–8 × 0.4–0.8 cm, apex long acuminate. Capitula numerous in dense corymbiform synflorescences, ca. 10 cm in diam. Involucres broadly campanulate, ca. 1 cm in diam.; phyllaries 2-seriate, linear-lanceolate, 5–7 mm, densely

hairy, apex acuminate; outer phyllaries shorter than inner ones, inner phyllaries glabrous below, margin scarious, apex reddish. Ray florets 2-seriate, blue (when dry), lamina oblanceolate, 4–5 × ca. 1 mm; disk florets 4–5 mm. Achenes (immature) obovoid, compressed, strigose, margin thick. Pappus white or brownish, equal, equaling disk corollas.

• Yunnan (Tengchong).

In aspect, *Aster rockianus* is similar to *A. moupinensis*, but its leaf shape and capitula are different. This species may be related to *A. diplostephioides*, but it differs in habit.

No specimens were seen by us.

140. SOLIDAGO Linnaeus, Sp. Pl. 2: 878. 1753.

一枝黄花属 yi zhi huang hua shu

Chen Yilin (陈艺林 Chen Yi-ling); John C. Semple

Herbs, perennial, rarely subshrubs; rhizome short to long or woody caudex. Stems decumbent to ascending or erect. Leaves basal (persistent or not by anthesis) and cauline, alternate, sessile or petiolate, blade ovate to broadly to narrowly lanceolate. Capitula usually small, radiate, numerous in terminal racemiform, paniculiform, or corymbose-paniculiform synflorescences. Involucre narrowly campanulate to ± cylindric; phyllaries 3–5-seriate, imbricate or subequal, linear-lanceolate, deltate, or oblong, herbaceous, margin scarious, apex rounded to obtuse or acute to attenuate. Receptacles slightly convex, alveolate, naked. Florets fertile; ray florets female, 1-seriate, usually yellow, usually glabrous, apex inconspicuously 2- or 3-denticulate; disk florets bisexual, yellow turning brown with age, tubular, limb expanded or narrow, apex 5-denticulate; anther base obtuse; style branches flattened, appendage lanceolate. Achenes obconic to cylindric, sometimes ± laterally compressed, glabrous or moderately strigillose, 8–10-ribbed. Pappus of outer short setiform scales rarely present, and 2 series of 25–45 fine, persistent, long, barbellate bristles, mid series 90%–95% length of inner, apically attenuate, inner apically very weakly to moderately clavate.

About 120 species: mainly in North America, a few species in Asia, Europe, and South America; six species (three introduced) in China.

1a. Synflorescence racemiform, long paniculiform, or corymbose-paniculiform, branches erect, inserted around stem, capitula attached around branch; involucre 3.5–9.5(–10) mm; inner (longest) pappus bristles weakly to moderately clavate.
2a. Phyllaries rounded or obtuse; involucre 4–6 mm; rare, occurs in NE China ..... 3. *S. pacifica*
2b. Phyllaries acuminate or acute; involucre 3.5–9.5(–10) mm.
3a. Upper stem leaves small, length from widest point to apex 6.5–31.5 mm, mean 14.3 mm; involucre 3.5–7.7 mm; pappus bristles 3.1–5.2 mm; E and S China, common ..... 1. *S. decurrens*
3b. Upper stem leaves larger, length from widest point to apex 25–45 mm, mean 34.5 mm; involucre 6–9.5(–10) mm; pappus bristles 4.5–7 mm; NE and far W China ..... 2. *S. dahurica*
1b. Synflorescence pyramidal, secund, branches usually spreading, curved, capitula attached on upper side of branch; involucre 2.3–4 mm; inner (longest) pappus bristles not obviously clavate.
4a. Stem leaves with multiple prominent lateral veins ..... 4. *S. rugosa*
4b. Stem leaves with 2 very prominent lateral veins (triplinerved).
5a. Upper stem leaves sharply serrate, abaxial veins sparsely hairy; involucre 2.5–3 mm; lower stem glabrous or hairy ..... 5. *S. canadensis*
5b. Upper stem leaves entire, abaxial veins densely hairy; involucre 3–4 mm; lower stem hairy ..... 6. *S. altissima*

1. Solidago decurrens Loureiro, Fl. Cochinch. 2: 501. 1790.

一枝黄花 yi zhi huang hua

Amphirhapis chinensis Schultz Bipontinus; *A. leiocarpa* Bentham; *Solidago cantoniensis* Loureiro; *S. virgaurea* Linnaeus subsp. *leiocarpa* (Bentham) Hultén; *S. virgaurea* var. *leiocarpa* (Bentham) A. Gray; *S. virgaurea* var. *paludosa* Honda.

Herbs, perennial, woody caudex shortly branched. Stems (5–)35–100 cm tall, erect, usually slender, solitary or rarely fascicled, simple or branched in upper part. Leaves: lower cauline 1–25 (including petiole) × 0.4–3(–4) cm, petiole 2–4 cm or more, with long wings, blade lanceolate to ovate, both surfaces puberulent or adaxially glabrous, upper margin serrate or entire; mid cauline petiole winged, blade elliptic, long elliptic, ovate, or broadly lanceolate, 2–14 × 0.4–2(–2.9) cm, base cuneate-attenuate, upper margin serrate, serrulate, or entire; upper cauline length from widest point to apex 6.5–31.5 mm, mean 14.3 mm. Capitula numerous in terminal, dense or lax racemiform or corymbose-paniculiform synflorescences, branches erect, inserted around stem, capitula attached around branch, rarely lower branches elongated terminating in separate synflorescences. Involucre 3.5–6.2(–7.7) mm; phyllaries 4–6-seriate, lanceolate or narrowly lanceolate, apex acute or acuminate. Ray florets 2–9, lamina 2–5(–6.5) × 0.9–2.8 mm. Achenes 2–3 mm, glabrous to sparsely strigose Pappus bristles 3.1–5.2 mm, inner (longest) weakly to moderately clavate. Fl. and fr. Apr–Nov.

Forests, forest margins, thickets and grasslands on slopes; below 100–2900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Laos, Nepal, Philippines, Vietnam].

This species is used medicinally for promoting hemostasis and for treating a variety of conditions, including snakebites, carbuncles, and furuncles. The leaves and capitula of *Solidago decurrens* are usually much smaller than those of *S. dahurica*.

2. Solidago dahurica (Kitagawa) Kitagawa ex Juzepczuk, Fl. URSS 25: 42. 1959.

兴安一枝黄花 xing an yi zhi huang hua

Solidago virgaurea Linnaeus var. *dahurica* Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 1: 297. 1937; *S. virgaurea* subsp. *dahurica* (Kitagawa) Kitagawa.

Herbs, perennial, woody caudex shortly branched; rhizomes woody, sometimes to 5–10 cm. Stems erect, 36–100 cm tall, simple or inflorescence-branched in upper part, glabrous in lower part, sparsely puberulent in upper part. Leaves: lower cauline petiole usually equaling blade, winged, blade elliptic, long elliptic, or lanceolate, rarely ovate, 7–18 × 2.5–3.5 cm, both surfaces glabrous or sparsely puberulent along veins, base gradually narrowed, decurrent, margin coarsely or finely serrate; mid cauline sessile, blade elliptic, long elliptic, or lanceolate, 5–17 × 1.5–4 cm; upper cauline length from widest point to apex 25–45 mm, mean 34.5 mm. Capitula 10–12 × ca. 10 mm, few to numerous in terminal, dense or lax, long paniculiform synflorescences to 30 cm, or in racemiform ones 10–12 cm, rarely glomerate, branches erect, inserted around stem, capitula attached around branch. Involucre campanulate, 6–9.5(–10) mm; phyllaries 3–5-seriate, lanceolate, 5–8 mm, outer often not much shorter than inner, margin narrowly scarious, apex acuminate or acute. Ray florets 5–10, yellow, lamina 4.6–6.5 mm; disk florets 4–24, averaging 12, 5–7.3 mm, lobes 1.1–1.5 mm. Achenes angled, 2.5–4 mm, distal 1/3–1/2 sparsely to moderately strigose, proximally glabrous or glabrate. Pappus white, bristles 4.5–6.8 mm, inner (longest) weakly to moderately clavate. Fl. and fr. Jul–Sep.

Forests, forest glades; 300–2100 m. Hebei, Heilongjiang, Jilin, Liaoning, Shanxi, Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Nepal, E and SC Russia, Uzbekistan].

This species has been treated as a variety or subspecies of *Solidago virgaurea* Linnaeus (Sp. Pl. 2: 880. 1753; 毛果一枝黄花 mao guo yi zhi huang hua). Typical *S. virgaurea* is native to Europe and SW Asia eastward to India, Nepal, and Pakistan. Its presence in China has not been confirmed, but it may occur in westernmost Xinjiang. It has large capitula similar to those of *S. dahurica* but has achenes that are very sparsely to densely strigose over the entire surface, not just distally.

3. Solidago pacifica Juzepczuk, Fl. URSS 25: 576. 1959.

钝苞一枝黄花 dun bao yi zhi huang hua

Solidago virgaurea Linnaeus var. *coreana* Nakai.

Herbs, perennial; rhizomes robust. Stems erect, slender, to 100 cm tall, simple, glabrous, laxly leaved. Leaves elliptic or lanceolate, both surfaces glabrous, or sparsely ciliate, lower cauline narrowly petiolate, upper cauline gradually smaller. Capitula 7–12 mm, numerous, in terminal corymbs, several corymbs arranged in racemiform synflorescences to 35 cm, branches erect, inserted around stem, capitula attached around branch. Involucre campanulate, 4–6 mm; phyllaries 3- or 4-seriate, elliptic or oblanceolate, 4–6 mm, rounded or obtuse. Ray florets ca. 5 mm. Achenes ca. 2 mm, glabrous. Pappus inner (longest) bristles weakly to moderately clavate. Fl. and fr. Aug–Oct.

Grasslands on slopes, forests, forest margins; ca. 1600 m. Hebei, Heilongjiang, Jilin, Liaoning [Russia].

4. Solidago rugosa Miller, Gard. Dict., ed. 8, *Solidago* no. 25. 1768.

多皱一枝黄花 duo zhou yi zhi huang hua

Herbs, perennial; rhizomes creeping, branched. Stems 30–50 cm tall (potentially to 100 cm), erect, simple, green, shortly hirsute. Leaves: lower cauline absent at anthesis, similar to mid or upper ones but larger; mid to upper cauline numerous, lanceolate, 4.5–7 cm, tapering at both ends, margin of lower cauline sharply serrate, lateral veins multiple, prominent (not trinerved), apex acuminate; upper cauline similar, ± reduced, margin sometimes entire. Capitula very small, in secund, pyramidal, paniculiform synflorescences, branches spreading to curved downward, lower branches longest, capitula borne on one side, sometimes a few lower branches much elongated. Involucre 3–4 mm; phyllaries linear-lanceolate, apex acute to obtuse. Florets golden yellow; ray florets 3–8, lamina 1.6–1.9 mm; disk florets 3–6, 2.9–3.3 mm, lobes 0.8–1.1 mm. Pappus inner (longest) bristles not obviously clavate. Fl. Aug–Sep.

Forest margins. Introduced in Jiangxi [native to E North America].

The Chinese plants belong to *Solidago rugosa* var. *rugosa*.

5. Solidago canadensis Linnaeus, Sp. Pl. 2: 878. 1753.

加拿大一枝黄花 jia na da yi zhi huang hua

Herbs, perennial; rhizomes creeping, branched. Stems to 150 cm tall, erect, simple, shortly and softly downy above. Leaves numerous, lanceolate or linear-lanceolate, 5–12 cm, abaxially downy, veins sparsely hairy, adaxially shortly pilose, tapering at both ends, margin of basal sometimes entire, of lower and upper cauline sharply serrate, longitudinal veins 3 (triplinerved), of which 2 lateral veins protrude weakly, apex acuminate. Capitula in paniculiform synflorescences, branches (racemes) curved downward, capitula attached on upper side of branch. Involucre 2.5–3 mm; phyllaries linear-lanceolate, slightly obtuse. Florets golden yellow; ray florets hardly longer than involucre. Pappus inner (longest) bristles not obviously clavate. Fl. Aug–Sep.

Occasionally cultivated in gardens and parks in China, and may possibly become naturalized [native to North America].

6. Solidago altissima Linnaeus, Sp. Pl. 2: 878. 1753.

高大一枝黄花 gao da yi zhi huang hua

Herbs, perennial; rhizomes creeping, branched. Stems erect, to 250 cm tall, simple, shortly and softly aqua-rose downy. Leaves numerous, lanceolate or linear-lanceolate, 5–12 cm, tapering at both ends, apex acuminate, margin of lower leaves sharply serrate, of basal leaves sometimes entire, of upper leaves entire, with 3 longitudinal veins, of which 2 lateral veins protrude weakly, glabrous or downy abaxially, shortly pilose adaxially. Capitula in paniculiform synflorescences, capitula attached on one side, branches curved downward. Involucre 3–4 mm; phyllaries linear-lanceolate, slightly obtuse. Florets

golden yellow; ray florets hardly longer than involucre. Pappus inner (longest) bristles not obviously clavate. Fl. Aug–Sep.

Cultivated in China; now widely naturalized as an often abundant weed in disturbed areas. Anhui, Fujian, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Liaoning, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [native to North America; widely introduced elsewhere].

The Chinese plants belong to *Solidago altissima* var. *altissima*. Material from China has often been misidentified as *S. canadensis*.

141. ERIGERON Linnaeus, Sp. Pl. 2: 863. 1753.

飞蓬属 fei peng shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Herbs, perennial, sometimes annual or biennial, or sometimes subshrubs. Leaves alternate, margin entire, serrate, or lobed. Capitula radiate, sometimes disciform or rarely discoid, solitary or several, sometimes numerous, in racemiform, corymbiform, or paniculiform synflorescences. Involucre hemispheric to campanulate or turbinate to cylindric; phyllaries 2–5-seriate, subequal, sometimes outer ones shorter, sometimes ± imbricate, linear-lanceolate to linear, membranous or herbaceous, margin scarious, midvein reddish brown, purplish, or green. Receptacles flat to slightly convex or conic, ± alveolate, naked. Ray florets fertile, rarely absent (discoid capitula) or 12–350, 1–5- or more seriate, inner series lamina reduced and/or elaminate, or all reduced or elaminate (disciform capitula), lamina purple, blue, pink, or white, rarely yellow or orange, usually short and narrow, sometimes ± broad; disk florets bisexual, 3–450, yellow (veins often orange), sometimes white, limb cylindric to narrowly funnelform [rarely campanulate], lobes (4 or)5, deltate; anther base obtuse, apical appendages ovate-lanceolate; style branch tips deltate, obtuse or arcuate. Achenes oblong or oblong-lanceoloid to oblong-obovoid, compressed to flattened, glabrous or sparsely to densely strigose or strigillose to sericeous, eglandular, 2(or 4)-veined, veins often orange. Pappus persistent or caducous, free or ± basally connate, 1- or 2-seriate, outer series of short setae or scales, inner of 5–40(–50) fine, barbellate or barbellulate bristles, sometimes pappus only on ray or only on disk achenes [or absent].

About 400 species: Asia, Europe, North America, a few in Africa and Australia; 39 species (14 endemic, six introduced) in China.

The sections of *Erigeron* used here follow Nesom (Lundellia 11: 8–38. 2008), except that the polyphyletic *Conyza* s.s. is included within the genus, as *E.* sect. *Caenotus* and *E.* sect. *Conyza*.

Key to sections

1a. Ray florets 1–3-seriate, lamina strap-shaped (sometimes narrowly), usually spreading.
  2a. Pappus of ray florets of short scales, without bristles, of disk florets 2-seriate, outer series of short scales, inner of 10–15 bristles; capitula numerous in corymbiform synflorescences; herbs annual or biennial; capitula nodding in bud ..... 3. *E.* sect. *Phalacroloma*
  2b. Pappus of ray and disk florets 2-seriate, outer of short scales or bristles, inner of bristles; capitula 1–5 terminal or from upper branches; herbs perennial, rarely annual or biennial; capitula erect in bud.
    3a. Leaves mostly basal, margin entire; capitula solitary ..... 1. *E.* sect. *Erigeron*
    3b. Leaves mostly cauline (basal withered at anthesis), margin serrate or lobed; capitula 1–5 from upper branches ..... 2. *E.* sect. *Karvinskia*
1b. Ray florets 4- or 5-seriate, sometimes elaminate or lamina filiform, erect.
  4a. Ray florets in 2 zones, outer 1–3 series laminate, inner 2 elaminate; achenes 2–2.4 mm; pappus accrescent ..... 4. *E.* sect. *Trimorpha*
  4b. Ray florets not in 2 zones, laminate or elaminate; achenes 0.8–2 mm; pappus not accrescent.
    5a. Leaf margin entire or sparsely serrate ..... 5. *E.* sect. *Caenotus*
    5b. Leaf margin coarsely serrate or lobed, rarely entire ..... 6. *E.* sect. *Conyza*

1. Erigeron sect. Erigeron

飞蓬组 fei peng zu

Herbs, perennial, rarely biennial or subshrubs; rhizome short, erect; caudex simple or shortly branched; herbage strigose to hirsute or villous. Stems simple. Leaves mostly basal, oblanceolate to obovate or spatulate, base not clasping, margin entire. Capitula erect in bud, solitary. Ray florets white or blue, rarely yellow or orange, lamina strap-shaped, erect or spreading, coiling (rarely not coiling). Achenes 1.6–2.8 mm, 2-veined. Pappus 2-seriate, outer of short scales or setae, inner of (7–)10–30 bristles, rarely accrescent.

About 65 species: Asia, Europe, North and South America; 27 species (13 endemic) in China.

1a. Ray floret lamina involute when dry.
  2a. Disk floret limb cylindric or cylindric-funnelform, anthers and style branches not exserted from corolla.
    3a. Disk floret limb cylindric-funnelform ..... 23. *E. petiolaris*
    3b. Disk floret limb cylindric and abruptly ampliate or narrowly cylindric.
      4a. Phyllaries exceeding or equaling disk florets, outer series slightly shorter than or equaling inner.

5a. Phyllaries appressed, apex purple, densely villous (some with purple crosswalls) ..... 24. *E. eriocalyx*
5b. Phyllaries ± loose, green or purplish, densely yellowish villous at base ..... 25. *E. lachnocephalus*
4b. Phyllaries longer than disk florets, outer series usually 1/2 as long as inner.
6a. Stems sparsely hirsute; achenes ca. 0.3 mm wide, sparsely strigose ..... 26. *E. lonchophyllus*
6b. Stems ± densely hirsute and strigillose; achenes ca. 0.6 mm wide, strigose ..... 27. *E. oreades*
2b. Disk floret corollas narrowly funnelform, anthers and style branches often exserted from disk corolla.
7a. Capitula 0.8–1.5 cm in diam.; ray florets 5–7 mm; phyllaries shorter than to equaling or sometimes slightly exceeding disk florets.
8a. Plants 15–50(–60) cm tall; mid and upper cauline leaves narrowly oblong, apex obtuse or rounded, surfaces eglandular ..... 20. *E. himalajensis*
8b. Plants 5–25 cm tall; mid and upper cauline leaves linear or linear-lanceolate, apex acute or shortly acuminate, surfaces often stipitate glandular.
9a. Stems green, 9–25 cm tall; phyllaries green, sparsely strigillose, densely short-stipitate glandular ..... 21. *E. pseudotenuicaulis*
9b. Stems purple, 5–7 cm tall; phyllaries purple, sparsely hirsute-villous, strigillose, often stipitate glandular at base ..... 22. *E. purpurascens*
7b. Capitula 1.5–3.2 cm in diam.; ray florets 6.5–13.7 mm; phyllaries exceeding or equaling disk florets.
10a. Phyllaries sparsely to ± densely villous and shortly strigose, ± densely stipitate glandular, outer apex spreading, often squarrose; ray florets purple; lobes of disk florets hairy ..... 15. *E. patentisquama*
10b. Phyllaries villous to glabrate, strigillose, eglandular, outer appressed; ray florets white or purplish; lobes of disk florets glabrous or hairy at base.
11a. Cauline leaves 3–6, often crowded at base, upper gradually reduced; stems sparsely long villous, strigillose ..... 19. *E. kunshanensis*
11b. Cauline leaves 5 to numerous, usually slightly reduced upward; stems densely villous, strigillose.
12a. Ray florets white, sometimes pink tinged or purplish; phyllaries green, sometimes purple, sparsely to ± densely villous, shortly scabrous; lobes of disk florets glabrous or hairy at base ..... 16. *E. multifolius*
12b. Ray florets purple; phyllaries ± purple, lanate (crosswalls pale yellow or purple); lobes of disk florets glabrous or hairy.
13a. Upper cauline leaves and phyllaries lanate (crosswalls yellow or purple); cauline leaves oblanceolate or oblong-oblanceolate to oblong; lobes of disk florets glabrous ..... 17. *E. porphyrolepis*
13b. Upper cauline leaves and phyllaries villous to lanate (crosswalls purple); cauline leaves elliptic-ovate; lobes of disk florets hairy ..... 18. *E. lanuginosus*
1b. Ray floret lamina flat.
14a. Phyllaries distinctly exceeding disk florets; ray florets lilac to lavender or purple, or sometimes white; disk floret lobes yellow.
15a. Capitula 1.2–2.5 cm in diam.
16a. Lower and mid cauline leaf margins entire ..... 12. *E. latifolius*
16b. Lower and mid cauline leaf margins 3–6-serrate to coarsely serrate above middle ..... 14. *E. kiukiangensis*
15b. Capitula 2.5–4 cm in diam.
17a. Phyllaries hirsute, densely stipitate glandular apically only; capitula 3–4 cm in diam. ..... 11. *E. multiradiatus*
17b. Phyllaries densely stipitate glandular, basally hirsute; capitula 2.5–3 cm in diam. ..... 13. *E. leucoglossus*
14b. Phyllaries shorter than to equaling or slightly longer than disk florets; ray florets blue, purple, lilac, reddish, white, or rarely orange; disk floret lobes yellow or purplish to purple.
18a. Leaves mostly basal ..... 10. *E. breviscapus*
18b. Leaves basal and cauline.
19a. Ray florets orange, sometimes yellow to brick-red ..... 5. *E. aurantiacus*
19b. Ray florets pale purple, blue, lilac, or rarely white.
20a. Capitula 1–2.5 cm in diam.
21a. Phyllaries dark cork-colored, shorter than or almost equaling disk florets, hirsute-villous and stipitate glandular; disk floret lobes yellow ..... 1. *E. leioreades*
21b. Phyllaries green or purple to partly purple, longer than or equaling disk florets, villous or scabridulous, eglandular or sparsely glandular; disk floret lobes purplish.
22a. Plants 5–20(–30) cm tall; basal leaf surfaces glabrate; phyllaries ± densely scabridulous; ray florets 6–7 mm, disk florets 3.8–4.2 mm; inner pappus bristles 3–3.5 mm ..... 8. *E. morrisonensis*

22b. Plants 20–35 cm tall; basal leaf surfaces sparsely villous-strigose, strigillose; phyllaries ± densely villous; ray florets 7–8.5 mm, disk florets 5–5.1 mm; inner pappus bristles 5–6 mm ..... 9. *E. taipeiensis*

20b. Capitula to 4 cm in diam.

23a. Ray florets blue ..... 4. *E. vicarius*

23b. Ray florets lilac to pale purple, rarely white.

24a. Disk floret lobes purplish ..... 7. *E. alpicola*

24b. Disk floret lobes yellow.

25a. Phyllaries densely villous to lanate, eglandular ..... 6. *E. allochrous*

25b. Phyllaries villous or strigose and stipitate glandular.

26a. Ray florets 6.5–8(–13) mm; phyllaries hirsute-villous and margin stipitate glandular ..... 2. *E. seravschanicus*

26b. Ray florets 10–12 mm; phyllaries densely stipitate glandular, sparsely strigose (or not) ..... 3. *E. altaicus*

1. Erigeron leioreades Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 52. 1940.

光山飞蓬 guang shan fei peng

Herbs, perennial, 10–37 cm tall, caespitose; rhizome slender. Stems usually several, erect to ascending, green or reddish, branched or rarely simple, hirsute-villous, strigillose, especially in upper parts, stipitate glandular, densely leafy. Leaves: basal withered or present at anthesis, petiolate, petiole hirsute-villous, blade oblanceolate, 0.7–8 × 0.3–1.2 cm, surfaces hirsute-villous or strigillose adaxially only, base attenuate, margin entire, hirsute-villous-ciliate, apex obtuse to acute; mid cauline sessile, blade lanceolate, 0.7–4.5 × 0.1–0.5 cm, base subclasping, apex acute; upper smaller, stipitate glandular. Capitula 1–6 in corymbiform synflorescences, 18–25 mm in diam. Involucre hemispheric; phyllaries linear-lanceolate, 5.5–6 × 0.5–0.7 mm, often shorter than or almost equaling disk florets, apex acute, outer shorter, dark cork-colored, hirsute-villous, stipitate glandular, inner margin scarious. Ray florets lilac, 7–9 mm, tube ca. 2.5 mm, hairy distally, lamina flat; disk florets yellow, 3.5–4 mm, hairy distally, lobes lanceolate, ca. 0.4 mm, glabrous. Achenes tan, oblong, compressed, 2–3 mm, strigose. Pappus 2-seriate, outer bristles short, inner 4.5–5 mm. Fl. Jul–Sep.

Picea forests, alpine meadows; 2100–3400 m. N Xinjiang [Kazakhstan, Russia (W Siberia)].

2. Erigeron seravschanicus Popov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 10. 1948.

泽山飞蓬 ze shan fei peng

Herbs, perennial, 4–30 cm tall, often caespitose; rhizome slender. Stems usually several, rarely solitary, erect to ascending, green or purplish in lower part, often branched, hispid-villous, sparsely so in lower part and on lower leaves, more densely so in upper part, stipitate glandular below capitula, loosely leafy. Leaves: basal withered at anthesis, petiolate, petiole base clasping, blade oblanceolate, 1.2–8 × 0.25–1 cm, surfaces glabrous or glabrate, base attenuate, petiole and margin hirsute-villous-ciliate, apex acute; lower cauline shortly petiolate, blade oblanceolate, mid and upper sessile, lanceolate to linear-lanceolate, 1.5–6.5 × 0.1–0.6 cm, base subclasping, apex acute. Capitula 2–14 in corymbiform synflorescences, sometimes solitary, 0.9–1.6 × 1.8–3.3 cm. Involucre hemispheric; phyllaries green, linear-lanceolate, 5.5–9 × 0.5–1 mm, apex acute, outer slightly shorter, hirsute-villous, inner with margin scarious, stipitate glandular. Ray florets lilac, 6.5–8(–13) mm, tube 1.5–2.5 mm, apically sparsely hairy, lamina ± flat; disk florets yellow, 4.5–5 mm, limb funnelform, lobes lanceolate, ca. 0.5 mm, glabrous. Achenes tan, oblanceoloid, compressed, 2.2–2.6 mm, strigose. Pappus 2-seriate, outer bristles ca. 0.7 mm, inner 4.3–5 mm. Fl. Jul–Sep.

Subalpine meadows; ca. 2600 m. C Xinjiang [Kazakhstan, Uzbekistan].

3. Erigeron altaicus Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 53. 1940.

阿尔泰飞蓬 a er tai fei peng

Herbs, perennial, 15–50 cm tall, caespitose; rhizome erect or ascending. Stems several, sometimes solitary, erect, green or reddish, branched or rarely simple, sometimes glabrate in lower part, strigose, strigillose, especially on upper part, peduncles densely stipitate glandular. Leaves green, margin entire; basal rosulate, often withered at anthesis, long petiolate, blade oblanceolate or spatulate, 2–16 × 0.4–1.2 cm, base attenuate, apex rounded, mucronate; cauline 0.3–1.3 × 0.5–1 cm, lower winged petiolate, oblanceolate, base subclasping, upper sessile, blade lanceolate, apex acute. Capitula 2–5 in corymbiform synflorescences, or solitary, ca. 1.2 × 2.1–3.7 cm. Involucre hemispheric; phyllaries 3-seriate, green, subequal, lanceolate to linear-lanceolate, 6–9 × 0.5–0.75 mm, sparsely strigose (or not), densely stipitate glandular, apex acute, margin of inner scarious. Ray florets lilac, 10–12 mm, tube ca. 2.5 mm, hairy, lamina 0.5–1.2 mm wide, flat; disk florets yellow, 4–4.5 mm, tube 1–1.5 mm, hairy, limb cylindric-funnelform, lobes triangular, ca. 0.5 mm, glabrous. Achenes (immature) ± strigose. Pappus 2-seriate, outer bristles short, inner 3.5–4 mm (immature). Fl. Jun–Aug.

Subalpine meadows, grasslands; ca. 2500 m. N Xinjiang [Kazakhstan, Russia (Siberia)].

4. Erigeron vicarius Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 260. 1957.

蓝舌飞蓬 lan she fei peng

Herbs, perennial, 25–28 cm tall; rhizome short, branching. Stems several, 1–3 mm in diam. at base, straight or ascending, simple, moderately to densely curved hirsute, usually moderately to densely stipitate glandular. Leaves green, margin entire;

basal petiolate, blade linear-lanceolate, 2–9 × 0.1–1.1 cm, apex acute; cauline 3–12, sessile, blade linear-lanceolate to lanceolate, apex acute; lowermost shortly petiolate, blade 0.7–6 × 0.1–0.6 cm. Capitula solitary, 1.4–1.8 × 2.1–3.8 cm. Involucre hemispheric; phyllaries 3-seriate, subequal, green, or reddish at tip, linear-lanceolate, 7–9 × 1–1.8 mm, densely lanate. Ray florets blue, 10–15 mm, tube 2.3–3.5 mm, hairy upward, lamina linear, 1–1.5 mm wide, flat; disk florets yellow, 4–4.5 mm, tube hairy upward. Achenes oblanceolate, flattened, 2.5–3 × 0.5–0.6 mm, strigose. Pappus 2-seriate, outer bristles short, inner 4–4.5 mm. Fl. Jul–Sep.

Alpine meadows, stony slopes; 2800–4500 m. Xinjiang [Kazakhstan, Uzbekistan].

No specimen of this species was seen by us.

5. Erigeron aurantiacus Regel, Gartenfl. 289. 1879.

橙花飞蓬 cheng hua fei peng

Herbs, perennial, 5–35 cm tall or more, caespitose; rhizome short, branched. Stems several, erect or ascending, simple or rarely branched, green or purplish below, ± densely villous-hirsute, especially in upper part, strigillose, eglandular. Leaves: surfaces strigose, eglandular, margin entire, strigose; basal rosulate, present at anthesis, long petiolate, blade oblong-oblanceolate or oblanceolate, sometimes obovate or elliptic, 1–16 × 0.4–1.6 cm, base attenuate, apex acute to obtuse; cauline 7–17, subclasping, apex acute, lower long winged petiolate, blade lanceolate or oblanceolate, mid and upper sessile, blade lanceolate to linear-lanceolate, 0.7–15 × 1.5–1.7 cm. Capitula 13–15 × 23–35(–42) mm, solitary. Involucre hemispheric, 7–9 × 15–22 mm; phyllaries 3-seriate, subequal, green and apically purplish, linear-lanceolate, 7–9 × 0.7–1 mm, slightly exceeding disk florets, leaflike, apex acute or acuminate, ± densely villous-hirsute, innermost margin narrowly scarious (if at all), erose. Ray florets 3-seriate, orange, sometimes yellow to brick-red, 7.8–12 mm, tube ca. 2.5 mm, sparsely hairy, lamina 1–1.4 mm wide, flat; disk florets yellow, 4–5.5 mm, hairy, tube ca. 0.8 mm, limb narrowly funnelform to cylindric-funnelform, lobes triangular, ca. 0.5 mm. Achenes oblong, compressed, ca. 2 mm, strigose. Pappus 2-seriate, outer bristles ca. 0.5 mm, inner 3.5–6 mm. Fl. Jul–Sep.

Forest margins, alpine meadows; 2100–3400 m. N Xinjiang [Kazakhstan].

6. Erigeron allochrous Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 259. 1957.

异色飞蓬 yi se fei peng

Herbs, perennial, 7–28 cm tall, caespitose; rhizome short, branched. Stems usually several, erect, simple, 1–3 mm in diam. at base, sparsely villous, more densely so in upper part, also strigillose, eglandular, densely leafy. Leaves petiolate, villous, abaxially or sometimes both surfaces sparsely villous on veins, margin entire, villous-ciliate; basal leaves dense, present at anthesis, blade obovate or oblanceolate, 1.2–12 × 0.3–1.4 cm, base attenuate, apex obtuse or acute, mucronate; lower cauline shortly petiolate, blade oblanceolate, mid and upper sessile, blade lanceolate, 0.8–7 × 0.1–0.8 cm, base cuneate, subclasping, apex acute or acuminate. Capitula solitary, 1.1–1.8 × 2.4–4 cm. Involucre hemispheric; phyllaries green or tip purplish, lanceolate, 6.5–8 × 0.7–1 mm, often exceeding disk florets, apex acute, outer slightly shorter, densely villous to lanate, eglandular. Ray florets 3-seriate, lilac, 9–13 mm, tube 2.5–3 mm, sparsely hairy, lamina flat, ca. 1.3 mm wide; disk florets yellow, 3.5–4.5 mm, tube 0.8–1 mm, limb cylindric-funnelform, hairy, lobes lanceolate, ca. 0.8 mm, glabrous. Achenes (immature) densely strigose to silky. Pappus 2-seriate, outer bristles short, inner 2.5–5 mm (immature). Fl. Jun–Sep.

Abies forests, subalpine meadows; ca. 2800 m. N Xinjiang (Ürümqi) [Kazakhstan].

7. Erigeron alpicola Makino, Bot. Mag. (Tokyo) 28: 339. 1914 [*"alpicolus"*].

山飞蓬 shan fei peng

Aster consanguineus Ledebour, Fl. Ross. 2: 473. 1845; *A. dubius* (Thunberg) Hultén subsp. *glabratus* (A. Gray) Kitamura & H. Hara; *A. dubius* var. *glabratus* (A. Gray) T. Shimizu; *Erigeron consanguineus* (Ledebour) Novopokrovsky (1938), not (Philippi) Cabrera (1937); *E. dubius* (Thunberg) Makino var. *glabratus* (A. Gray) Miquel ex Matsumura; *E. komarovii* Botschantzev; *E. thunbergii* A. Gray subsp. *glabratus* (A. Gray) H. Hara; *E. thunbergii* var. *glabratus* A. Gray; *E. thunbergii* subsp. *komarovii* (Botschantzev) Á. Löve & D. Löve.

Herbs, perennial, 10–35 cm tall; rhizomes short, branched. Stems several, sometimes single, erect to ascending, simple, green, striate, 1–2.5 mm in diam. at base, sparsely villous (yellow crosswalls distally), denser in upper part, strigillose, sparsely stipitate glandular, sometimes glabrate. Leaves crowded; basal rosulate, long, narrowly winged petiolate, blade obovate, spatulate, or oblanceolate, 2–10 × 0.3–1.6 cm, surfaces sparsely villous, sometimes glabrate, conspicuously 3-veined, base attenuate, margin entire or sometimes sparsely mucronate, villous-ciliate (yellow crosswalls), apex obtuse; lower cauline shortly petiolate, blade oblanceolate, apex acute, upper sessile, blade lanceolate or linear-lanceolate, 1–4 × 0.1–0.9 cm, apex acute. Capitula solitary, 0.9–1.7 × 2–4 cm. Involucre hemispheric; phyllaries 3-seriate, linear-lanceolate, 6–10 × 0.8–1.6 mm, membranous, acuminate, outer green, somewhat shorter than inner, densely villous. Ray florets 2-seriate, lilac, rarely white, 8–14 × 1–2 mm, tube 2–2.7 mm, hairy, lamina spreading, flat when dry; disk florets yellow, 3–4.5 mm, tube 1.2–1.8 mm, hairy from middle onto limb base, limb funnelform, lobes triangular, 0.4–0.6 mm, purplish. Achenes oblanceolate, flattened, sparsely strigose. Pappus 2-seriate, cinnamon, outer bristles short, inner 2.5–4.7 mm. Fl. Jul–Sep.

Alpine lawns or forest margins, riverbanks, lakeshores; 1700–2600 m. Jilin (Changbai Shan) [Japan, Russia (Kamchatka, E Siberia)].

8. Erigeron morrisonensis Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 126. 1908.

玉山飞蓬 yu shan fei peng

Herbs, perennial, 5–20(–30) cm tall, ± caespitose; rhizome short. Stems single to several, erect to ascending (procumbent), 0.8–1.5 mm in diam. at base, simple or sparsely branched above, branches ascending, sparsely villous-hirsute, moderately to densely strigillose, more densely so upward. Leaves: basal persistent at anthesis, rosulate, long petiolate, blade oblanceolate to narrowly spatulate, 2–6 × 0.2–0.7 cm, surfaces glabrate,

base attenuate, margin sparsely mucronulate or entire, sometimes remotely narrowly serrate-mucronulate, scabrous, apex obtuse, mucronate; cauline sessile, blade linear or oblong-lanceolate, 1–3(–5) × 0.15–5 mm, surfaces strigillose to glabrate, base cuneate to rounded, margin entire, villous-ciliate, apex obtuse to acuminate; upper gradually reduced; uppermost linear, 3–5 mm. Capitula 2–6, in corymbose synflorescences terminal on stems and branches, sometimes solitary, 1–2 cm in diam.; peduncle long. Involucre hemispheric, 5–7 × 11–15 mm; phyllaries 3-seriate, green (outer) to purple, linear-lanceolate, slightly exceeding or equaling disk florets, moderately to densely scabridulous, sparsely glandular or eglandular, membranous, margin villous-ciliate and/or glandular (distally), apex acuminate, outer 2.7–4.2 mm, inner 4.8–6.8 mm, margin narrowly scarious, erose. Ray florets 3-seriate, lilac to pale purple, 6–7 × ca. 0.5 mm, tube 2.7–3.2 mm, ± hairy onto base of lamina, lamina spreading, flat when dry; disk florets yellow to greenish, 3.8–4.2 mm, tubes 1.6–1.7 mm, limb narrowly funnelform, lobes ovate, 0.4–0.6 mm, purplish. Achenes greenish straw-colored, oblong, flattened, 2–2.5 mm, densely strigose, veins orange. Pappus yellowish, outer scales 0.15–0.25 mm, inner bristles 3–3.5 mm. Fl. May–Nov.

• Alpine meadows, montane coniferous–broad-leaved forests, rocky summits, streamsides, open rocky slopes, mountain ridge grasslands, roadsides, trailsides; 1500–3600 m. Taiwan.

9. Erigeron taipeiensis Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 406. 1973.

太白飞蓬 tai bai fei peng

Herbs, perennial, 20–35 cm tall, caespitose; rhizome vertical, ascending, branching. Stems several or solitary, erect, 1–2.5 mm in diam. at base, simple, green, hirsute-villous, stipitate glandular below capitula. Leaves green; basal dense, rosulate, long petiolate, blade oblanceolate, (specimen too damaged to provide dimensions), surfaces sparsely villous-strigose, strigillose, conspicuously 3-veined, base attenuate, margin entire or 1- or 2-serrulate, villous-ciliate; lower cauline shortly petiolate, blade oblanceolate, mid and upper sessile, blade lanceolate or linear-lanceolate, 0.8–5 × 0.3–1.4 cm, base ± rounded, subclasping, margin entire, apex acute or acuminate; uppermost with surfaces villous, margin villous-ciliate. Capitula solitary, 10–13 × 20–25 mm. Involucre hemispheric, 7–10 × 15–20 mm; phyllaries 3-seriate, green, apex and midvein purplish, linear-lanceolate, acuminate, ± densely villous, outer shorter, inner slightly longer than or rarely equaling disk florets, ca. 0.5 mm wide, 1-veined. Ray florets 3-seriate, lilac, 7–8.5 mm, tube ca. 3 mm, hairy, lamina ca. 0.4 mm wide, flat; disk florets yellow, 5–5.1 mm, tube ca. 2.5 mm, hairy, limb narrowly funnelform, lobes triangular, ca. 0.4 mm, purplish. Achenes tan, narrowly oblong, compressed, 2–2.5 mm, strigose. Pappus 2-seriate, yellowish, outer bristles ca. 0.5 mm, inner 5–6 mm. Fl. Jul.

• Alpine meadows; ca. 3200 m. S Shaanxi (Taibai Shan).

10. Erigeron breviscapus (Vaniot) Handel-Mazzetti, Symb. Sin. 7: 1093. 1936.

短葶飞蓬 duan ting fei peng

Aster breviscapus Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 495. 1903; *Erigeron breviscapus* var. *alboradiatus* Y. Ling & Y. L. Chen; *E. breviscapus* var. *leucanthus* X. D. Dong & Ji H. Li; *E. breviscapus* var. *tibeticus* Y. Ling & Y. L. Chen; *E. dielsii* H. Léveillé; *E. praecox* Vierhapper & Handel-Mazzetti.

Herbs, perennial, 1–50 cm tall (sometimes less than 1 cm), sometimes ± caespitose; rhizome woody, thick. Stems several or solitary, or less than 1 cm, 1–1.5 mm in diam. at base, erect or ascending, sometimes procumbent, green or rarely purplish, simple or sometimes 2–4 branched, sparsely to densely hirsute, strigillose, sparsely to moderately stipitate glandular, denser distally. Leaves mostly basal, basal rosulate, present at anthesis, winged petiolate, blade oblanceolate to obovate-lanceolate or broadly spatulate, 1.5–4 × 0.5–2.5 cm, surfaces sparsely to densely scabrous-hirsute, sparsely scabridulous, sparsely minutely glandular, sometimes glabrate, ± 3-veined, base ± gradually attenuate, margin entire, hirsute-ciliate, apex obtuse or rounded, mucronate; cauline 2–4, rarely absent, sessile, blade narrowly ovate-lanceolate to narrowly lanceolate, 1–4 × 0.5–1 cm, base subclasping, apex obtuse to acute; upper reduced, linear. Capitula solitary at ends of stems or branches, 1.8–2.8(–3.5) cm in diam. Involucre hemispheric, 0.5–0.8 × 1–1.5 cm; phyllaries 3-seriate, slightly exceeding or equaling disk florets, green or purplish at margin and apex, linear-lanceolate, ca. 8 × 1 mm, membranous, acute to acuminate, outer 3.8–5.6 × 0.6–0.8 mm, abaxially densely to sparsely hirsute, ± densely strigillose, short-stipitate glandular, inner 5.6–7.3 × 0.6–0.85 mm, margin narrowly scarious, erose, sparsely ciliate. Ray florets 3-seriate, blue to purple or white, 9–12 × 0.8–1.1 mm, tube 2–3 mm, sparsely hairy in upper part and onto lamina base, lamina spreading, flat when dry; disk florets yellow, 3.5–4 mm, tube 1.2–1.5 mm, limb funnelform, sparsely hairy, lobes ovate, 0.55–0.6 mm, glabrous, tips sometimes reddish. Achenes narrowly oblong to oblanceolate, flattened, ca. 2.2 mm, densely strigose, often 1-ribbed abaxially. Pappus 2-seriate, brownish, outer bristles ca. 0.4 mm, inner 3.7–4 mm. Fl. Mar–Oct.

• Mid-elevation mountains, alpine to montane meadows, forest margins, *Pinus* forests, streamsides, grasslands, disturbed slopes, roadsides; 1200–3600 m. Guangxi, Guizhou, Hunan, Sichuan, E and S Xizang, Yunnan.

In addition to the typical variety, three varieties have been recognized. *Erigeron breviscapus* var. *tibeticus* (S Xizang: Qüxü; ca. 3600 m) is a high-elevation, shortly stemmed (sometimes less than 1 cm) morphotype; this extreme may represent phenotypic plasticity at the extreme limit of the species range. *Erigeron breviscapus* var. *alboradiatus* (EC Yunnan: Songming) is a white-rayed form with slender stems. The recently described *E. breviscapus* var. *leucanthus* is another pale-rayed form. Color forms frequently occur in *Erigeron* through a simple mutation within the flavonoid pathway. A biosystematic study of the complex is required to evaluate the value of these varieties.

11. Erigeron multiradiatus (Lindley ex Candolle) Bentham ex C. B. Clarke, Compos. Ind. 56. 1876 [*"multiradiatum"*].

多舌飞蓬 duo she fei peng

Stenactis multiradiata Lindley ex Candolle, Prodr. 5: 299. 1836; *Aster inuloides* D. Don; *A. roylei* Onno; *Erigeron multiradiatus* var. *glabrescens* Y. Ling & Y. L. Chen; *E. multiradiatus* var. *ovatifolius* Y. Ling & Y. L. Chen; *E. multiradiatus* var. *salicifolius* C. C. Chang ex Y. Ling & Y. L. Chen.

Herbs, perennial, 20–60 cm tall; rhizome woody. Stems several or single, 2–4 mm in diam. at base, erect, ascending or procumbent, branched or sometimes simple, purplish at base, rarely green, sparsely or ± densely hirsute, scabridulous, base sometimes glabrate, long-stipitate glandular. Leaves: basal rosulate, often withered at anthesis, long winged petiolate, blade oblong-oblanceolate to oblanceolate, sometimes ovate to ovate-elliptic, (4–)5–15 × 0.6–1.5(–2.6) cm, surfaces scabrous or rarely sparsely long hairy, or rarely glabrate or glabrous, glandular, 3–5-veined, base attenuate, sometimes broad, margin entire or remotely serrate, hirsute-ciliate, apex acute or obtuse, rarely rounded or acuminate; lower cauline similar, shortly petiolate, mid sessile, blade ovate-lanceolate to oblong-lanceolate or lanceolate, rarely narrowly lanceolate, 3–6(–8.5) × 0.6–2.2 cm, base subclasping, margin entire or remotely serrate, apex acute or acuminate, upper sessile, reduced, linear or linear-lanceolate, 1–2 cm, apex acuminate. Capitula usually 2 to several in corymbiform synflorescences, or solitary, 3–4 cm in diam. or more. Involucre hemispheric, 8–10 × 15–20 mm; phyllaries 3-seriate, green, apex or entire surface purplish, linear-lanceolate, distinctly exceeding disk florets, 0.6–1 mm wide, abaxially sparsely to densely hirsute, densely stipitate glandular apically, leaflike (outer and inner), margin stipitate glandular, apex acuminate, outer 5–5.4 mm, innermost 6.8–7.6 mm, membranous, margin not or narrowly scarious and hyaline, long acuminate. Ray florets lilac or lavender to purple, spreading, 8.8–17 × 0.4–1 mm, 2 × as long as involucre, tube 1.5–2 mm, sparsely hairy in upper part to lamina base, lamina ± flat when dry; disk florets yellow, 2.9–4.5 mm, tube 0.7–1.5 mm, sparsely hairy above to limb base, limb narrowly funnelform, 2.1–2.3 mm, lobes ovate, 0.4–0.6 mm, glabrous. Achenes oblong to lanceolate, flattened, ca. 2 mm, sparsely strigose, 1-veined abaxially. Pappus 2-seriate, dirty white or yellowish to brownish, outer bristles short, inner ca. 4 mm. Fl. May–Sep.

Alpine or subalpine meadows, slopes, forest margins, forests, open hillsides; 2300–4600 m. Sichuan, Xizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, Nepal; SW Asia (Iran)].

In addition to the typical variety, three varieties have been recognized in this species. *Erigeron multiradiatus* var. *ovatifolius* (SW Sichuan: Muli) is characterized by ovate to ovate-elliptic leaves with a rounded-obtuse, mucronate apex. *Erigeron multiradiatus* var. *salicifolius* (NW Yunnan: Weixi; ca. 2900 m, in forests) has thin, narrowly lanceolate, sparsely long hairy leaves with an attenuate, somewhat clasping base and an acute or acuminate apex. These may represent extremes of leaf variation of the species or distinct forms or even the result of phenotypic plasticity in the case of *E. multiradiatus* var. *salicifolius*, which is found in forests; a morphometric study of the complex would be needed to address this issue. *Erigeron multiradiatus* var. *glabrescens*, found in alpine meadows of NW Yunnan (Zhongdian; ca. 3200 m), has glabrate or glabrous, entire leaves; other reported features appear to fall within the range of variation of the species.

12. Erigeron latifolius Hao Zhang & Zhi F. Zhang, Novon 20: 117. 2010.

宽叶飞蓬 kuan ye fei peng

Herbs, perennial, 25–50 cm tall; rhizome erect or ascending, caudices simple or branched, fibrous-rooted, with marcescent leaf bases. Stems single (or ?several), erect, simple or branched from base, sparsely strigose, sparsely villous, sometimes hirtellous, sometimes stipitate glandular. Leaves: basal rosulate, usually withering at anthesis, petiolate, blade oblong-oblanceolate to oblanceolate, 7–13 × 0.7–1.5 cm, sparsely strigose to villous, stipitate glandular, 3–5-veined, margin entire, apex acute to obtuse; lower and mid cauline sessile, blade lanceolate to oblong-lanceolate, 8–15 × 1–2.5 cm, base auriculate-clasping, margin entire, apex acute to obtuse, upper blade lanceolate, 2–5 × 0.5–1 cm, densely white villous, apex acuminate. Capitula 1 or 2–7 in corymbiform synflorescences, 1.2–2.5 cm in diam. Involucre 0.8–1.5 × 0.8–1.2 cm; phyllaries 3-seriate, lustrous green, linear-lanceolate, 8–10 × 1–2 mm, exceeding disk florets, moderately villous, apex acuminate, purple, outer shorter than inner. Ray florets 3-seriate, outer 150–250(–400), usually purple, 5–10 mm, lamina flat; disk florets 250–450, 5–7 mm, tube 1.5–2 mm, limb campanulate, lobes shortly triangular, 0.5–1 mm, purple. Achenes tan, oblong, compressed, 2–3 mm, sparsely hispidulous, 1-veined. Pappus 2-seriate, white, outer bristles short, inner ca. 4 mm. Fl. Jun–Sep.

● Mountain meadows, scrub margins; ca. 3100 m. Sichuan (Zhegu Shan).

This description is adapted from the protologue. Only a photograph of a paratype has been seen by the present authors. It is close to *Erigeron multiradiatus*.

13. Erigeron leucoglossus Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 411. 1973.

白舌飞蓬 bai she fei peng

Herbs, perennial, to 35 cm tall; rhizome short, woody. Stems single, erect or ascending, stout, 3–4 mm in diam. at base, often branched, sparsely to moderately hirsute-villous, strigillose, ± densely stipitate glandular above. Leaves: basal withered or present at anthesis, narrowly winged long petiolate, petiole base clasping, blade oblanceolate to oblanceolate-spatulate, 6–9 × 1–1.6 cm, surfaces sparsely hirsute, 3-veined, base attenuate, margin entire, hirsute-ciliate, apex obtuse, mucronate; lower cauline similar, shortly petiolate, margin entire or with 1–3 fine serrations, mid and upper sessile, blade ovate-elliptic to lanceolate, 2.5–5 × 1–1.8 cm, surfaces abaxially hirsute on veins or glabrate, 3–5-veined, base cuneate, ± subclasping, margin entire, hirsute-ciliate, apex acute, mucronate, uppermost blade narrowly lanceolate to linear-lanceolate, 1–2 × 0.2–0.4 cm, surfaces and margin also distally stipitate glandular, adaxially strigillose, 1-veined. Capitula 3–7 in corymbiform synflorescences, 2.5–3 cm in diam. Involucre hemispheric, ca. 6 × 12–17 mm; phyllaries 3-seriate, dark green, purplish at apex and margin, lanceolate, ca. 0.3 mm wide, distinctly exceeding disk, abaxially basally hirsute, densely stipitate glandular, apex acuminate, outer ones short, inner 5–6 mm, margin scarious, erose. Ray florets 3-seriate, 10–11 mm, tube 1.5–2 mm, sparsely hairy distally, lamina white, flat and patent, 1–1.2 mm wide; disk florets yellow, ca. 4.2 mm, tube ca. 1.2 mm, sparsely hairy in middle part, limb narrowly funnelform, lobes triangular, 0.4–0.5 mm, purple, glabrous. Achenes (immature) oblong, compressed, ± strigose. Pappus 2-seriate, (immature) outer bristles short, inner ca. 3.8 mm. Fl. Aug.

● Alpine grasslands; ca. 3400 m. Xizang (Gongbo'gyamda).

14. Erigeron kiukiangensis Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 412. 1973.

俅江飞蓬 qiu jiang fei peng

Herbs, perennial, to 55 cm tall, caespitose; rhizome woody. Stems several or solitary, erect or ascending, often branched above, green, strigillose, densely hirsute, especially upper part, densely stipitate glandular in upper part. Leaves: basal crowded, rosulate, withered or present at anthesis, narrowly winged petiolate, blade oblanceolate or oblanceolate-spatulate, 4–8 × 0.8–1.2 cm, 3–5-veined, base attenuate, margin entire or 1- or 2-serrulate, strigose-ciliate, apex obtuse, mucronate; lower and mid cauline ± petiolate, blade oblanceolate, 3.5–6 × 0.6–1.5 cm, surfaces strigose, base attenuate to cuneate, margin 3–6-serrate to coarsely serrate above middle, rarely entire, upper gradually reduced, sessile, blade narrowly lanceolate or linear, surfaces strigose, stipitate glandular, 1–3-veined, base subclasping. Capitula several in corymbiform synflorescences, sometimes solitary, 2–2.5 cm in diam. Involucre hemispheric, 6–8 × 12–15 mm; phyllaries 3-seriate, green, linear-lanceolate, ca. 0.8 mm wide, often overtopping disk florets, densely stipitate glandular, rarely strigose or strigillose, inner margin scarious, apex acuminate. Ray florets 2- or 3-seriate, 9–10 mm, tube 2–2.5 mm, sparsely hairy, lamina reddish, ca. 0.6 mm wide, spreading, flat; disk florets yellow, 3.5–4 mm, hairy, tube ca. 1 mm, limb funnelform, lobes lanceolate, ca. 0.6 mm, glabrous. Achenes (immature) oblong, compressed, ca. 2 × 0.6 mm, densely strigose. Pappus (immature) yellowish, 2-seriate, outer bristles short, inner ca. 3.5 mm. Fl. Jul–Sep.

• Open mountain slopes, rocky places; 3000–3200 m. SE Xizang (Zayü), NW Yunnan (Gongshan).

15. Erigeron patentisquama Jeffrey ex Diels, Notes Roy. Bot. Gard. Edinburgh 5: 185. 1912.

展苞飞蓬 zhan bao fei peng

Herbs, perennial, 20–45 cm tall; rhizome woody. Stems solitary or several, erect to ascending, sometimes procumbent, ca. 3 mm in diam., purplish or green, branched from middle or upper part, rarely simple, moderately to densely hirsute and strigose, often ± densely long-stipitate glandular in upper part. Leaves: surfaces sparsely to ± densely hirsute and shortly strigose, densely stipitate glandular, sometimes sparsely so; basal dense, rosulate, long winged petiolate, blade spatulate or oblanceolate-spatulate, 4–15 × 0.6–2 cm, 3-veined and with 2–4 lateral veins, base attenuate, margin entire, apex obtuse, mucronulate; mid and upper sessile, blade narrowly lanceolate or lanceolate to lanceolate-ovate, 2–7 × 0.5–1 cm, base semiclasping, apex acuminate or acute, uppermost reduced, linear or linear-lanceolate. Capitula solitary or 2–4 in corymbiform synflorescences, ca. 2.5 cm in diam. Involucre hemispheric, 1–1.5 × 1.5–2 cm; phyllaries 3-seriate, subequal or inner somewhat longer, lanceolate, 0.8–1 mm wide, exceeding disk florets, sparsely to ± densely villous and shortly strigose, ± densely stipitate glandular, margin stipitate glandular, apex spreading, often squarrose, outer leaflike, green, inner membranous, margin narrowly scarious. Ray florets 3-seriate, purple, 8–13.7 mm, ± exceeding involucre, tube 2–3.3 mm, sparsely hairy above, lamina linear, 0.4–0.6 mm wide, involute; disk florets yellow to orange, limb or lobes sometimes purplish, ca. 4.3 mm, tube 1–1.5 mm, limb narrowly funnelform, lobes hairy, anthers and style branches often exserted from corolla. Achenes straw-colored, oblong or lanceoloid, compressed, 2.5–3 mm, ± densely strigose, particularly at base, 1-veined on back, veins orange. Pappus yellowish, 2-seriate, outer bristles 0.2–0.7 mm, inner 3.6–4.5 mm. Fl. Jul–Sep.

• Forest margins, alpine or subalpine meadows, grassy slopes, ridges; 2400–4100 m. SW and W Sichuan, Xizang, NE and NW Yunnan.

16. Erigeron multifolius Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 627. 1937.

密叶飞蓬 mi ye fei peng

Erigeron multifolius var. *amplisquamus* Y. Ling & Y. L. Chen; *E. multifolius* var. *pilanthus* Y. Ling & Y. L. Chen.

Herbs, perennial, (3–)6–25 cm tall; rhizome thick, ca. 10 mm in diam. Stems single or several, erect to ascending, sometimes decumbent, 2–3 mm in diam. at base, simple, rarely branched, densely villous, strigillose, more densely so upward, ± stipitate glandular, densely leafy. Leaves: surfaces villous-scabrous and scabridulous (particularly on veins), margin entire, rarely sparsely serrate; basal often withered at anthesis, blade spatulate to oblanceolate, subequal; cauline numerous, lower petiolate, petiole narrowly winged, blade oblong or oblanceolate-oblong, 3–7 × 0.3–0.7 cm, slightly reduced upward, base attenuate, apex rounded or obtuse, mid and upper sessile, lanceolate or oblong-lanceolate to linear-lanceolate, 2–6 × 0.5–1 cm, subclasping, apex obtuse or acute. Capitula solitary, or sometimes 2–4 in corymbose synflorescences, 2–3 cm in diam. Involucre hemispheric, 0.6–0.8 × 1.5–2.5 cm; phyllaries 3-seriate, equaling or exceeding disk florets, outer slightly shorter (sometimes broad, 1.5–2 mm wide), green, sometimes purple, lanceolate, abaxially sparsely to ± densely villous (particularly at base), shortly scabrous (particularly along midvein), eglandular, leaflike, inner narrowly oblong, 7–10 × 0.5–1 mm, membranous, margin ± villous-ciliate, apex acuminate, often purplish, innermost margin narrowly scarious. Ray florets 3-seriate, white, sometimes pink tinged or purplish, 8–10 mm, tube 2.5–3 mm, sparsely puberulent above, lamina linear, 0.3–0.6 mm wide, involute when dry, glabrous or sparsely hairy; disk florets yellow, veins orange, (4–)4.6–4.8 mm, tube 2.5–2.9 mm, sparsely hairy above, also sometimes on limb and lobe base, limb narrowly funnelform, lobes ovate, 0.5–0.6 mm, anthers and style branches often exserted from disk corolla. Achenes oblong to oblanceolate, flattened (immature), 2–3 mm, sparsely to ± densely strigillose. Pappus 2-seriate, yellowish, outer bristles 0.2–0.3 mm, inner 3.7–4.7 mm. Fl. Jun–Aug.

• Forest margins, alpine or subalpine meadows, rocky slopes; 2600–4100 m. SE Xizang, NW Yunnan.

Two varieties have been recognized in *Erigeron multifolius* in addition to the typical variety, both from NW Yunnan. *Erigeron multifolius* var. *pilanthus* (Weixi; 3500–3600 m) has a hairy disk corolla limb and lobe base, an extension of hairiness from the sparsely hairy tube; more data on this feature in other populations are needed before recognition of the variety is warranted. *Erigeron multifolius* var. *amplisquamus*, from alpine meadows at 3400–3800 m, has broad outer phyl-

laries (1.5–2 mm wide) equaling or exceeding the purplish ray florets. This variety may deserve recognition upon further study.

17. Erigeron porphyrolepis Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 416. 1973.

紫苞飞蓬 zi bao fei peng

Herbs, perennial, 8–27 cm tall, caespitose; rhizome robust, woody. Stems numerous or single, erect, 1.5–2 mm in diam. at base, simple, long villous (crosswalls yellow), strigillose, stipitate glandular below capitula. Leaves: basal rosulate, withered or present at anthesis, narrowly winged petiolate, blade spatulate to oblanceolate, 1.5–3 × 0.5–1 cm, 3-veined, base attenuate, margin entire or 1–3-serrulate, villous-ciliate, apex obtuse, mucronate; cauline 5–7, lower shortly petiolate or subsessile, blade oblanceolate or oblong-oblanceolate to oblong, 2–3.5 × 0.3–0.4 cm, surfaces villous, subclasping, uppermost lanate (crosswalls yellow or purple). Capitula solitary, 2–3.2 cm in diam. Involucre hemispheric, 9–20(–25) mm; phyllaries 3- or 4-seriate, purple, appressed, lanceolate, acuminate, abaxially lanate (crosswalls yellow or purple), stipitate glandular, outer 5.5–8.5 mm, mid and inner subequal, 9–11 mm, often exceeding disk florets. Ray florets 2- or 3-seriate, purple, 6.5–7 mm, tube 2.5–2.8 mm, hairy, lamina ca. 0.3 mm wide; disk florets yellow, 4.5–5 mm, tube 2.1–2.6 mm, tube and limb hairy, limb cylindric-funnelform, lobes triangular, ca. 0.5 mm, purple, glabrous, anthers and style branches often exserted from corolla. Achenes narrowly oblong, flattened, 2–2.5 mm, strigose. Pappus yellowish or brownish, 2-seriate, outer bristles 0.4–0.5 mm, inner ca. 5 mm. Fl. Aug.

• Alpine meadows; 3900–4700 m. Sichuan, E Xizang (Bomi).

18. Erigeron lanuginosus Y. L. Chen, Acta Phytotax. Sin. 19: 89. 1981.

棉毛飞蓬 mian mao fei peng

Herbs, perennial, 18–25 cm tall, caespitose; rhizome woody, thick, ascending. Stems numerous, green, purplish striate, simple or branched above, villous, strigillose, more densely so upward. Leaves: basal rosulate, withered or present at anthesis, narrowly winged petiolate, petiole base clasping, blade spatulate or oblanceolate, 2–7 × 0.5–0.8 cm, 3-veined, base attenuate, margin entire or 1–3-serrulate, villous-ciliate, apex obtuse, mucronate; cauline numerous, lower shortly petiolate or subsessile, blade oblong-oblanceolate or oblong, 3–5 × ca. 0.7 cm, surfaces sparsely villous, mid and upper blade elliptic-ovate, slightly reduced upward, surfaces villous, base cuneate, subclasping, margin villous-ciliate, apex acuminate, uppermost lanate (crosswalls purple). Capitula solitary or few in corymbose synflorescences, 1.5–2 cm in diam. Involucre hemispheric, 8–10 mm; phyllaries 3-seriate, ± purple, appressed, linear-lanceolate or linear, exceeding disk florets, 1–1.5 mm wide, apex acuminate, outer 7.5–8 mm, abaxially and marginally lanate (crosswalls purple), mid and inner subequal, longer, margin scarious, purplish, apex often reflexed. Ray florets 2- or 3-seriate, bright purple, 7–8 mm, tube hairy, lamina 0.3–0.4 mm wide, ± exceeding involucre, involute when dry; disk florets yellow, 4–4.8 mm, sparsely hairy, tube 2–2.3 mm, limb cylindric-funnelform, lobes triangular, ca. 0.5 mm, purplish, hairy, anthers and style branches often exserted from corolla. Achenes narrowly oblong, 2–2.5 mm, strigose, glandular. Pappus 2-seriate, outer bristles flattened, ca. 0.5 mm, inner ca. 5.5 mm. Fl. Aug.

• Alpine grasslands on slopes; 3200–4200 m. SE Xizang (Bomi, Zayü).

19. Erigeron kunshanensis Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 417. 1973.

贡山飞蓬 gong shan fei peng

Herbs, perennial, 10–20 cm tall, caespitose; rhizome woody, rather thick. Stems numerous, rarely 1 or 2, 1–1.5 mm in diam., erect or ascending, purplish, rarely green, simple, sparsely long villous, strigillose. Leaves: basal withered at anthesis, long winged petiolate, petiole villous and villous-ciliate, blade spatulate to oblanceolate, 2–6 × 0.5–1.2 cm, 3-veined, conspicuously reticulate, base attenuate, margin entire, villous-ciliate, apex obtuse to acute; cauline 3–6, often crowded at base, lower and mid sessile, blade lanceolate or linear-lanceolate, 1.3–3.5 × 0.4–0.7 cm, subclasping, apex acute, upper gradually reduced, blade lanceolate to linear-lanceolate, abaxial surface with veins sparsely villous, adaxial villous, strigillose. Capitula solitary, ca. 2 cm in diam. Involucre hemispheric, ca. 8 × 15–20 mm; phyllaries 3-seriate, ± equaling disk florets, purplish or green, appressed, subequal, 1–1.5 mm wide, outer linear-oblanceolate, abaxially villous, strigillose, eglandular, reticulate, apex ± acute, inner linear-lanceolate, villous or glabrate, 1–3-veined, margin narrowly scarious, apex acuminate. Ray florets 3-seriate, purplish, 7–8 mm, tube 2–2.5 mm, hairy above, lamina ca. 0.5 mm wide, flat, involute when dry; disk florets yellow, 3.5–4 mm, sparsely hairy, limb cylindric-funnelform, lobes ovate, ca. 0.5 mm, glabrous, purplish, anthers and style branches often exserted from corolla. Achenes tan, narrowly oblong, compressed, 2–2.5 mm, densely strigose, 2-veined. Pappus 2-seriate, brownish, outer bristles ca. 0.6 mm, inner ca. 4 mm. Fl. Aug–Oct.

• Alpine meadows, rocky slopes; 3000–3800 m. NW Yunnan (Gongshan).

20. Erigeron himalajensis Vierhapper, Beih. Bot. Centralbl., Abt. 2, 19: 491. 1906.

珠峰飞蓬 zhu feng fei peng

Herbs, perennial, 15–50(–60) cm tall, sometimes caespitose; rhizome woody, simple. Stems single or several, 1.5–2 mm in diam., erect or ascending, purple or green above, branched in middle or upper part, sparsely to moderately hirsute-villous, strigillose, base often glabrate, eglandular. Leaves: surfaces sparsely hirsute-villous, sparsely strigillose, sometimes glabrate, eglandular; basal rosulate, withered and fallen at anthesis, long petiolate, blade oblanceolate to oblong; cauline relatively numerous, thin, lower narrowly winged shortly petiolate, blade oblanceolate to oblong, 2–3.5 × 0.2–0.4 cm, ± distinctly 3-veined, base attenuate, margin entire, ciliate, apex obtuse or sometimes acute, mid and upper sessile, blade narrowly oblong, 2–5 × 0.2–0.3 cm, base subclasping, margin entire or with 1 or 2 small teeth, ciliate, apex rounded to obtuse, uppermost reduced, linear. Capitula 2 to many in corymbiform

synflorescences, 1–1.5 cm in diam.; peduncles slender; bracts 1 or 2, linear. Involucre campanulate, 5–7 × 10–15 mm; phyllaries 3-seriate, abaxially sparsely hirsute-villous, strigillose, or glabrate, eglandular. Ray florets 2- or 3-seriate, slightly exceeding or equaling disk florets, 5–6 mm, tube 3–3.5 mm, hairy distally, lamina pink to purple, linear to narrowly oblanceolate, 1–2 mm, involute when dry; disk florets yellow, 4.8–5.3 mm, tube 2.2–2.3 mm, limb cylindric to narrowly funnelform, lobes lanceolate, 0.4–0.5 mm, purplish, glabrous. Achenes straw-colored, oblong, flattened, 2–2.2 mm, strigose, 4-veined. Pappus yellowish to brownish, 2-seriate, outer bristles 0.3–0.4 mm, inner 4.8–5 mm. Fl. Jul–Sep.

Forest margins, stony slopes; 2000–3600 m. W Sichuan, E Xizang, NW Yunnan [Afghanistan].

21. Erigeron pseudotenuicaulis Brouillet & Y. L. Chen, **nom. nov.**

细茎飞蓬 xi jing fei peng

Replaced synonym: *Erigeron tenuicaulis* Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 418. 1973, not *Erigeron tenuicaulis* M. E. Jones, Contr. W. Bot. 12: 44. 1908.

Herbs, perennial, 9–25 cm tall; rhizome woody, tortuous or crowded in tuber, collar clad with marcescent petiole bases, simple or branched. Stems slender, 0.6–1.5 mm in diam., erect or ascending, branched in middle or simple, green, sparsely strigose and strigillose, denser in upper part, sometimes glabrate below, sometimes short-stipitate glandular in upper part. Leaves: basal rosulate, present at anthesis, narrowly winged long petiolate, blade narrowly oblanceolate or oblanceolate-spatulate, 1.5–9 × 0.2–0.4 cm, surfaces strigillose, 3-veined, base attenuate, margin entire or sometimes 2–4-serrulate, strigillose-ciliate, apex obtuse or rounded; lower cauline identical to basal, shortly petiolate, mid and upper sessile, blade linear or linear-lanceolate, 1–2 × 0.1–0.2 cm, surfaces strigillose, short-stipitate glandular, 1–3-veined, margin strigillose-ciliate, apex shortly acuminate. Capitula solitary or 2 or 3 in corymbiform synflorescences, 1–1.5 mm in diam.; peduncles slender; bracts 1–3, linear or subulate. Involucre hemispheric, 3–4 × 8–10 mm; phyllaries 3-seriate, green, linear-lanceolate, ca. 0.5 mm wide, shorter than disk florets, abaxially sparsely strigillose, densely short-stipitate glandular, apex acute to acuminate, outer ca. 1/2 as long as inner, inner 3–4 mm, margin narrowly scarious. Ray florets 2- or 3-seriate, reddish, 6–7 mm, equaling or ± longer than disk florets, tube 2.5–3 mm, hairy, lamina ca. 0.3 mm wide, involute; disk florets yellow, 3.5–4 mm, tube 1–1.5 mm, limb narrowly funnelform, lobes lanceolate, ca. 0.4 mm, reddish. Achenes oblong, compressed, ca. 2 mm (immature), sparsely strigose, 2-veined. Pappus (immature) yellowish brown, 2-seriate, outer bristles very short, inner ca. 4 mm. Fl. Jul–Sep.

• Stony open slopes; ca. 2200 m. SW and W Sichuan (Kangding, Muli).

This species differs from *Erigeron himalajensis* by its slender stems, strigose-ciliate leaf margin, and glandular upper leaf surface.

22. Erigeron purpurascens Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 419. 1973.

紫茎飞蓬 zi jing fei peng

Herbs, perennial, 5–7 cm tall, caespitose; rhizome subwoody or tuberiform, collar clad with marcescent leaf bases. Stems several or single, ca. 1 mm in diam., erect or ascending, purple, branched in middle part, rarely simple, sparsely hirsutulous, strigillose, short-stipitate glandular below capitula. Leaves: basal rosulate, present at anthesis, narrowly winged petiolate, blade spatulate to oblanceolate, 1.5–2.5 × 0.3–0.6 cm, surfaces glabrous, 3-veined, base attenuate, margin entire or 2- or 3-serrulate, ciliate, apex obtuse or rounded; cauline 3–5, sessile, blade linear-lanceolate or linear, 0.5–2 × 0.1–0.3 cm, surfaces strigillose, often stipitate glandular (not seen), 1- or inconspicuously 3-veined, margin strigose-ciliate, apex acute. Capitula 2 or 3 in corymbiform synflorescences, rarely solitary, 0.8–1.5 cm in diam. Involucre hemispheric, 5–8 × 5–12 mm; phyllaries 3-seriate, purple, linear-lanceolate, ca. 0.5 mm wide, apex acuminate, inner shorter than to equaling disk florets, abaxially sparsely hirsute-villous, strigillose, often stipitate glandular at base (not seen), outer 2–3 mm, inner ca. 8 mm, margin narrowly scarious. Ray florets laminate, 2- or 3-seriate, 6–7 mm, tube ca. 3 mm, hairy, lamina almost filiform, purple, ca. 0.3 mm wide, not patent, involute when dry; disk florets yellow, 4–4.5 mm, tube ca. 1.7 mm, limb narrowly funnelform, sparsely hairy, lobes triangular, ca. 0.5 mm, purplish. Achenes oblong, compressed, ca. 2 mm (immature), strigose. Pappus yellowish, 2-seriate, outer bristles ca. 0.5 mm, inner ca. 5 mm. Fl. Aug–Sep.

• Grasslands on mountain slopes. Sichuan (Kangding).

23. Erigeron petiolaris Vierhapper, Beih. Bot. Centralbl., Abt. 2, 19: 522. 1906.

柄叶飞蓬 bing ye fei peng

Erigeron pseudoneglectus Popov.

Herbs, perennial, 5–28 cm tall, sometimes caespitose; rhizome short. Stems several, erect, simple, green or reddish, moderately to densely hirsute-villous, sparsely strigillose. Leaves: petiole, margin, and surfaces hirsute-villous, sometimes glabrate or only margin ciliate; basal present at anthesis, long petiolate, blade oblanceolate or oblanceolate-spatulate, 1.5–2 × 0.2–0.4 cm, 3-veined, base attenuate, margin entire or sometimes 2–4-serrulate, apex obtuse, mucronate; cauline 3–12, 0.7–7.2 × 0.1–0.8 cm, lower petiolate, blade oblanceolate, apex obtuse or acuminate, upper sessile, lanceolate, base subclasping, apex acute. Capitula solitary or 2 or 3 in corymbose synflorescences, 1–1.5 cm in diam.; peduncles slender; bracts 1–3, linear or subulate. Involucre hemispheric, 3–4 × 8–10 mm; phyllaries 3-seriate, green, apex purplish, linear-lanceolate, ca. 0.5 mm wide, abaxially hirsute-villous, shorter than disk, apex acuminate, outer ca. 1/2 as long as inner, inner 3–4 mm, margin narrowly scarious. Ray florets 2- or 3-seriate, pink, rarely white, 8–9 mm, tube ca. 2.5 mm, sparsely hairy, lamina ca. 0.4 mm wide, involute when dry; disk florets yellow, ca. 4 mm, hairy, tube ca. 1.5 mm, limb cylindric-funnelform, lobes lanceolate, ca. 0.5 mm, tip purple, anthers and style branches not exserted from corolla. Achenes (immature) oblong, compressed, ca. 2 mm, strigose. Pappus 2-seriate, outer bristles ca. 0.5 mm, inner ca. 4 mm (immature). Fl. Jul–Sep.

Alpine or subalpine meadows, rocky slopes; 2700–3100 m. N Xinjiang (Qinghe) [Kazakhstan, Russia (N Siberia), Uzbekistan].

24. Erigeron eriocalyx (Ledebour) Vierhapper, Beih. Bot. Centralbl., Abt. 2, 19: 521. 1906.

棉苞飞蓬 mian bao fei peng

Erigeron alpinus Linnaeus var. *eriocalyx* Ledebour, Fl. Altaic. 4: 91. 1833.

Herbs, perennial, 5–25 cm tall, ± caespitose; caudex branched. Stems several, sometimes single, erect or ascending, green or reddish, simple, sometimes branched, hirsute-villous (at least some crosswalls purple in upper part), strigillose, more densely so upward, eglandular. Leaves green, surfaces sparsely hirsute-villous, margin entire, sparsely villous-ciliate (some crosswalls yellow); basal rosulate, withered at anthesis, long petiolate, blade oblanceolate, 1.5–9.5 × 0.2–0.8(–1.3) cm, base attenuate, apex obtuse; cauline 2–8, lower identical to basal, short-winged petiolate, mid and upper sessile, blade lanceolate to linear-lanceolate, 1–5(–7.5) × 0.2–0.8 cm, base ± subclasping, apex acute. Capitula solitary, rarely 2 or 3 in corymbiform synflorescences, 9–14 × 19–25 mm. Involucre hemispheric; phyllaries 3-seriate, apex purple, appressed, ± equaling disk florets, lanceolate to linear-lanceolate, densely hirsute-villous at base (at least some with purple crosswalls), distally sparsely villous to glabrate, eglandular, membranous, apex acuminate, outer 4.2–5.2 × 0.5–0.6 mm, inner 5–9 × 0.6–1 mm, margin narrowly scarious. Ray florets purple, violet, or lilac, rarely white, 6.6–10 mm, tube 2–2.5 mm, lamina ca. 0.5 mm wide, hairy proximally, involute when dry; disk florets yellow, 3.5–4 mm, tube 1.5 mm, limb cylindric, abruptly ampliate, tube and limb hairy, lobes lanceolate, 0.3–0.4 mm, tip pink, anthers and style branches not exserted from corolla. Achenes narrowly oblong, ± compressed, 2–2.5 × ca. 0.6 mm, strigose. Pappus whitish, 2-seriate, outer bristles 0.2–0.4 mm, inner 3.6–4.5 mm. Fl. Jul–Sep.

Alpine or subalpine meadows; 2400–2600 m. Nei Mongol, W Xinjiang [Kazakhstan, Mongolia, Russia (Siberia); Europe].

A specimen at A from Sichuan (Dêgê Xian, *D. E. Boufford et al. 36776*), determined as *Erigeron porphyrolepis*, keys out here but appears distinct. No other material of this entity was seen at other herbaria. It may represent an unrecognized species.

25. Erigeron lachnocephalus Botschantzev, Fl. URSS 25: 230. 1959.

毛苞飞蓬 mao bao fei peng

Erigeron turkestanicus Vierhapper, Beih. Bot. Centralbl., Abt. 2, 19: 522. 1906, not (Regel & Schmalhausen) O. Fedtschenko (1903).

Herbs, perennial, 5–10(–15) cm tall, caespitose; caudex short, branched. Stems several, rarely single, erect or ascending, ca. 2 mm in diam. at base, simple, green or reddish, ± densely yellowish hirsute-villous, more so under capitulum, strigillose, eglandular. Leaves green or grayish, surfaces hirsute-villous, rarely glabrate, margin entire, villous-ciliate; basal present at anthesis, petiolate, blade oblanceolate, 1–7 × 0.2–0.9 cm, base attenuate, apex obtuse or rounded; cauline 4–8, sessile, blade lanceolate to oblong, 0.7–4 × 0.1–0.8 cm, base subclasping, apex acute. Capitula solitary, sometimes 2, 1–1.7 × 2–3 cm. Involucre hemispheric; phyllaries 3-seriate, equal, exceeding disk florets, ± loose, purplish or rarely green, lanceolate, 7–9.5 × 0.8–1 mm, densely yellowish villous at base to glabrate apically, apex acute, sometimes ± reflexed. Ray florets pink or lilac, 6.5–8.5 mm, tube 2–2.7 mm, hairy above, lamina ca. 0.5 mm wide, involute when dry; disk florets yellowish, ca. 4.9 mm, tube ca. 1.5 mm, limb cylindric, abruptly ampliate, tube and limb hairy, lobes triangular, 0.3–0.5 mm, pink or lilac, anthers and style branches not exserted from corolla. Achenes narrowly oblong, flattened, 2–2.7 mm, strigose, 2-veined. Pappus brownish, 2-seriate, outer bristles 0.4–0.5 mm, inner 3.6–4 mm. Fl. Jun–Aug.

Alpine or subalpine meadows, stony slopes; 2500–3600 m. N Xinjiang [Kazakhstan, Uzbekistan].

26. Erigeron lonchophyllus Hooker, Fl. Bor.-Amer. 2: 18. 1834.

矛叶飞蓬 mao ye fei peng

Erigeron armeriifolius Turczaninow ex Candolle; *E. armeriifolius* var. *elatior* Ledebour; *E. armeriifolius* var. *humilis* Ledebour; *E. podolicus* Besser var. *pusillus* Ledebour; *Trimorpha armeriifolia* (Turczaninow ex Candolle) Vierhapper; *T. lonchophylla* (Hooker) G. L. Nesom.

Herbs, biennial or short-lived perennial, 3–30 cm, caespitose; rhizome weak. Stems usually several, 1–1.5 mm in diam., erect or ascending, slenderly branched, green or purplish tinged, sparsely hirsute, especially upward. Leaves basal, rosulate, petiolate or subsessile, blade linear-lanceolate to oblanceolate or spatulate, 1–10 cm × 0.15–6 mm, surfaces sparsely hirsute, margin entire, hirsute-ciliate, apex acute; cauline few, sessile, ± subclasping, blade linear, upper reduced gradually. Capitula 8–10 × 15–20 mm, solitary or several in racemiform, rarely paniculiform synflorescences, long pedunculate. Involucre hemispheric; phyllaries 3-seriate, linear-lanceolate, abaxially hirsute, apex acuminate, outer almost 1/2 as long as inner, inner yellowish green, purple at apex, often exceeding or sometimes equaling disk florets, 5.5–8.5 × 0.5–0.75 mm, margin narrowly scarious. Ray florets 3- or 4-seriate, lilac or pink to pale violet, 5–7 mm, tube 2.5–3 mm, hairy distally, lamina involute; disk florets pale yellow, ca. 4.2 mm, hairy, tube ca. 2 mm, limb narrowly cylindric, lobes lanceolate, ca. 0.2 mm, glabrous, often purplish tinged, anthers and style branches not exserted from corolla. Achenes straw-colored, narrowly oblong, 1.5–2 × ca. 0.3 mm, sparsely strigose. Pappus yellowish, 2-seriate, outer bristles ca. 0.6 mm, inner 4.5–5 mm. Fl. Jul–Sep.

Meadows on banks of rivers, lakes, and marshes, lower mountain plains. N Xinjiang [Kazakhstan, Mongolia, Russia (Siberia); SW Asia (Iran), North America].

27. Erigeron oreades (Schrenk ex Fischer & C. A. Meyer) Fischer & C. A. Meyer, Index Sem. Hort. Petrop. 11(Suppl.): 17. 1846.

山地飞蓬 shan di fei peng

Erigeron uniflorus Linnaeus var. *oreades* Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 2: 39. 1842; *E. alpinus* Linnaeus var. *oreades* (Schrenk ex Fischer & C. A. Meyer) Trautvetter.

Herbs, biennial or short-lived perennial, 2.5–25 cm tall; rhizome weak. Stems solitary, 1–2.5 mm in diam. at base, erect or ascending, simple, or rarely branched, green or sometimes purple-red, densely hirsute, strigillose. Leaves few, margin and petiole hirsute-ciliate, surfaces glabrous or glabrate to sparsely hirsute; basal withered at anthesis, long petiolate, petiole base subclasping, blade oblanceolate, 1–3(–7) × 0.2–0.4 cm, base attenuate, apex obtuse to rounded, mucronate; cauline 4–7, sessile, blade linear or linear-lanceolate, 1–4 × 0.1–0.3 cm, apex acute, uppermost often overtopping capitula. Capitula usually solitary, or sometimes 2–8 in racemose synflorescences, ca. 0.8 × 1.5–1.8 cm. Involucre hemispheric; phyllaries 3-seriate, green or purple at apex, linear-lanceolate, (5–)8–9 × 0.6–1 mm, abaxially sparsely villous-hirsute, outer 1/2 as long as inner or less, inner conspicuously exceeding disk florets, margin scarious. Ray florets 2- or 3-seriate, pale violet, 6–7 mm, tube ca. 2 mm, hairy above, lamina involute when dry; disk florets yellowish, 4–4.5 mm, hairy, tube ca. 1.5 mm, limb cylindric, lobes lanceolate, ca. 0.6 mm, purple tinged, anthers and style branches not exserted from corolla. Achenes narrowly oblong, compressed, 2–2.5 × ca. 0.6 mm, strigose. Pappus 2-seriate, yellowish, outer bristles ca. 0.5 mm, inner 4.5–5 mm. Fl. Jul–Sep.

Subalpine meadows, moist places on slopes; ca. 2500 m. N Xinjiang (Qinghe) [Kazakhstan, Mongolia, Russia (Siberia)].

2. Erigeron sect. **Karvinskia** G. L. Nesom, Phytologia 67: 79. 1989.

加勒比飞蓬组 jia le bi fei peng zu

Herbs, perennial [or rarely annual], taprooted; caudex simple [or rhizomatous]; herbage strigose to hirsute. Stems branched. Leaves basal (withered at anthesis) and cauline, spatulate to oblanceolate or linear, base not clasping, margin [entire or] serrate or lobed. Capitula erect in bud, 1–5 from upper branches. Ray florets white, becoming lavender, lamina strap-shaped, spreading, not or slightly coiling. Achenes 1–1.9 mm, 2-veined. Pappus 2-seriate, outer of short setae, inner of 10–27 bristles, not accrescent.

Seven species: Central and North America; one species (introduced) in China.

28. Erigeron karvinskianus Candolle, Prodr. 5: 285. 1836.

加勒比飞蓬 jia le bi fei peng

Herbs, short-lived perennial, caespitose, [10–]15–40+[–100] cm tall; caudex short, simple or few branched, taprooted. Stems creeping or prostrate to ascending or erect, sometimes rooting at nodes, branched upward, sometimes with axillary leaf tufts, sparsely strigose to glabrate, eglandular. Leaves: basal and lower usually withered at anthesis, petiolate, petiole narrowly winged, blade elliptic or obovate; cauline shortly petiolate, elliptic to obovate or oblanceolate, 1–4 × 0.3–1.4 cm, even sized, surfaces sparsely strigose to glabrate, eglandular, base attenuate to cuneate, margin 2–4-lobed or entire, slightly revolute, strigose, apex acute or acuminate, mucronulate. Capitula 1 or 2[–5] at ends of upper branches, 5–7 × 10–13 mm. Involucre campanulate; phyllaries 3- or 4-seriate, membranous, linear to lanceolate, 1.5–3.3 × 0.3–0.6 mm, sparsely strigose, apex acuminate, outer slightly shorter, green along midvein, inner margin narrowly scarious, erose. Ray florets female, 1- or 2-seriate, 45–80, 6–8 mm, tube 1–1.5 mm, lamina flat or slightly coiling, white, sometimes pinkish upon drying, linear, ca. 5 × 0.6 mm, 2-denticulate at apex, glabrous; disk florets bisexual, yellow, narrowly funnelform, tube ca. 2 mm, sparsely hairy, veins orange, lobes glabrous, apex papillate. Achenes oblong, flattened, ca. 0.8 mm (immature), sparsely strigose, 2-veined. Pappus 2-seriate, outer of short setae, inner bristles 15–27, ca. 2.5 mm. Fl. Mar–Nov.

Hillsides, escaped from cultivation; ca. 700 m. Naturalized in Hong Kong [native to Central America and North America (Mexico)].

Erigeron karvinskianus has become a pantropical and subtropical weed.

3. Erigeron sect. **Phalacroloma** (Cassini) Torrey & A. Gray, Fl. N. Amer. 2: 175. 1841.

一年蓬组 yi nian peng zu

Phalacroloma Cassini in F. Cuvier, Dict. Sci. Nat. 39: 404. 1826; *Achaetogeron* A. Gray; *Polyactidium* Candolle; *Stenactis* Cassini.

Herbs, annual or biennial [or short-lived perennial], fibrous-rooted [rarely rhizomatous, caudex simple]; herbage strigose to sparsely hirsute. Stems branched. Leaves basal and cauline, oblanceolate, base not clasping, margin serrate. Capitula nodding in bud, numerous in loosely corymbiform or paniculiform synflorescences. Ray floret lamina narrowly strap-shaped, white, spreading, not coiling or reflexed. Achenes (0.5–)0.8–1.2 mm, 2(–4)-veined. Pappus 2-seriate, outer of scales, bristles of ray florets absent [or present], of disk florets 8–15, not accrescent.

Twenty-one species: Asia, North America; two species (both introduced) in China.

1a. Stems sparsely hispid, strigose above; basal leaves withered at anthesis, lower cauline similar; leaf margin coarsely serrate to sometimes entire ..... 29. *E. annuus*

1b. Stems sparsely to moderately strigose to strigillose or hirsute-strigillose; basal leaves persistent at anthesis, cauline gradually reduced; leaf margin entire or ± deeply serrate to crenate ..... 30. *E. strigosus*

29. Erigeron annuus (Linnaeus) Persoon, Syn. Pl. 2: 431. 1807 [*"annuum"*].

一年蓬 yi nian peng

Aster annuus Linnaeus, Sp. Pl. 2: 875. 1753; *Erigeron heterophyllus* Muhlenberg ex Willdenow; *Stenactis annua* (Linnaeus) Cassini ex Lessing.

Herbs, annual, [10–]30–100[–150] cm tall. Stems erect, branched in upper part, sparsely hispid, strigose above (hairs spreading). Leaves: surfaces strigose-hirsute or sometimes glabrate, eglandular; basal withered at anthesis, winged petiolate, blade elliptic or broadly ovate, rarely spatulate, 4–17 × 1.5–4 cm or more, base attenuate, margin coarsely serrate, scabrous, apex acute or obtuse; lower cauline similar, shortly petiolate, mid and upper shortly petiolate or sessile, blade oblong-lanceolate or lanceolate, 1–9 × [0.3–]0.5–2 cm, margin irregularly serrate to subentire, apex acute, uppermost linear. Capitula 5–50+, in loose paniculiform or corymbiform synflorescences, 6–8 × 10–15 mm. Involucre hemispheric; phyllaries 2- or 3(or 4)-seriate, greenish or ± brownish, abaxially sparsely hirsute, minutely glandular, subequal or outer shorter, lanceolate, 3–5 × 0.5–1 mm, herbaceous. Ray florets 80–125, 2-seriate, [4–]6–8[–10] mm, tube 1–1.5 mm, sparsely hairy above, lamina white or sometimes bluish, linear, ca. 5 × 0.6 mm, flat, tardily coiling; disk florets yellow, 2–2.8 mm, sparsely hairy, lobes glabrous. Achenes lanceolate, flattened, [0.8–]1.2 mm, sparsely strigillose. Pappus 2-seriate, outer of scales or setae, inner absent in ray florets, in disk florets of [8–]10–15 long bristles. Fl. Jun–Sep.

Wastelands, roadsides; sea level to 1100 m. Naturalized in Anhui, Fujian, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Shandong, Sichuan, Xizang [native to E North America; widely introduced worldwide].

This species is spreading in China and is probably more widespread than shown here.

30. Erigeron strigosus Muhlenberg ex Willdenow, Sp. Pl. 3: 1956. 1803 [*"strigosum"*].

糙伏毛飞蓬 cao fu mao fei peng

Erigeron annuus (Linnaeus) Persoon subsp. *strigosus* (Muhlenberg ex Willdenow) Wagenitz.

Herbs, annual, sometimes biennial or weakly perennial, 30–70 cm tall. Stems erect to ascending, branched in upper part, sparsely to moderately strigose to strigillose or hirsute-strigillose (hairs not spreading). Leaves: surfaces glabrous or glabrate to sparsely strigose or hirsute-strigose; basal usually persistent at anthesis, blade spatulate to oblanceolate or linear, 3–15 × 0.5–2 cm or more, base attenuate, margin entire or shallowly to deeply serrate or crenate, apex acute or obtuse; cauline gradually reduced to near capitula. Capitula 10–200+, in loose corymbiform to paniculate-corymbiform synflorescences. Involucre hemispheric; phyllaries 2–4-seriate, subequal or outer ones shorter, glabrous, strigose, or sparsely hirsute, sometimes minutely glandular, lanceolate, herbaceous. Ray florets 50–100, 2-seriate, 4–6 mm, lamina white, sometimes pinkish or bluish, linear, flat; disk florets yellow, 1.5–2 mm. Achenes lanceolate, flattened, 0.9–1.2 mm, sparsely strigillose. Pappus 2-seriate, outer of scales or setae, inner absent in ray florets, in disk florets of 8–15 long bristles. Fl. Jun–Sep.

Wastelands, roadsides. Naturalized in Anhui, Fujian, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Shandong, Sichuan, Xizang [native to North America].

The variety introduced to China appears to be *Erigeron strigosus* var. *strigosus*. This species has been confused with *E. annuus*, which explains why it is poorly known in China. Its distribution is likely more widespread than shown here.

4. Erigeron sect. **Trimorpha** (Cassini) Candolle, Prodr. 5: 290. 1836 [*"Trimorphaea"*].

三型花飞蓬组 san xing hua fei peng zu

Trimorpha Cassini, Bull. Sci. Soc. Philom. Paris 1817: 137. 1817.

Herbs, annual, biennial, or perennial, taprooted or fibrous-rooted; caudex simple. Stems usually branched. Leaves basal and cauline, oblanceolate or oblong to lanceolate or linear-lanceolate, base not clasping, margin entire or sparsely serrate. Capitula erect in bud, few or numerous, in corymbiform or broadly racemiform synflorescences. Ray florets 3–5-seriate, in 2 zones, outer 1–3 lamina filiform, white to pink or purplish, erect, not coiling or reflexed, inner 2 elaminate. Achenes 2–2.4 mm, 2-veined. Pappus of 12–35 bristles, accrescent.

About 30 species: Asia, C and N Europe, North America; six species (one endemic) in China.

1a. Ray floret lamina equaling or slightly longer than disk florets; phyllaries shorter than disk; biennial or perennial herbs ..... 31. *E. acris*
1b. Ray floret lamina longer than disk florets, rarely only slightly so; phyllaries shorter than or almost equaling disk; perennial herbs.
2a. Ray florets blue ..... 34. *E. tianschanicus*
2b. Ray florets pink or lilac.
3a. Stems and phyllaries stipitate glandular and hirsute-villous; leaves lanceolate to oblanceolate.
4a. Stems densely stipitate glandular at least below capitula and sparsely hirsute-villous; ray florets pink ..... 32. *E. krylovii*
4b. Stems sparsely stipitate glandular and densely villous, lower part almost entirely densely villous; ray florets pink or lilac ..... 33. *E. pseudoseravschanicus*
3b. Stems strigillose or strigose, or glabrate at base, phyllaries villous or strigillose, sometimes sparsely short-stipitate glandular; leaves linear-lanceolate or linear.
5a. Stems reddish; leaf blade linear-lanceolate to linear, margin entire; phyllaries reddish or rarely green, villous, inner shorter than disk florets ..... 35. *E. schmalhausenii*
5b. Stems green; leaf blade linear, margin serrate or subentire; phyllaries green or reddish at apex, strigillose, inner slightly longer than or almost equaling disk florets ..... 36. *E. fukuyamae*

31. Erigeron acris Linnaeus, Sp. Pl. 2: 863. 1753 [*"acre"*].

飞蓬 fei peng

Herbs, biennial or perennial, 5–70(–100) cm, taprooted or woody rhizomatous. Stems solitary or sometimes several, 1–6 mm in diam. at base, erect, branched in upper part, strigillose, ± hirsute or hispid, or sometimes glabrate, short-stipitate glandular below capitula. Leaves thin, surfaces sparsely to ± densely strigose-villous, glabrate, or glabrous, margin entire or remotely serrulate or serrate, strigose- or villous-ciliate; basal present or absent at anthesis, long petiolate, oblanceolate or oblong, 1.5–13 × 0.3–1.8 cm, inconspicuously 3-veined, base attenuate, apex obtuse or acute; mid and upper cauline sessile, blade lanceolate or oblong, 0.3–8.5 × 0.1–1 cm, base subclasping, apex acute, arcuate, or obtuse. Capitula numerous, in dense and narrow, or rarely loose and broad, paniculiform or sometimes corymbiform synflorescences, sometimes few in corymbiform synflorescences, 6–13 × 10–25 mm. Involucre hemispheric; phyllaries 3-seriate, green or purple, lanceolate to linear-lanceolate, abaxially ± densely villous or sparsely strigose, sometimes ± densely short-stipitate glandular, apex acute to acuminate, outer almost 1/2 as long as inner, inner shorter than disk florets, 5–7.5 × 0.5–1 mm, margin scarious. Ray florets 4- or 5-seriate, outer 2 or 3 series laminate, 5–7 mm, tube 2.5–3.5 mm, sparsely hairy, lamina pink or lilac, rarely white, ca. 0.25 mm wide, inner 2 series reduced to tube, uncolored, 2.5–3.5 mm, style exceeding tube by 1–2.2 mm, sometimes with rudimentary lamina; disk florets yellow, lobes sometimes ± purplish or dark lilac, 3.6–5.4 mm, sparsely hairy, tube 1.5–2.9 mm, limb cylindric or cylindric-funnelform, lobes lanceolate, 0.4–0.5 mm. Achenes straw-colored, oblong to oblong-lanceoloid, ± compressed, 1.6–2.5 mm, ± strigose, 2-veined. Pappus 1- or 2-seriate, white or whitish, outer bristles 0.2–0.5 mm, inner 4–6 mm. Fl. Jun–Sep.

Meadows, pastures, grasslands on slopes, forest margins; 700–3500 m. Gansu, Guangdong, Guangxi, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Bhutan, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia (Kamchatka, Siberia), Uzbekistan; SW Asia, Europe, North America].

"Erigeron acer" is an alternate spelling.

1a. Stems and phyllaries purple, rarely green; phyllaries densely stipitate glandular, sometimes also sparsely hispid; capitula many, in corymbose-paniculiform synflorescences ..... 31c. subsp. *politus*

1b. Stems and phyllaries green, rarely purplish; phyllaries densely or sparsely villous, mixed with appressed short hairs; capitula numerous, in paniculiform or racemiform synflorescences.

2a. Basal and lower cauline leaf margin entire or remotely serrulate; phyllaries abaxially ± densely villous, often short-stipitate glandular; capitula usually in dense, narrow, paniculiform synflorescences ..... 31a. subsp. *acris*

2b. Basal and lower cauline leaf margin remotely serrate; phyllaries abaxially sometimes sparsely strigose, densely short-stipitate glandular; capitula usually in loose, broad, paniculiform synflorescences ..... 31b. subsp. *kamtschaticus*

31a. Erigeron acris subsp. **acris**

飞蓬(原亚种) fei peng (yuan ya zhong)

Erigeron kamtschaticus Candolle var. *hirsutus* Y. Ling; *Trimorpha acris* (Linnaeus) Gray; *T. vulgaris* Cassini, nom. illeg. superfl.

Herbs, 5–60 cm tall. Stems solitary, sometimes several, 1–4 mm in diam. at base, green or rarely purplish, moderately to densely hirsute-villous, strigillose, or sometimes glabrate. Leaves: surfaces ± densely strigose-villous, thin, margin entire or rarely remotely serrulate, strigose-villous-ciliate; basal dense, often present at anthesis, blade oblanceolate, 1.5–10 × 0.3–1.2 cm, apex obtuse or acute; mid and upper cauline lanceolate, 0.5–8 × 0.1–0.8 cm, uppermost and branch leaves small, linear. Capitula numerous, in dense, narrow, or rarely loose and broad, paniculiform or sometimes corymbiform synflorescences, 6–10 × 11–21 mm. Phyllaries abaxially ± densely villous, often short-stipitate glandular, apex acute, inner 5–7 × 0.5–0.8 mm. Ray florets: outer series 5–7 mm, tube 2.5–3.5 mm; inner series 3–3.5 mm, style exceeding tube by 1–1.5 mm; disk florets 3.6–5 mm, tube 1.5–2 mm, limb cylindric. Achenes oblong-lanceolate, ca. 1.8 mm, sparsely strigose. Pappus 2-seriate, inner 4–6 mm. Fl. Jul–Sep.

Meadows, pastures, forest margins; 1400–3500 m. Gansu, Guangxi, Hebei, Hubei, Hunan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Afghanistan, Japan, Kazakhstan, Korea, Mongolia, Russia (W Siberia), Uzbekistan; SW Asia, Europe].

31b. Erigeron acris subsp. **kamtschaticus** (Candolle) H. Hara, J. Jap. Bot. 15: 317. 1939.

堪察加飞蓬 kan cha jia fei peng

Erigeron kamtschaticus Candolle, Prodr. 5: 290. 1836; *E. acris* var. *kamtschaticus* (Candolle) Herder; *E. acris* var. *manshuricus* Komarov; *E. angulosus* Gaudin var. *kamtschaticus* (Candolle) H. Hara; *E. kamtschaticus* var. *manshuricus* (Komarov) Koidzumi; *Trimorpha acris* var. *kamtschatica* (Candolle) G. L. Nesom.

Herbs, 30–70(–100) cm. Stems solitary or several, 1–6 mm in diam. at base, green or sometimes purplish, strigillose, densely so below capitula, sometimes sparsely hirsute (sometimes only in basal part). Leaves: surfaces sparsely strigose or strigillose, or glabrate or glabrous, thin; basal often withered at anthesis, blade oblanceolate, 2–13 × 0.3–1.8 cm, margin remotely serrate, strigose-ciliate, apex acute; mid and upper cauline blade lanceolate, 0.3–8.5 × 0.4–1 cm, margin entire, sparsely strigose-ciliate. Capitula numerous in loose, broad, paniculiform or sometimes few in corymbiform synflorescences, 6–10 × 10–19 mm. Phyllaries abaxially sometimes

sparsely strigose, densely short-stipitate glandular, apex acute to acuminate, inner 5–6.5 × 0.6–0.7 mm, margin scarious. Ray florets: outer series 5–6.2 mm, tube 3–3.5 mm; inner 2.5–3 mm, style exceeding tube by 1.5–2.2 mm, sometimes with reduced lamina and pink tipped; disk florets lobes purplish, 4–5.4 mm, tube 2–2.9 mm, limb cylindric-funnelform. Achenes oblong, 1.6–2.5 mm, strigose. Pappus whitish, 2-seriate, inner 5.5–6 mm. Fl. Jun–Sep.

Grasslands on slopes, forest margins; 700–1200 m. Gansu, Guangdong, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi [Mongolia, Russia (Kamchatka, W Siberia); North America].

31c. Erigeron acris subsp. **politus** (Fries) H. Lindberg, Enum. Pl. Fennoscandia, 56. 1901.

长茎飞蓬 chang jing fei peng

Erigeron politus Fries, Summa Veg. Scand. 1: 184. 1845; *E. elongatus* Ledebour (1833), not Moench (1802); *Trimorpha elongata* Vierhapper; *T. polita* (Fries) Vierhapper.

Herbs, 10–50 cm tall, sometimes ± caespitose; rhizome woody, ascending. Stems usually several, 1–4 mm in diam. at base, purple, rarely green, strigillose, sparsely hispid. Leaves green or with reddish petioles, glabrous, rigid, margin entire, strigose-ciliate; basal and lower cauline long petiolate, blade oblanceolate or oblong, 1–10 × 0.1–1.1 cm, apex obtuse; mid and upper sessile, blade oblong or lanceolate, 0.5–7 × ca. 0.8 cm, apex arcuate or obtuse. Capitula many, in corymbiform or corymbose-paniculiform synflorescences, often on long branches, 9–13 × 17–25 mm. Phyllaries 3-seriate, purple, rarely green, densely short-stipitate glandular, sometimes also sparsely hispid, apex acuminate, inner 5.5–7.5 × 0.7–1 mm. Ray florets: outer 6–8 mm, tube 3–4.3 mm, lamina pink or lilac, 0.3–0.5 mm wide, inner 2.5–4.5 mm, style exceeding tube by 1–1.7 mm, sometimes with rudimentary lamina; disk florets yellow, lobes dark lilac, 3.5–5 mm, tube ca. 2.3 mm. Achenes 2–2.5 mm. Pappus white, 1- or 2-seriate, inner 4.5–6 mm. Fl. Jul–Sep.

Meadows on slopes of low mountains, forest margins; 1900–2600 m. Gansu, Hebei, Heilongjiang, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang [Kazakhstan, Kyrgyzstan, Russia (Siberia); C and N Europe].

32. Erigeron krylovii Sergievskaya, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1945(1): 2. 1945.

西疆飞蓬 xi jiang fei peng

Herbs, perennial, (5–)14–60 cm tall, caespitose; rhizome woody; caudex branched. Stems several, 1–4 mm in diam. at base, erect or ascending, green or reddish, branched in upper part, sparsely hirsute-villous, more densely so above, ± densely short-stipitate glandular at least below capitula. Leaves green, surfaces densely short-stipitate glandular, sometimes eglandular, hirsute-villous, strigillose, margin entire, hirsute-villous-ciliate; basal long petiolate, blade oblanceolate, 3–13 × 0.4–1.4 cm, apex obtuse to acute; cauline 0.5–10 × 0.7–1 cm, lower similar to basal, narrowly to broadly winged petiolate, petiole base subclasping, blade base attenuate, upper oblanceolate to lanceolate, sessile, subclasping, apex acute. Capitula 2–6 in corymbose-racemiform synflorescences, sometimes solitary, 9–13 × 17–25 mm. Involucre hemispheric; phyllaries 3-seriate, green, linear-lanceolate, densely stipitate glandular, sometimes hirsute-villous, apex acute, outer almost 1/2 as long as inner, inner shorter than or sometimes equaling disk florets, 5.5–7.5 × 0.7–1 mm, margin narrowly scarious. Ray florets 3-seriate, outer laminate, (4–)7.5–10 mm, longer than disk florets, tube 2.5–3.3 mm, hairy distally, lamina pink, filiform, 0.4–0.6 mm wide, inner 2 series reduced to tube, uncolored, 2–3.8 mm; disk florets yellow, lobes pink, tube hairy above. Achenes lanceoloid, slightly flattened, 2.2–2.5 mm, densely strigose. Pappus 2-seriate, outer bristles 0.3–0.5 mm, inner 4–5 mm. Fl. Jul–Sep.

Open grasslands on slopes, subalpine meadows; 1700–2800 m. N Xinjiang [Kazakhstan, Russia (Siberia)].

33. Erigeron pseudoseravschanicus Botschantzev, Fl. URSS 25: 585. 1959.

假泽山飞蓬 jia ze shan fei peng

Herbs, perennial, 5–60 cm tall, sometimes caespitose; rhizome woody; caudex branched. Stems several, 1–3 mm in diam. at base, erect, branched, green, sometimes reddish, ± densely hirsute-villous, sometimes also strigillose, rarely glabrate, sparsely stipitate glandular. Leaves green, surfaces sparsely hirsute-villous, sometimes also sparsely stipitate glandular, notably on petioles, margin entire or sparsely serrate, hirsute-ciliate; basal long petiolate, petiole base clasping, blade lanceolate to oblanceolate, 1–15 × 0.3–1.6 cm, base attenuate, apex acute or obtuse; cauline 0.3–13 × 0.5–1.1 cm, lower similar to basal, upper lanceolate, sessile, apex acute. Capitula usually many, in corymbose-racemiform synflorescences, sometimes solitary, 7–14 × 13–30 mm. Involucre hemispheric; phyllaries 3-seriate, green, sometimes reddish, slightly shorter than disk florets, linear-lanceolate, hirsute-villous or rarely glabrous, stipitate glandular, apex acute, outer ca. 1/2 as long as inner, inner 5–7 × ca. 0.8 mm, margin scarious. Ray florets 3-seriate, outer 2 series laminate, 5.8–8.5 mm, tube 2.2–3.5 mm, lamina pink or lilac, ca. 0.3 mm wide, inner tubular, uncolored, tube 2.2–3 mm, apex hairy, style exceeding tube by 1–1.5 mm, uncolored; disk florets yellow, lobe tips purple, 4–4.7 mm, tube 1.5–2 mm, hairy, limb cylindric-funnelform, lobes lanceolate, ca. 0.4 mm. Achenes tan, oblanceoloid, compressed, 2–2.2 mm, strigose. Pappus 2-seriate, outer bristles very short, 0.4–0.6 mm, inner 4–5.3 mm. Fl. Jul–Sep.

Subalpine or alpine meadows, forest margins; 1700–2800 m. N Xinjiang [Kazakhstan, Russia (Siberia), Uzbekistan].

Two forms have been recognized in China: *Erigeron pseudoseravschanicus* f. *pseudoseravschanicus* and *E. pseudoseravschanicus* f. *glabrescens* Y. Ling & Y. L. Chen (Acta Phytotax. Sin. 11: 426. 1973). The latter, described from Qinghe, has stems and leaves glabrous or glabrate, only upper part and phyllaries stipitate glandular.

34. Erigeron tianschanicus Botschantzev, Fl. URSS 25: 259. 1959.

天山飞蓬 tian shan fei peng

Erigeron coeruleus Popov, Trudy Bot. Inst. Akad. Nauk

S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 7: 11. 1948, not *E. caeruleus* Urban (1912).

Herbs, perennial, 5–60 cm tall, caespitose; rhizomes woody; caudex branched. Stems several, 1–3 mm in diam., green or reddish, branched, hirsute-villous, stipitate glandular, sometimes also strigillose. Leaves green, surfaces sparsely hirsute-villous or glabrous, sparsely to densely stipitate glandular (or rarely eglandular), margin entire, hirsute-ciliate; basal long petiolate, petiole base clasping, blade oblanceolate or lanceolate, 2–15 × 0.2–0.8(–1.7) cm, base attenuate, apex acute to obtuse, mucronate; cauline 0.5–2 × 0.1–0.3 cm, lower similar to basal, upper sessile, blade lanceolate to linear-lanceolate, subclasping, apex acute. Capitula several, in corymbose-racemiform synflorescences, 7–11 × 14–23 mm. Involucre hemispheric; phyllaries 3-seriate, green, slightly shorter than disk florets, linear-lanceolate, sparsely hirsute-villous, moderately to densely stipitate glandular, apex acute, outer ca. 1/2 as long as inner, inner 5–7 × 0.5–0.8 mm, margin narrowly scarious. Ray florets 2- or 3-seriate, outer laminate, 5.9–8 mm, tube 2.5–3 mm, blue, ca. 0.5 mm wide, inner reduced to tube, 2.3–2.9 mm; disk florets yellow, lobes becoming reddish, 3.4–4.1 mm, tube ca. 3 mm, hairy distally, limb cylindric-funnelform, lobes ovate, ca. 4 mm. Achenes oblong-lanceoloid, slightly compressed, 2–2.2 mm, strigose. Pappus yellowish, 2-seriate, outer bristles short, ca. 0.5 mm, inner 4–4.8 mm. Fl. Jul–Sep.

Open slopes; ca. 2900 m. W Xinjiang [Kazakhstan].

35. Erigeron schmalhausenii Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 8: 51. 1940.

革叶飞蓬 ge ye fei peng

Erigeron eriocephalus Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 613. 1877, not J. Vahl (1840).

Herbs, perennial, 10–45 cm tall, caespitose; rhizome long, woody; caudex branched. Stems usually many, 1–3 mm in diam., ascending or erect, sinuate especially in upper part, reddish, rarely green, branched, strigillose or glabrate at base, sometimes also villous below capitula. Leaves green or reddish, surfaces glabrous, membranous, margin entire, strigillose- or villous-ciliate; basal long petiolate, blade linear-lanceolate, 1.5–6(–9) × 0.1–0.4(–0.8) cm, apex obtuse or acute; cauline sessile, blade linear or narrowly linear-lanceolate, 0.5–7(–9) × 0.3–0.5 cm, apex acute. Capitula usually numerous, in corymbose-racemiform synflorescences, 7–12 × 14–25 mm. Involucre hemispheric; phyllaries 3-seriate, reddish or rarely green, linear-lanceolate, villous, sparsely short-stipitate glandular, apex acute, outer ca. 1/2 as long as inner, inner shorter than disk florets, 6–9 × 0.6–1.1 mm, margin scarious. Ray florets 2-seriate, outer or both series laminate, 5.5–8 mm, tube 2.5–3.5 mm, lamina pink or lilac, ca. 0.5 mm wide, inner sometimes reduced to tube, uncolored, tube 2–4.6 mm; disk florets yellow, lobes pinkish or purplish, 4.5–5.9 mm, tube ca. 2 mm, hairy. Achenes straw-colored, oblanceoloid, compressed, 2.2–2.3 mm, densely strigose. Pappus yellowish to orangish, 2-seriate, outer bristles short, inner ones 5–6.7 mm. Fl. Jun–Sep.

Glacial moraines and mountains; 1600–3600 m. W Xinjiang [Kazakhstan, Russia (W Siberia), Uzbekistan].

36. Erigeron fukuyamae Kitamura, Acta Phytotax. Geobot. 2: 42. 1933.

台湾飞蓬 tai wan fei peng

Erigeron morrisonensis Hayata var. *fukuyamae* (Kitamura) Kitamura.

Herbs, perennial, 10–30 cm tall, caespitose; rhizome short; caudex branched. Stems several, 1–1.5 mm in diam., erect or ascending, branched above, green, sparsely strigose, sometimes glabrate at base, stipitate glandular. Leaves: basal rosulate, withered, rarely present at anthesis, long petiolate, blade linear, 2–7 × 1–1.5 cm, glabrate or surfaces strigillose, leathery, 1-veined, margin serrate or subentire, apex acute or obtuse; cauline usually many, dense, upper sessile, gradually diminished, 2–6 × 0.1–0.3 cm, margin entire or sometimes remotely serrulate, on synflorescence branches very small, 5–6 mm. Capitula 3–9 in loose corymbiform synflorescences, 1.5–2.3 cm in diam.; peduncles 3–10 cm. Involucre hemispheric, 5–8 × 10–18 mm; phyllaries 3-seriate, equal, green or reddish at apex, linear-lanceolate, 0.5–0.7 mm wide, abaxially strigillose, sometimes also sparsely strigose, apex acuminate, outer 4–5 mm, inner 5–8 mm, margin scarious. Ray florets in 2 forms, outer laminate, ca. 6 mm, tube ca. 2.5 mm, sparsely hairy above, lamina reddish, ca. 0.5 mm wide, mid-inner tubular, ca. 2 mm; disk florets bisexual, yellow, tubular, ca. 4 mm, with scattered appressed fine hairs. Achenes oblong, ca. 2 × 0.5 mm, flattened, with appressed fine hairs. Pappus white or brownish, 2-seriate, outer bristles short, inner 3.5–4 mm. Fl. Apr–Jul.

• Alpine meadows, exposed forest roadsides; 1800–3000 m. Taiwan.

5. Erigeron sect. **Caenotus** (Nuttall) Brouillet & Y. L. Chen, **stat. nov.**

小篷草组 xiao peng cao zu

Basionym: *Erigeron* [unranked] *Caenotus* Nuttall, Gen. N. Amer. Pl. 2: 148. 1818; *Caenotus* (Nuttall) Rafinesque; *Conyzella* Fabricius; *Leptilon* Rafinesque.

Herbs, annual [or subshrubs], taprooted [caudex simple]; herbage hirsute or glabrate. Stems branched. Leaves linear to lanceolate or oblanceolate, base not clasping, margin entire or sparsely serrate. Capitula erect in bud, numerous, in paniculiform or loosely corymbiform synflorescences. Ray florets white, lamina filiform, slightly longer than involucre, erect, not coiling or reflexed. Achenes 0.8–1.5 mm. Pappus 1-seriate, of 11–25 bristles, not accrescent.

Six species: North and South America, one species widely introduced worldwide in temperate to tropical regions, including China.

37. Erigeron canadensis Linnaeus, Sp. Pl. 2: 863. 1753.

小蓬草 xiao peng cao

Conyza canadensis (Linnaeus) Cronquist; *Conyzella canadensis* (Linnaeus) Ruprecht; *Leptilon canadense* (Linnaeus) Britton; *Marsea canadensis* (Linnaeus) V. M. Badillo.

Herbs, annual, 50–100 cm tall or more; root fusiform, fibrous rooted. Stems erect, sparsely hirsute, branched above, densely leafy. Leaves: basal withered at anthesis, lower petiolate, oblanceolate, [2–]6–10 × [0.4–]1–1.5 cm, surfaces or only adaxial sparsely pilose, base attenuate, margin sparsely serrate or entire, apex acute or acuminate; mid and upper subsessile or sessile, blade linear-lanceolate or linear, smaller, margin entire or rarely 1- or 2-toothed. Capitula 3–4 mm in diam., numerous, in terminal, large paniculiform synflorescences; peduncles slender, 5–10 mm. Involucre subcylindric, 2.5–4 mm; phyllaries 2- or 3-seriate, greenish, abaxially sparsely strigose [or glabrous], linear-lanceolate or linear, acuminate, outer ca. 1/2 as long as inner, inner 3–3.5 × ca. 0.3 mm, margin scarious, glabrous. Ray florets 20–30(–45), white, 2.5–3.5 mm, lamina slightly longer than disk floret, apex 2-denticulate; disk florets 8–30, yellowish, 2.5–3 mm, tube sparsely puberulent, lobes 4 or 5. Achenes linear-lanceoloid, compressed, 1–1.5 mm, sparsely strigillose. Pappus 1-seriate, dirty white, bristles 15–25, 2.5–3 mm. Fl. May–Sep.

Common weed of open places, field margins, roadsides, dry streamsides; sea level to 3000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [native to North America].

6. Erigeron sect. **Conyza** (Lessing) Baillon, Hist. Pl. 8: 143. 1882.

白酒草组 bai jiu cao zu

Conyza Lessing, Syn. Gen. Compos. 203. 1832, nom. cons., not Linnaeus (1753).

Herbs, annual or biennial [or perennial], taprooted [caudex simple]; herbage hirsute to strigose [often glandular]. Stems simple or branched. Leaves linear to lanceolate, oblanceolate, or spatulate, base clasping or not, margin coarsely serrate or pinnatilobed, sometimes entire. Capitula erect in bud, in paniculiform, racemiform, or racemose-paniculiform synflorescences. Ray florets white, elaminate or lamina slightly longer than involucre. Achenes 0.8–2 mm, 2-veined. Pappus 1-seriate, of 10–25 bristles, not accrescent.

About 60–100 species: Africa, Asia, Australia, Europe, North and South America, some species widespread weeds in tropical and subtropical regions worldwide; two species (both introduced) in China.

1a. Lower cauline leaf blade margin usually coarsely 4–8-serrate per side, apex acute or acuminate; capitula in large and long paniculiform synflorescences, peduncles 3–5 mm; involucre ca. 4 mm; pappus white, later yellowish brown; ray floret lamina short, filiform ..... 38. *E. sumatrensis*

1b. Lower cauline leaf blade margin usually coarsely serrate or pinnatilobed, sometimes entire, apex acute or obtuse; capitula in racemiform or racemose-paniculiform synflorescences, peduncles 10–15 mm; involucre ca. 5 mm; pappus reddish, sordid, or tawny; ray floret elaminate ..... 39. *E. bonariensis*

38. Erigeron sumatrensis Retzius, Observ. Bot. 5: 28. 1788.

苏门白酒草 su men bai jiu cao

Conyza sumatrensis (Retzius) E. Walker.

Herbs, annual or biennial, 80–150 cm tall; roots fusiform. Stems erect, thick, branched above middle, densely leafy, densely gray-white strigose, sparsely hirsute. Leaves: basal withered at anthesis, lower cauline petiolate, blade oblanceolate or lanceolate, 6–10 × 1–3 cm, surfaces densely strigose, especially abaxially, base attenuate, margin usually coarsely 4–8-serrate per side, apex acute or acuminate, mid and upper reduced, blade narrowly lanceolate to linear, margin serrate or entire. Capitula 5–8 mm in diam., numerous, in large and long paniculiform synflorescences; peduncles 3–5 mm. Involucre campanulate to urceolate, ca. 4 × 3–4 mm; phyllaries 3-seriate, gray-green, linear-lanceolate or linear, abaxially scabrous, apex acuminate, outer short or ca. 1/2 as long as inner, inner ca. 4 mm, margin scarious. Ray florets numerous, 4–4.5 mm, lamina yellowish or purplish, short, filiform, apex 2-denticulate; disk florets 6–11, yellowish, ca. 4 mm, tube sparsely puberulent. Achenes linear-lanceoloid, compressed, 1.2–1.5 mm, strigillose. Pappus white, later yellowish brown. Fl. May–Oct.

Common weed of grasslands on slopes, open places, roadsides, streamsides; 100–2500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [presumably native to South America; widely distributed as a weed in tropical and subtropical regions worldwide].

39. Erigeron bonariensis Linnaeus, Sp. Pl. 2: 863. 1753.

香丝草 xiang si cao

Conyza ambigua Candolle; *C. bonariensis* (Linnaeus) Cronquist; *C. crispa* (Pourret) Ruprecht; *C. leucodasys* Miquel; *Erigeron crispus* Pourret; *E. linifolius* Willdenow; *Leptilon bonariense* (Linnaeus) Small; *Marsea bonariensis* (Linnaeus) V. M. Badillo.

Herbs, annual or biennial, [10–]20–50[–150] cm tall; roots fusiform, fibrous rooted. Stems erect or ascending, thin, often branched above middle, densely leafy, densely strigose, sparsely hirsute. Leaves: basal withered at anthesis, lower cauline long petiolate, blade oblanceolate or oblong-lanceolate, 3–5[–8] × 0.3–1[–2.5] cm, surfaces densely strigose or hispidulous, base attenuate, margin usually coarsely serrate or pinnatilobed, sometimes entire, apex acute or obtuse, mid and upper shortly petiolate or sessile, blade narrowly lanceolate or linear, [1–]3–7 × 0.2–0.5[–1] cm, margin of mid dentate, margin of upper entire. Capitula 3–10 mm in diam., numerous, in racemiform or

racemose-paniculiform synflorescences; peduncles 10–15 mm. Involucre urceolate, ca. 5 × 8 mm; phyllaries 2- or 3-seriate, linear, abaxially densely gray-white scabrous, apex acute, outer ones slightly short or ca. 1/2 as long as inner, inner ones ca. 4 × 0.7 mm, margin scarious. Ray florets 65–150 or more, white, 3–3.5 mm, elaminate or 3- or 4-denticulate at apex; disk florets ca. 3 mm, tube sparsely puberulent. Achenes linear-lanceoloid, compressed, ca. 1.5 mm, sparsely strigillose [or glabrous]. Pappus reddish, sordid, or tawny, 3–4 mm. Fl. May–Oct.

Field margins, grassy slopes, roadsides; sea level to 3100 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [native to South America; widely distributed as a weed in tropical and subtropical regions worldwide].

142. EURYBIA (Cassini) Cassini in F. Cuvier, Dict. Sci. Nat. 16: 46. 1820.

北美紫菀属 bei mei zi wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Aster subg. *Eurybia* Cassini, Bull. Sci. Soc. Philom. Paris 1818: 166. 1818.

Perennials, rhizomatous, usually eglandular [sometimes stipitate glandular]. Stems ascending to erect, usually simple, rarely branched at base, glabrous or ± densely hairy. Leaves basal and cauline, sessile or petiolate, blade cordate, ovate, obovate, elliptic, or oblong to spatulate, oblanceolate, or lanceolate, glabrate to hairy, margin entire or serrate [sometimes spinulose-serrate]. Capitula radiate, numerous, usually in corymbiform synflorescences, rarely solitary. Involucre cylindric-campanulate to broadly campanulate; phyllaries in 3–7 series, unequal, bases hardened (rarely wholly leaflike), glabrous or ± hairy [sometimes ± stipitate glandular], margins narrowly scarious (seldom herbaceous), green zones ± basally truncate, in distal 1/3–3/4 (outer) or less (inner), 1-veined, apices obtuse to acute. Receptacles flat to slightly convex, alveolate, epaleate. Florets fertile. Ray florets few to many, purple [or white]; disk florets few to many, bisexual, yellow, limb funnelform to campanulate, lobes 5, deltate to lanceolate; anther base obtuse, apical appendage lanceolate; style branch tip lanceolate. Achenes cylindric-obconic to fusiform, ± compressed, glabrous or sparsely to densely strigillose, eglandular, 7–12(–18)-veined. Pappus persistent, reddish to yellowish, in 4 series, of numerous unequal, barbellate bristles, inner apically ± clavate.

Twenty-three species: Asia, Europe, North America; one species in China.

Eurybia is North American. *Eurybia sibirica* extended into N Eurasia via the Bering land bridge.

1. Eurybia sibirica (Linnaeus) G. L. Nesom, Phytologia 77: 261. 1995.

西伯利亚紫菀 xi bo li ya zi wan

Aster sibiricus Linnaeus, Sp. Pl. 2: 872. 1753; *A. ircutianus* Candolle; *A. sachalinensis* Kudô.

Herbs, perennial, [1–]5–35[–60] cm tall; rhizome thin. Stems usually ascending, sometimes decumbent, often purplish, simple or sometimes branched basally or above, densely villous (sometimes lanate below capitula). Leaves: basal small, deciduous at anthesis; mid cauline sessile, blade oblong to lanceolate [or lanceolate-ovate, obovate, or spatulate], [2.5–]5–8[–9.5] × [0.6–]1–1.7[–3.5] cm, markedly veined, abaxially glabrescent or scabridulous, adaxially sparsely to ± densely villous or villous-strigose, base attenuate to cuneate, subclasping, margin serrate [or entire], apex acute; upper gradually reduced, linear-oblong. Capitula solitary or 2–5[–50] in dense corymbiform synflorescences. Involucre campanulate, 10–13 mm in diam.; phyllaries 3- or 4[or 5]-seriate, purplish wholly or at apex, densely villous, membranous, green zone in distal 1/3–4/5, truncate basally, or outer often leaflike, apex ± squarrose, outer oblong-lanceolate, 4–5 × ca. 1 mm, 1-veined, margin narrowly scarious, apex acute, inner linear-lanceolate, 4–5 × 1–1.5 mm, apex acuminate. Ray florets 12–50, purple [or white to pale violet], tube 3–4 mm, lamina 7–17.5 × 0.8–1.8 mm; disk florets 25–125, yellow becoming purplish, [5–]6.5–7[–8.1] mm, tube ca. 3 mm, limb funnelform, lobes purplish, triangular, 0.5–1.1 mm. Achenes brown, fusiform, strigillose, veins 7–10. Pappus dark cinnamon to reddish, ± equaling to slightly longer than disk corolla. Fl. Jul–Aug.

Grasslands on hills; ca. 300 m. Heilongjiang [Japan, Mongolia, E Russia; N Europe, NW North America].

143. GRINDELIA Willdenow, Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 1: 259. 1807.

胶菀属 jiao wan shu

Perennials, taprooted. Stems usually erect, simple or branched, glabrous or hairy, often gland-dotted and/or resinous. Leaves basal and cauline, alternate, petiolate or (upper) sessile, blade oblong, obovate, oblanceolate, or spatulate to triangular, lanceolate, or linear, glabrous or ± hairy, gland-dotted, margin serrate [sometimes entire]. Capitula radiate [or discoid], usually few to numerous, in corymbiform [or paniculiform] synflorescences, sometimes solitary. Involucres globose to hemispheric or broadly urceolate [sometimes campanulate or obconic]; phyllaries in [3–]5–6[–9+] series, unequal, filiform, linear or lanceolate, glabrous or ± resinous, bases indurate, 1-veined, apices herbaceous, looped or hooked [to straight or incurved]. Receptacles flat to slightly convex, ± alveolate,

epaleate. Florets fertile. Ray florets [absent or] 5–60+, yellow [or orange]; disk florets (20–)100–200(–300+), bisexual, yellow, limb funnelform to campanulate, lobes 5, deltate; anther base obtuse, apical appendage lanceolate; style branch appendage lanceolate [linear to ± deltate]. Achenes ellipsoid to obovoid, ± compressed, sometimes ± 3- or 4-angled, glabrous, eglandular, [striate, ribbed, furrowed, or rugose]. Pappus deciduous, of [1 or]2–8[–15] smooth, barbellulate or barbellate, inner sometimes apically ± clavate, subulate scales or setiform awns [or 1-seriate bristles].

About 30 species: W North America and South America, introduced in Eurasia; one species (introduced) in China.

Grindelia is North American, with a disjunct distribution in South America. Fan et al. (Pl. Diversity Resources 33: 171–173. 2011) recently reported it as introduced to China.

1. Grindelia squarrosa (Pursh) Dunal, Mém. Mus. Hist. Nat. 5: 50. 1819.

胶菀 jiao wan

Donia squarrosa Pursh, Fl. Amer. Sept. 2: 559. 1813; *Grindelia aphanactis* Rydberg; *G. nuda* Alph. Wood; *G. serrulata* Rydberg.

Herbs biennial, perennial, or subshrubs, [10–]40–55[–100] cm tall. Stems erect, glabrous, resinous. Leaves: cauline sessile, oval, ovate, [obovate or oblong to spatulate, oblanceolate, lanceolate, or linear], 3.1–4.2 × 1.3–1.6 cm, glabrous, strongly gland-dotted, base ± clasping, margin usually crenate to serrate (teeth resin-tipped) [rarely entire], apex [obtuse to] acute. Capitula in corymbiform synflorescences, rarely solitary, 0.9–1.5 cm. Involucres broadly urceolate to hemispheric or globose, [8–20 mm in diam.]; phyllaries 5- or 6(–10)-seriate, reflexed to spreading or appressed, filiform or linear to lanceolate-linear, 4–7 mm, resinous, apex usually looped or hooked, subulate. Ray florets [absent or] (12–)24–36(–40), lamina elliptic, 7[–14] mm; disk florets 3–4 mm, limb funnelform, lobes ca. 1 mm. Achenes stramineous [or whitish, brown, or gray], [1.5–]2.8–3[–4.5] mm, faces smooth, striate or ± furrowed. Pappus of 2–4(–8) deciduous, straight or contorted to curled scales or awns [2.5–]4[–5.5] mm, shorter than disk corollas. Fl. [Jul–]Aug–Sep[–Oct].

100–200 m or more. Liaoning [native to W North America].

The specimens were not seen by us; the description is based on Fan et al. (Pl. Diversity Resources 33: 171–173. 2011) and Strother and Wetter (Fl. North America 20: 424–436. 2006).

144. SYMPHYOTRICHUM Nees, Gen. Sp. Aster. 135. 1832.

联毛紫菀属 lian mao zi wan shu

Chen Yilin (陈艺林 Chen Yi-ling); Luc Brouillet

Brachyactis Ledebour.

Herbs, perennial or annual, rhizomatous or taprooted, eglandular [sometimes stipitate glandular]. Stems ascending to erect, usually simple, sometimes branched distally, rarely proximally, usually hairy in decurrent lines at least distally, glabrous or hairy, proximally often glabrous. Leaves basal (sometimes persistent at anthesis) and cauline, petiolate (basal and lower cauline) or sessile, blade cordate to elliptic, oblanceolate, spatulate, ovate, elliptic, lanceolate, or linear, faces glabrous or hairy, sometimes stipitate glandular, margin serrate, crenate, or entire, scabrous or ciliate. Capitula radiate or disciform, numerous, usually in paniculiform, sometimes in racemiform or subcorymbiform, synflorescences, sometimes solitary. Involucre cylindric to campanulate [or hemispheric]; phyllaries in (3 or)4–6(–9) series, unequal to subequal, glabrous or hairy [rarely glandular], outer sometimes leaflike, base usually hardened, margin usually scarious, 1(–3)-veined, apex acute to obtuse, usually with a well-defined green zone, sometimes ± leaflike. Receptacles flat to slightly convex, alveolate, epaleate. Florets fertile. Ray florets few to numerous, in 1 [rarely 4 or 5+] series and laminate, or in 2–5+ series and ± elaminate, lamina white, pink, blue, or purple; disk florets few to numerous, bisexual, yellow [or rarely white], limb funnelform or cylindric, lobes 5, deltate to lanceolate; anther base obtuse, apical appendage lanceolate; style branch tip lanceolate. Achenes obovoid or obconic, sometimes fusiform, ± compressed, glabrous or strigillose, eglandular [rarely stipitate glandular], veins (2 or)3–5(–10). Pappus persistent, white to brownish, in 4 series, of numerous ± equal, barbellate, apically acute bristles.

About 90 species: Asia, Europe, North and South America; three species (two introduced) in China.

Symphyotrichum pilosum (Willdenow) G. L. Nesom var. *pringlei* (A. Gray) G. L. Nesom was collected from a park in Hong Kong; it may not be established in the flora. Cultivars of *S. novi-belgii* (Linnaeus) G. L. Nesom and other undetermined taxa (possibly horticultural hybrids) are cultivated in China but appear not to have escaped. A cultivar of *S. lanceolatum* (Willdenow) G. L. Nesom is cultivated for the cut-flower market.

1a. Herbs perennial; cauline leaves lanceolate to lanceolate-ovate ..... 1. *S. retroflexum*
1b. Herbs annual; cauline leaves linear to linear-lanceolate.
2a. Capitula disciform, ray florets elaminate in 2–5+ series, disk floret limb cylindric; phyllaries subequal, outer sometimes longer, leaflike ..... 2. *S. ciliatum*
2b. Capitula radiate, ray florets laminate, purple, in 1 series, disk floret limb funnelform; phyllaries unequal ..... 3. *S. subulatum*

1. Symphyotrichum retroflexum (Lindley ex Candolle) G. L. Nesom, Phytologia 77: 291. 1995.

倒折联毛紫菀 dao zhe lian mao zi wan

Aster retroflexus Lindley ex Candolle, Prodr. 5: 244. 1836; *A. curtisii* Torrey & A. Gray.

Herbs, perennial, 45–80 cm tall. Stems erect, sometimes purplish, glabrous (except above in lines). Leaves: basal petiolate, lanceolate to ovate, rarely rounded, usually fallen at anthesis; cauline petiolate to sessile, lanceolate to lanceolate-ovate, [5–]6–9.5 × 0.7–1.5[–3.1] cm, slightly reduced in size upward, surfaces glabrous, base attenuate to cuneate or rounded, margin serrate to crenate, sometimes entire, ciliate, apex acute to acuminate. Capitula radiate, numerous, in open, leafy, paniculiform synflorescences, branches spreading; peduncles 0.2–2.5 cm; leaflike bract usually subtending capitulum. Involucre campanulate; phyllaries 3–5-seriate, outer squarrose, often leaflike, lanceolate to linear-lanceolate, ± unequal, outer 6–11 × 0.8–2 mm, eglandular, glabrous, margin narrowly scarious, erose, eciliate, apex acute to acuminate. Ray florets [13–]18–20[–30] in 1 series, lamina purplish blue, [10 or]11[–17] × 1.5[–3] mm, glabrous; disk florets cream to pale yellow, becoming pinkish, 5[–6.8] mm, limb funnelform, 3–3.5 mm, lobes erect, lanceolate, 0.9–1.2 mm, glabrous. Achenes oblanceoloid, ± compressed, 3–3.9 mm, sparsely strigillose, 4–6-veined. Pappus white to reddish, inner 4–4.5 mm, innermost 5–6 mm. Fl. and fr. Sep–Dec.

Roadsides along fields or in mountains. Introduced in Jiangxi [E North America].

2. Symphyotrichum ciliatum (Ledebour) G. L. Nesom, Phytologia 77: 277. 1995.

短星菊 duan xing ju

Erigeron ciliatus Ledebour, Icon. Pl. 1: 24. 1829; *Aster angustus* Torrey & A. Gray; *A. brachyactis* S. F. Blake; *A. ciliatus* (Ledebour) B. Fedtschenko (1915), not Walter (1788), nor Muhlenberg ex Willdenow (1803), nor Nuttall (1840); *A. latisquamatus* (Maximowicz) Handel-Mazzetti; *Brachyactis ciliata* (Ledebour) Ledebour; *B. latisquamata* (Maximowicz) Kitagawa; *Conyza altaica* Candolle; *E. latisquamatus* Maximowicz.

Herbs, annual, [7–]9–60[–70+] cm tall. Stems erect, usually branched from base, branches then decumbent, often reddish below, upper half and branches sparsely to moderately pilosulose, densely leafy. Leaves: basal petiolate, fallen at anthesis; cauline sessile, linear or linear-lanceolate, 2–6 × 0.3–0.6 cm, reduced in size upward, base subclasping, slightly decurrent, margin entire, sometimes serrulate, apex acute. Capitula disciform, numerous, in racemiform or paniculiform synflorescences, rarely solitary at ends of branches. Involucre campanulate; phyllaries 2- or 3-seriate, subequal or outer longer, linear, acute, outer leaflike, 3–6 × ca. 1 mm, margin ciliate, margin of inner scarious below, leaflike above. Ray florets 75–95+ in 4 or 5 series, reduced to tube (sometimes with an extremely reduced lamina remnant, latter sometimes pinkish), 2–3 mm, apex sparsely hairy; disk florets white with pink-tipped lobes, 3.5–5 mm, limb narrowly funnelform, ca. 2 mm, lobes erect, triangular, 0.2–0.3 mm. Achenes purplish, narrowly obovoid, [1.5–]2–2.5 mm, moderately strigillose, 2–4-veined. Pappus of many white, fine, barbellulate bristles, outer very short, inner 6–7 mm. Fl. and fr. Aug–Oct.

Salt marshes, meadows, damp riverbanks, marshes and lakes in plains and steppes, usually saline; 500–1500 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Xinjiang [Japan, Kazakhstan, Korea, Mongolia, Russia, Uzbekistan; E Europe, North America].

This North American species crossed the Bering Sea during the Pleistocene.

3. Symphyotrichum subulatum (Michaux) G. L. Nesom, Phytologia 77: 293. 1995.

钻叶紫菀 zuan ye zi wan

Aster subulatus Michaux, Fl. Bor.-Amer. 2: 111. 1803.

Herbs, annual, 16–150 cm tall. Stems erect, sometimes purplish, glabrous, eglandular. Leaves: basal petiolate, lanceolate to ovate, usually fallen at anthesis; cauline petiolate to sessile, lanceolate to linear-lanceolate, 2–11 × 0.1–1.7 cm, slightly reducing in size upward, surfaces glabrous, eglandular, base attenuate to cuneate, margin serrulate to entire, eciliate, apex acute. Capitula radiate, numerous, in paniculiform synflorescences; peduncles 0.3–1 cm, glabrous, eglandular. Involucre cylindric; phyllaries 3–5-seriate, lanceolate to linear-lanceolate, glabrous, strongly unequal, outer 1–2 × ca. 0.2 mm, margin scarious, entire, scabrous, distally ciliate, eglandular, apex acute to acuminate. Ray florets numerous, in 1 series, lamina purplish blue, 1.5–2.5 mm, glabrous, eglandular; disk florets yellow, pinkish with age, 3–3.5 mm, limb 1.4–1.5 mm, lobes erect, triangular, 0.4–0.5 mm, glabrous, eglandular. Achenes lanceoloid, 1.5–2.5 mm, 2–6-veined, sparsely strigillose. Pappus of many white, fine, barbellulate bristles, 4–5 mm. Fl. and fr. Aug–Oct.

Disturbed areas, roadsides, grassy fields, irrigation ditches, rice field margins; near sea level to 2000 m. Introduced in Anhui, Fujian, Guangxi, Guizhou, Hebei, Henan, Hong Kong, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Africa, Central, North, and South America].

9. Tribe **ANTHEMIDEAE**

春黄菊族 chun huang ju zu

Lin Yourun (林有润 Ling Yeou-ruenn, Ling Yuou-ruen), Shi Zhu (石铸 Shih Chu);
Christopher J. Humphries, Michael G. Gilbert

Shrubs, subshrubs, or annual or perennial herbs, aromatic; indumentum of short biseriate glandular hairs (glands) and uniseriate simple, T-shaped or stellate hairs. Leaves alternate, rarely opposite, fasciculate or in basal rosettes, pinnatisect, pinnatifid, lobed, serrulate, serrate, or dentate, rarely entire, rarely succulent, base sometimes with stipulelike auricles ("pseudostipules"). Synflorescences mostly terminal, sometimes axillary, cymose or racemose, often paniculate, often flat-topped. Capitula heterogamous, with marginal female florets and central bisexual or male disk florets, or homogamous with only bisexual tubular florets. Phyllaries in 2–7 rows, overlapping, usually with scarious margin and apices. Receptacle paleate or epaleate, rarely pilose or hirsute. Marginal female florets radiate, or corollas tubular to filiform, often 2-toothed, or absent, and capitula disciform, fertile or sterile; corolla yellow or white, less often purplish, pink, orange, or red. Disk florets bisexual or male, tubular or funnel-shaped, usually yellow, rarely whitish, purplish, or red, usually 4- or 5-lobed. Anthers mostly rounded, rarely shortly tailed at base, apical appendage ovate or triangular to subulate. Pollen with or without spines. Style base slender or bulbous; style branches usually free (rarely fused in functionally male florets), usually linear, rarely wider, with apex truncate, penicillate. Achenes often obovoid, obconical, or cylindric, sometimes dorsiventrally flattened, apex rounded or truncate, true pappus absent, sometimes with a pappuslike corona of rather few scarious or bristlelike scales, or with an auricle, usually adaxial.

About 110 genera and ca. 1,750 species: worldwide, mainly concentrated in C Asia, the Mediterranean region, and S Africa; 29 genera (two endemic, four introduced) and 364 species (138 endemic, ten introduced) in China.

This tribe includes well-known vegetables (*Glebionis carinata*, *G. coronaria*, and *G. segetum*) and famous ornamental plants (most notably *"Chrysanthemum grandiflorum"*; see note under *Chrysanthemum*). Insecticides are extracted from some species (e.g., *Tanacetum (Pyrethrum) cinerariifolium*). Other species are very important medicinally (e.g., *Artemisia annua*, the source of the important anti-malarial drug artemisinin) while some are significant forage plants in dry regions.

The generic sequence follows Oberprieler et al. (in Kadereit & C. Jeffrey, Fam. Gen. Vasc. Pl. 8: 342–373. 2007).

Records of *Anthemis tinctoria* Linnaeus (Sp. Pl. 2: 896. 1753; *Cota tinctoria* (Linnaeus) J. Gay ex Gussone, Fl. Sicul. Sin. 2: 867. 1844–1845; 春黄菊 chun huang ju), *Argyranthemum frutescens* (Linnaeus) Schultz Bipontinus (in Webb & Berthelot, Hist. Nat. Iles Canaries 2: 264. 1844; *Chrysanthemum frutescens* Linnaeus, Sp. Pl. 2: 887. 1753; *Pyrethrum frutescens* (Linnaeus) Willdenow; 木茼蒿 mu tong hao), *Chamaemelum nobile* (Linnaeus) Allioni (Fl. Pedem. 1: 185. 1785; *Anthemis nobilis* Linnaeus, Sp. Pl. 2: 894. 1753; 果香菊 guo xiang ju), and *Coleostephus myconis* (Linnaeus) Cassini (Dict. Sci. Nat. 41: 43. 1826; *Chrysanthemum myconis* Linnaeus, Sp. Pl., ed. 2, 1254. 1763; *Myconia chrysanthemum* Schultz Bipontinus; 鞘冠菊 qiao guan ju) in FRPS (76(1): 7, 9, 20, 74. 1983) were based on cultivated ornamental plants.

1a. Capitula radiate; ray florets often conspicuous, but sometimes not so.
2a. Receptacle scales present at least near margins of receptacle.
3a. Capitula in ± flat-topped panicles; involucres 2–7(–9) mm in diam.; mostly wild plants, only occasionally cultivated as medicinal plants ..... 167. *Achillea*
3b. Capitula solitary, long pedunculate; involucres 7–15 mm in diam.; mostly grown as ornamentals and only occasionally found as an escape ..... 168. *Anthemis*
2b. Receptacle scales absent, but receptacle sometimes hairy.
4a. Achene winged: marginal achenes 2- or 3-winged, disk achenes 1- or 2-winged; ray florets mostly bright yellow; plants often grown as vegetables or ornamentals ..... 172. *Glebionis*
4b. Achene not winged; ray florets mostly white or pink, less often yellow (*Brachanthemum*, some species of *Chrysanthemum*).
5a. Pappus or corona absent, but achenes sometimes with an obtuse rim or with ribs apically projected.
6a. Achene with ribs projected at apex.
7a. Marsh plants; ray florets sterile ..... 163. *Leucanthemella*
7b. Grassland plants, often grown as ornamentals and only occasionally found as an escape; ray florets fertile ..... 173. *Leucanthemum*
6b. Achene with ribs not projected at apex.
8a. Dwarf shrubs or subshrubs; involucres campanulate, hemispheric, or obconical; ray florets yellow, lamina ovate, to 3 mm ..... 149. *Brachanthemum*
8b. Herbs, annual or perennial; involucres shallowly cup-shaped; ray florets white, red, or violet, less often yellow (some species of *Chrysanthemum*), lamina oblong, often more than 5 mm.
9a. Perennial herbs or subshrubs; achenes terete, ribs 5–8, uniformly spaced, rather obscure ..... 150. *Chrysanthemum*

9b. Annual herbs; achenes dorsiventrally compressed, ribs 3–5, mainly adaxial, slender but distinct ..... 171. *Matricaria*

5b. Pappuslike corona present.

10a. Corona of separate scales or bristles.

11a. Corona scales obovate, brown tipped ..... 158. *Richteria*

11b. Corona scales bristlelike or subulate.

12a. Corona scales many, bristlelike, with flat and palmate bases ..... 156. *Allardia*

12b. Corona scales 4–6, subulate, unequal, mainly abaxial ..... 165. *Opisthopappus*

10b. Corona cupular, shallowly or deeply divided or divided to base.

13a. Achene with multicellular hairs between ribs ..... 164. *Microcephala*

13b. Achene glabrous.

14a. Achene with 5–10 equal ribs, without resin sacs ..... 169. *Tanacetum*

14b. Achene with both thick and thin ribs, abaxially and apically with distinct resin sacs ..... 170. *Tripleurospermum*

1b. Capitula discoid with all florets bisexual, tubular, or capitula disciform with marginal florets inconspicuous, corollas narrowly tubular to filiform or absent.

15a. Capitula heterogamous, disciform: marginal florets female or neuter, corolla tubular or narrowly tubular or absent, disk florets male or bisexual, tubular.

16a. Marginal female florets in many rows.

17a. Capitula pedunculate, terminal; achenes without persistent style ..... 145. *Cotula*

17b. Capitula sessile, axillary; achenes with persistent style ..... 146. *Soliva*

16b. Marginal female florets in 1 row.

18a. Capitula in spikes or racemes, often secund, often grouped into panicles.

19a. Pappuslike corona present ..... 153. *Crossostephium*

19b. Corona absent.

20a. Marginal florets female, disk florets bisexual, fertile; achenes all over receptacle; leaf blade very variable but never pectinate-pinnatisect ..... 151. *Artemisia*

20b. Marginal florets partly female, disk florets bisexual, fertile and sterile; achenes in a row around base of receptacle; leaf blade pinnatisect with ± pectinately arranged lateral lobes ..... 155. *Neopallasia*

18b. Capitula in terminal, rounded to flat-topped panicles, clusters, or solitary.

21a. Corolla exterior stellate hairy or apically densely pilose with erect straight hairs.

22a. Annual herbs; corolla exterior apically densely pilose with erect straight hairs ..... 148. *Ajaniopsis*

22b. Subshrubs; corolla exterior with stellate hairs ..... 162. *Kaschgaria*

21b. Corolla exterior glabrous or with lower part only sparsely pilose.

23a. Achene 5–10-ribbed, corona present, 0.1–0.4 mm ..... 169. *Tanacetum*

23b. Achene 2–6-striate, corona absent.

24a. Florets all fertile; achenes 4 or 5(or 6)-striate/ribbed ..... 147. *Ajania*

24b. Central disk florets sterile; achenes 2-striate ..... 154. *Filifolium*

15b. Capitula homogamous: all florets bisexual, tubular.

25a. Receptacle scales present at least near margins of receptacle; stems 1 to few, thick with wide pith.

26a. Stem densely dirty white lanate in lower part, glabrescent in upper part; synflorescence corymbose; involucres ca. 5 mm in diam. ..... 159. *Handelia*

26b. Stem densely arachnoid hairy; synflorescence long pedunculate, umbel-like; involucres 6–9 mm in diam. ..... 160. *Pseudohandelia*

25b. Receptacle scales absent; stems rarely solitary, not conspicuously thickened with wide pith.

27a. Corona absent.

28a. Capitula many, in elongated spikes or racemes, often grouped into panicles ..... 152. *Seriphidium*

28b. Capitula many or few, in glomerules or flat-topped panicles.

29a. Subshrubs, 40–80 cm tall, branches divaricate, sometimes ± spine-tipped; capitula solitary ..... 149. *Brachanthemum*

29b. Herbs or subshrubs, branches not divaricate nor spine-tipped; capitula in corymbs or umbels of 3 or more.

30a. Annual herbs; corolla bowl-shaped ..... 166. *Stilpnolepis*

30b. Biennial or perennial herbs or subshrubs; corolla not bowl-shaped.

31a. Herbs, stem often solitary, robust, 20–100 cm tall, unbranched below synflorescence, dying after flowering; synflorescence long pedunculate, umbel-like ..... 160. *Pseudohandelia*

31b. Herbs perennial or stemless, small subshrubs, or cushion plants, rarely more than 40 cm tall; synflorescence dense or lax ± flat-topped panicles ..... 161. *Hippolytia*

27b. Corona present, cupular or with distinct scales.

32a. Achene with distinct resin sacs ..... 170. *Tripleurospermum*

32b. Achene without resin sacs.

33a. Perennial herbs or subshrubs; achene with 5–12 equally arranged ribs.

34a. Capitula usually solitary at apex of stem; florets yellow ..... 157. *Cancrinia*

34b. Capitula many or several, in flat-topped panicle, rarely solitary and then florets orange-red ..... 169. *Tanacetum*

33b. Annual herbs; achene with 3–5 adaxial ribs.

35a. Capitula usually solitary at apex of stem; florets constricted in middle ..... 164. *Microcephala*

35b. Capitula many or several, in lax corymb or solitary at apex of lateral branches; florets not constricted ..... 171. *Matricaria*

145. COTULA Linnaeus, Sp. Pl. 2: 891. 1753.

山芫绥属 shan yuan sui shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Lancisia Fabricius; *Machlis* Candolle.

Herbs, annual or perennial; indumentum absent or of basifixed hairs. Leaves alternate or sometimes opposite or rosulate, pinnatisect, lobed, or occasionally entire. Capitula solitary, pedunculate, heterogamous, radiate, rarely homogamous and discoid. Involucres hemispheric; phyllaries in 2 or 3 rows, unequal, scarious margin narrow. Receptacle flat to conical, epaleate. Marginal florets in 1 to several rows, female, fertile, generally pedicellate, corolla tube short or absent, lamina generally absent, white if present; disk florets yellow, bisexual, fertile, apex 4- or 5-lobed. Anther bases obtuse; apical appendage lanceolate. Style branches truncate or obtuse at apex or style undivided. Achenes dorsiventrally flattened, often laterally winged, wings aristately lengthened at apex of achene. Corona absent.

Fifty-five species: mostly in S Hemisphere, particularly S Africa and the Pacific islands (New Zealand), also in Australia and South America, a few species extending to E Africa and New Guinea; two species in China.

1a. Achenes of marginal female florets obovoid; lateral wings broad and thick; ultimate segments of leaves shortly triangular or lanceolate ..... 1. *C. anthemoides*

1b. Achenes of marginal female florets narrowly oblong; lateral wings very narrow; ultimate segments of leaves linear or linear-lanceolate ..... 2. *C. hemisphaerica*

1. Cotula anthemoides Linnaeus, Sp. Pl. 2: 891. 1753.

芫绥菊 yuan sui ju

Herbs, annual, small. Stems with diffuse branches, ± villous with pale brown hairs. Basal leaves petiolate; leaf blade oblanceolate-oblong, 3–5 × 1–2 cm, both surfaces sparsely villous or subglabrous, 2-pinnatisect; primary lateral segments 5-paired; ultimate segments shortly triangular or lanceolate, apex shortly acute. Middle stem leaves similar, base semiamplexicaul. Capitula solitary at apex of branches, axillary or opposite with leaves, ca. 5 mm in diam. Involucres cup-shaped; phyllaries in 2 rows, oblong, with 1 red midvein, margin scarious, outer ones small, inner ones large. Marginal female florets many, without corolla; disk florets few, corolla yellow, 4-lobed. Achenes obovoid, ca. 1.2 mm, dorsiventrally flattened, lateral wings broad and thick, with sessile glands. Pappus absent. Fl. and fr. Sep–Mar of next year. $2n = 20$.

Wet places by rivers, paddies; 1000–1100 m. Fujian, Guangdong, Hubei, Sichuan, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Thailand, Vietnam; Africa].

2. Cotula hemisphaerica (Roxburgh) Wallich ex Bentham in Bentham & J. D. Hooker, Gen. Pl. 2: 429. 1873.

山芫绥 shan yuan sui

Artemisia hemisphaerica Roxburgh, Fl. Ind., ed. 1832, 3: 423. 1832; *Cotula chinensis* Kitamura; *Machlis hemisphaerica* (Roxburgh) Candolle.

Herbs, annual, small. Stems with diffuse branches, ± villous with brownish hairs. Basal leaves shortly petiolate; leaf blade oblanceolate, 3–5 × 1–2 cm, both surfaces subglabrous, 2-pinnatisect; primary lateral segments 5-paired; ultimate segments linear or linear-lanceolate. Middle stem leaves similar, oblong, base amplexicaul; distal stem leaves small. Capitula solitary at apex of branches, ca. 5 mm in diam. Involucres cup-shaped; phyllaries in 2 rows, oblong, margin scarious, apex obtuse or acute, with brown midvein. Marginal female florets many, without corolla or corolla 2-toothed; disk florets few, corolla yellow, 4-lobed. Achenes narrowly oblong, ca. 1 mm, slightly dorsiventrally flattened, lateral wings narrow, with sessile glands. Pappus absent. Fl. and fr. Jan–May.

Sandy and stony places by rivers, by paddies; ca. 100 m. Hubei, Sichuan, Taiwan [Bhutan, India, Nepal, Pakistan].

The record of *Cotula chinensis* in Fl. Taiwan (4: 840. 1978) is referable to *Soliva anthemifolia*.

146. SOLIVA Ruiz & Pavon, Fl. Peruv. Prodr. 113. 1794.

裸柱菊属 luo zhu ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Solivaea Cassini, nom. illeg. superfl.

Herbs, annual, small. Leaves alternate, pinnatisect. Capitulum solitary at leaf axils, disciform. Involucres hemispheric; phyllaries in 2 rows, equal, margin scarious. Receptacle convex or conical, epaleate. Marginal florets female, without corolla; disk florets sterile, corolla tubular, 3- or 4-lobed. Anther obtuse at base. Style branches fused. Achenes dorsiventrally flattened, laterally winged; wings sometimes projected, teeth apex with persistent and spinescent style, sometimes transversely wrinkled to sulcate. Pappus absent.

Eight species: mostly in Australia, North and South America; two species (both introduced) in China.

1a. Leaves 5–15 cm; capitula often restricted to base of plant; disk florets 3-merous; achenes longer than broad, prominently villous at apex, with thick corky margins ..... 1. *S. anthemifolia*
1b. Leaves 1.5–5 cm; capitula scattered along stem; disk florets 4-merous; achenes broader than long, glabrous, with thin papery wings indented below middle ..... 2. *S. pterosperma*

1. Soliva anthemifolia (Jussieu) R. Brown, Trans. Linn. Soc. London 12: 102. 1818.

裸柱菊 luo zhu ju

Gymnostyles anthemifolia Jussieu, Ann. Mus. Natl. Hist. Nat. 4: 262. 1804.

Stems very short, prostrate, rooting adventitiously. Leaves alternate, in basal rosettes, spatulate in outline, 5–15 × 1–3 cm overall; petiole 2–3 cm; leaf blade 2- or 3-pinnatifid; ultimate lobes linear, sparsely villous or subglabrous. Capitula at base of stem, sessile, 6–12 mm in diam. Involucres hemispheric, 5–8 × 6–10 mm; phyllaries in 2 or 3 rows, oblong or lanceolate, margin scarious, apex acuminate, outer ones 3–3.5 × 1–1.2 mm, inner ones 3–4 × 0.3–0.6 mm. Marginal female florets in several rows, corolla absent, styles persistent; disk florets 8–12, corolla yellow, tubular, ca. 1.2 mm, apex 3-lobed; style apex capitate. Achenes oblanceolate, 2–2.5 × 0.1–1 mm, dorsiventrally flattened, with thick corky lateral wings, apex long villous, rounded; style persistent, spinescent. Pappus absent. Fl. and fr. year-round. $2n = 18$.

Naturalized in waste ground and cultivated areas. Fujian, Guangdong, Hainan, Jiangxi, Taiwan, Zhejiang [native to South America].

2. Soliva pterosperma (Jussieu) Lessing, Syn. Gen. Compos. 268. 1832.

翼子裸柱菊 yi zi luo zhu ju

Gymnostyles pterosperma Jussieu, Ann. Mus. Natl. Hist. Nat. 4: 262. 1804.

Stems decumbent, not rooting adventitiously, branches ascending, pilose. Leaves in basal rosettes, alternate, spatulate in outline, 1.5–5 cm overall; petiole widened below synflorescences; leaf blade tripinnatifid to tripinnate, both surfaces pilose. Capitula axillary, scattered along stem, sessile, to 5 mm in diam. Involucres hemispheric, ca. 3 × 5 mm; phyllaries in ca. 2 rows, subequal, oblong to lanceolate, 4–4.5 × 1.5–2 mm, herbaceous, abaxially pilose. Marginal female florets 13–15, in several rows, corolla absent, styles forked, persistent; disk florets 5 or 6, corolla greenish, tubular, 1.6–1.8 mm, apex 4-lobed; style capitate. Achenes obovate, ca. 2 × 3 mm, dorsiventrally flattened, glabrous, with thin, flat lateral wings indented below middle into a small basal lobe and larger upper one, apex with persistent, spinelike style, often with additional incurved spines on shoulders of upper lobes.

Naturalized in parks and gardens. N Taiwan [native to South America].

Soliva pterosperma can be a noxious weed of lawns, readily distributed by the spiny infructescences. Webb (New Zealand J. Bot. 24: 665–669. 1986) suggested that it might not be separable from *S. sessilis* Ruiz & Pavon.

147. AJANIA Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 419. 1955.

亚菊属 ya ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Phaeostigma Muldashev.

Herbs, perennial, or small subshrubs. Leaves alternate, pinnately or palmate-pinnately divided, serrate, rarely entire. Synflorescences cymose, flat-topped or rarely capitula solitary. Capitula heterogamous, disciform. Involucres campanulate or cylindric; phyllaries in 4 or 5 rows, herbaceous, scarious margin white or brown. Receptacle convex to conical, epaleate. Florets yellow, rarely purple. Marginal florets in 1 row, female, corolla usually narrowly tubular, rarely wider, apex 2- or 3(–5)-denticulate; disk florets bisexual, corolla tubular, 5-lobed. Anthers obtuse at base, apical appendage lanceolate. Style branches linear, apex truncate. Achenes obovoid, 4–6-ribbed/striate. Corona absent.

Thirty-four species: temperate Asia; 35 species (23 endemic) in China.

1a. Involucres straw-colored, glossy, 2–4 mm in diam.; phyllaries with colorless scarious margin.
2a. Capitula 5–14, often regularly fascicled-corymbose at apices of branches; involucres cylindric or narrowly campanulate; phyllaries rigidly herbaceous, apex acute.
3a. Leaf blade adaxially green, 2-pinnatisect ..... 23. *A. parviflora*
3b. Leaf blade gray-green, 3-parted or -lobed ..... 24. *A. trifida*
2b. Capitula many, corymbose or compound-corymbose at apices of stem and branches; involucres campanulate; phyllaries herbaceous, apex obtuse or rounded.
4a. Perennial herbs.
5a. Involucres 6–7 mm in diam.; outer phyllaries narrowly elliptic, apices with rounded waxy appendage ..... 33. *A. pallasiana*
5b. Involucres 2.5–4 mm in diam.; outer phyllaries ovate or lanceolate, apices without rounded waxy appendage.
6a. Stem weakly branched at base, often solitary, almost herbaceous; middle and lower stem leaf blades usually bipinnate with 5–7 lobes ..... 34. *A. fastigiata*
6b. Stem strongly branched at base, woody for much of length; middle and lower stem leaf blades usually twice ternately divided ..... 35. *A. gracilis*
4b. Small shrubs or subshrubs.
7a. Young stems glabrous; leaf blade abaxially green or pale green, glabrous or nearly so ..... 32. *A. nematoloba*
7b. Young stems hairy; leaf blade abaxially gray-white, appressed pubescent.
8a. Leaf blade shallowly toothed to subentire, only occasionally lobed.
9a. Leaf blade adaxially green or gray-green, glabrous or very sparsely pubescent; disk florets ca. 2.5 mm ..... 25. *A. potaninii*
9b. Leaf blade adaxially densely gray-white tomentose; disk florets ca. 4 mm ..... 26. *A. amphisericea*
8b. Leaf blade pinnatisect, pinnatipartite, 2-pinnatisect, palmate-pinnately 3–5-divided, or twice ternately divided.
10a. Leaf blade pinnatisect or pinnatipartite.
11a. Leaf blade pinnatisect, adaxially gray-white, densely pubescent ..... 27. *A. truncata*
11b. Leaf blade pinnatipartite, adaxially green, glabrous ..... 28. *A. hypoleuca*
10b. Leaf blade 2-pinnatisect, palmate-pinnately 3–5-divided, bipalmatisect, or twice ternately divided.
12a. Leaf blade 2-pinnatisect ..... 29. *A. achilleoides*
12b. Leaf blade bipalmatisect, palmately-pinnately 3–5-divided, or twice ternately divided.
13a. Leaf blade twice ternately divided ..... 35. *A. gracilis*
13b. Leaf blade bipalmately 3–5-sect or bipalmate, pinnately 3–5-sect.
14a. Leaves with divided pseudostipules ..... 30. *A. nitida*
14b. Leaves with entire pseudostipules ..... 31. *A. fruticulosa*
1b. Involucres not straw-colored, not glossy, 4–10 mm in diam.; phyllaries with dark brown or purple scarious margin.
15a. Leaf blade undivided, 3-lobed, or simply pinnatisect, or pinnatipartite.
16a. Leaf blade undivided, margin entire, serrate, or incised-serrate.
17a. Leaf blade linear, margin entire ..... 1. *A. salicifolia*
17b. Leaf blade narrowly elliptic, lanceolate, or obovate-oblong, or broadly oblanceolate, rarely linear, margin serrate or incised-serrate.
18a. Subshrubs; leaves 5–10 × 0.3–4 cm, without pseudostipules, abaxially densely and thickly tomentose ..... 2. *A. quercifolia*
18b. Perennial herbs; leaves 3–4.5 × 1–2 cm, with divided pseudostipules, abaxially densely pubescent ..... 3. *A. latifolia*
16b. Leaf blade 3-lobed or pinnately divided.
19a. Leaf blade 3-lobed ..... 6. *A. alabasica*
19b. Leaf blade pinnately divided.
20a. Leaf blade with 1 or 2 pairs of lateral lobes; lobes linear ..... 4. *A. variifolia*
20b. Leaf blade with 3 or 4 pairs of lateral lobes; lobes narrowly elliptic, lanceolate, falcate, or obliquely triangular ..... 5. *A. ramosa*
15b. Leaf blade more complexly divided: 2-pinnatisect, bipalmatisect, palmate-pinnately 3–7-divided, tripinnatisect, or tripinnate, pinnately divided.
21a. Small subshrubs with thick, woody rootstocks; stems 4–25 cm.
22a. Capitula solitary; involucres 7–10 mm in diam. ..... 10. *A. scharnhorstii*

22b. Capitula in panicles; involucres 4–7(–8) mm in diam.
23a. Phyllary margin dark purple; corolla apex purple-red ..... 8. *A. purpurea*
23b. Phyllary margin deep brown; florets uniformly yellow.
24a. Leaf blade elliptic or obliquely elliptic in outline, 1–2 cm, both surfaces densely tomentose; involucre 4–6 mm in diam. ..... 7. *A. tibetica*
24b. Leaf blade suborbicular in outline, 0.3–0.5 cm, both surfaces densely pubescent; involucre 5–7 mm in diam. ..... 9. *A. trilobata*
21b. Erect or diffuse perennial herbs, with slender fibrous roots; stems often more than 25 cm.
25a. Leaf blade tripinnatisect, subtripinnatisect, or palmate, tripinnately divided.
26a. Whole plant densely and thickly tomentose; phyllaries inconspicuous ..... 19. *A. sericea*
26b. Whole plant pubescent or densely so; phyllaries conspicuous.
27a. Leaf blade 3–3.5 × 2–3 cm, adaxially green or pale green, glabrous or nearly so, ultimate segments lanceolate or elliptic ..... 20. *A. tripinnatisecta*
27b. Leaf blade 1–2 × 1–1.5 cm, adaxially gray-white, densely pubescent, ultimate segments linear.
28a. Stems thinly silvery gray tomentose; leaf blade ca. 2 × 1.5 cm ..... 21. *A. elegantula*
28b. Stems densely pubescent; leaf blade ca. 1 × 1 cm ..... 22. *A. nubigena*
25b. Leaf blade 2-pinnatisect, bipalmatisect, or subpalmately 3–5-divided.
29a. Leaf blade bipalmatisect or palmately 3–5-divided.
30a. Leaf blade adaxially green, subglabrous; involucres 4–5 mm in diam. ..... 17. *A. breviloba*
30b. Leaf blade adaxially densely gray-white or white pubescent; involucres 6–10 mm in diam. ..... 18. *A. khartensis*
29b. Leaf blade 2-pinnatisect.
31a. Phyllary margin ± distinctly 2-colored: dark brown with a narrow but distinct colorless margin ..... 16. *A. tenuifolia*
31b. Phyllary margin uniformly brown or dark brown scarious.
32a. Primary lateral segments of leaf blade pinnatilobed, pinnatifid, or pinnatipartite.
33a. Primary lateral segments of leaf blade 1- or 2-paired, if 2-paired then ca. 1 cm apart; ultimate lobes narrowly elliptic or falcate ..... 14. *A. remotipinna*
33b. Primary lateral segments of leaf blade 2–4-paired, ca. 5 mm at intervals; ultimate lobes elliptic, lanceolate, or obliquely triangular ..... 15. *A. myriantha*
32b. Primary lateral segments of leaf blade or leaf blade pinnatisect.
34a. Leaf blade adaxially gray-white, densely villous or pubescent; involucres 5–6 mm in diam.; corolla of marginal female florets with truncate apex ..... 11. *A. brachyantha*
34b. Leaf blade adaxially green, subglabrous; involucres 2.5–5 mm in diam.; corolla of marginal female florets with toothed apex.
35a. Ultimate segments of leaf blade linear-lanceolate or narrowly elliptic; involucres ca. 2.5 mm in diam. ..... 12. *A. przewalskii*
35b. Ultimate segments of leaf blade linear; involucres 4–5 mm in diam. ..... 13. *A. adenantha*

1. Ajania salicifolia (Mattfeld ex Rehder & Kobuski) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 424. 1955.

柳叶亚菊 liu ye ya ju

Tanacetum salicifolium Mattfeld ex Rehder & Kobuski, J. Arnold Arbor. 13: 207. 1932; *Chrysanthemum linearifolium* C. C. Chang; *C. salicifolium* (Mattfeld ex Rehder & Kobuski) Handel-Mazzetti; *Phaeostigma salicifolium* (Mattfeld ex Rehder & Kobuski) Muldashev.

Subshrubs, 30–60 cm tall. Flowering branches purple-red, sericeous, especially in upper part and on synflorescence branches. Lower and middle stem leaves sessile; leaf blade linear to lanceolate, 5–10 × 0.3–1 cm, abaxially white, densely and thickly sericeous, adaxially green, glabrous, margin entire. Upper stem leaves progressively smaller. Synflorescence a dense terminal flat-topped panicle. Capitula many. Involucres campanulate, 4–6 mm in diam.; phyllaries in 4 rows, scarious margin broad, brown, outer ones ovate, ca. 2 mm, abaxially sparsely sericeous, middle and inner ones ovate or ovate-elliptic to linear-lanceolate, 3–4 mm. Florets yellow; marginal female florets 6, corolla narrowly tubular, ca. 2 mm, apex 3-denticulate; disk florets many, corolla tubular, ca. 3.5 mm. Achenes ca. 1.8 mm. Corona absent. Fl. and fr. Jun–Sep.

• Mountain slopes; 2600–4600 m. Gansu, Qinghai, Shaanxi, Sichuan.

2. Ajania quercifolia (W. W. Smith) Y. Ling & C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 12. 1980.

栎叶亚菊 li ye ya ju

Tanacetum quercifolium W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 119. 1913; *Chrysanthemum quercifolium* (W. W. Smith) Handel-Mazzetti; *Dendranthema quercifolium* (W. W. Smith) Kitamura; *Phaeostigma quercifolium* (W. W. Smith) Muldashev.

Subshrubs, 60–150 cm tall. Old branches gray-black; flowering branches robust, white, powdery-sericeous especially in upper part and on peduncles. Middle leaves of flowering branches shortly petiolate; leaf blade narrowly elliptic, lanceolate, or obovate-oblong, rarely linear, 5–10 × 2–4 cm, rigid, abaxially white or gray-white, densely and thickly sericeous, adaxially green, glabrous, margin coarsely dentate, incised-lobed, or -fid, teeth or lobes 3- or 4-paired, obliquely triangular or lanceolate, sometimes middle and distal leaves of flowering branches linear-lanceolate or broadly linear, to 10 cm, margin entire. Upper leaves progressively smaller. Synflorescence a dense flat-topped panicle, 4–9 cm in diam.; peduncle robust. Capitula many. Involucres campanulate, 5–6 mm in diam.; phyllaries in 4 rows, scarious margin yellow-brown, outer ones ovate-lanceolate, ca. 2 mm, abaxially sparsely sericeous, middle and inner ones narrowly elliptic to lanceolate, 3–4 mm, abaxially glabrous. Florets yellow, with sessile glands; marginal female florets 11, corolla narrowly tubular, apex minutely 4-denticulate; disk florets many, corolla tubular, apex 5-lobed. Achenes ca. 1.5 mm. Pappus absent. Fl. and fr. Aug–Oct.

• Forest understories, thickets; 3200–3900 m. Sichuan, Yunnan.

3. Ajania latifolia C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 12. 1980.

宽叶亚菊 kuan ye ya ju

Chrysanthemum shihchuanum H. Ohashi & Yonekura.

Herbs, perennial, 20–35 cm tall, rhizomes long or short, procumbent. Flowering and sterile stems many, sometimes densely clustered, erect, shortly corymbosely branched on upper part, pubescent, especially on synflorescence branches and peduncles, densely leafy throughout. Lower leaves withered by anthesis. Middle and upper leaves sessile or subsessile, with divided pseudostipules; leaf blade broadly oblanceolate, obovate, or elliptic, 3–4.5 × 1–2 cm, abaxially gray-white, densely and thickly appressed pubescent, adaxially green, glabrous, pinnatifid above middle, base cuneate; lobes 2- or 3-paired, lanceolate or obliquely triangular. Synflorescence a compound flat-topped panicle, 3–5 cm in diam. Capitula many. Involucres campanulate, 5–6 mm in diam.; phyllaries in 4 rows, scarious margin broadly yellow-brown, outer ones ovate or ovate-lanceolate, 2–2.5 mm, abaxially sparsely pubescent, middle and inner ones ovate-lanceolate to long ovate, middle ones sparsely pubescent abaxially, inner ones glabrous abaxially. Florets yellow; marginal female florets 6, corolla narrowly tubular, ca. 2.5 mm; disk florets many, corolla tubular, ca. 3 mm, apex 5-lobed. Fl. and fr. Oct.

• Mountain slopes; ca. 3100 m. Sichuan.

4. Ajania variifolia (C. C. Chang) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 401. 1961.

异叶亚菊 yi ye ya ju

Chrysanthemum variifolium C. C. Chang, Sinensia 5: 161. 1934; *Ajania manchurica* Poljakov; *Dendranthema variifolium* (C. C. Chang) Voroschilov; *Phaeostigma variifolium* (C. C. Chang) Muldashev.

Subshrubs, ca. 30 cm tall, old branches with densely leafy tips. Flowering branches sparsely sericeous or subglabrous. Middle leaves of flowering branches with petiole 1–2 cm; leaf blade ovate, 2–3 × 1.5–2.5 cm, abaxially gray-white, densely sericeous, adaxially green, glabrous, 3–5-pinnatisect; segments linear or narrowly linear. Lower and upper leaves smaller, blades 3-sect. Synflorescence a terminal compound flat-topped panicle. Capitula many. Involucres campanulate, 4–5 mm in diam.; phyllaries in 4 rows, scarious margin yellow-brown, outer ones ovate or long ovate, ca. 2 mm, abaxially sparsely sericeous at base, apex acute, middle and inner ones narrowly obovate or elliptic, 3–4 mm, apex rounded. Florets yellow, exterior with sessile glands; marginal female florets 6, corolla narrowly tubular, ca. 2.5 mm, apex 2- or 3-denticulate; disk florets many, corolla tubular, ca. 3 mm. Achenes ca. 2 mm. Fl. and fr. Aug–Sep.

Rocky slopes; 1200–3500 m. Heilongjiang, Hubei, Shaanxi [Korea, Russia].

The whole plant is used medicinally for relieving spasms.

5. Ajania ramosa (C. C. Chang) C. Shih in C. Shih & G. X. Fu, Acta Phytotax. Sin. 17(2): 114. 1979.

分枝亚菊 fen zhi ya ju

Chrysanthemum variifolium C. C. Chang var. *ramosum* C. C. Chang, Sinensia 5: 163. 1934; *C. ramosum* (C. C. Chang) H. Ohashi & Yonekura; *Phaeostigma variifolium* (C. C. Chang) Muldashev var. *ramosum* (C. C. Chang) Muldashev.

Shrubs, 80–150 cm tall. Old branches brownish; flowering branches of current year sericeous, especially above and on synflorescence branches. Middle leaves of flowering branches petiolate; leaf blade elliptic, oblanceolate, or long ovate, 4–5 × 2–2.5 cm, abaxially white or gray-white, densely and thickly sericeous, adaxially green, glabrous, pinnatipartite; lobes 3- or 4-paired, narrowly elliptic, lanceolate, or falcate. Proximal and distal leaves progressively smaller. Capitula compound-corymbose at apices of branches. Involucres campanulate, 5–6 mm in diam.; phyllaries in 4 rows, outer ones triangular-ovate, 1.5–2 mm, abaxially sparsely sericeous, scarious margin yellow-brown, apex rounded; middle and inner ones ovate-oblong or oblanceolate, 4–4.5 mm. Florets many, corolla yellow, exterior with sessile glands; marginal female florets 7, corolla narrowly tubular, ca. 2 mm, apex 4-denticulate; disk florets many, corolla tubular, ca. 3 mm. Achenes ca. 1.3 mm. Fl. and fr. Aug–Sep. $2n = 18$*.

• Mountain slopes, river valleys; 2900–4600 m. Hubei, Shaanxi, Sichuan, Xizang.

6. Ajania alabasica H. C. Fu in Ma, Fl. Intramongol. 6: 325. 1982.

内蒙亚菊 nei meng ya ju

Chrysanthemum alabasicum (H. C. Fu) H. Ohashi & Yonekura.

Subshrubs, 15–30 cm tall. Old branches brown or gray-brown, with many short sterile branches and long flowering branches. Sterile and flowering branches densely sericeous, glabrescent. Lower and middle stem leaves with petiole 2–4 mm; leaf blade spatulate or flabelliform, 0.5–1.5 × 0.2–1.5 cm, both surfaces gray-white, densely sericeous, tripartite or trisect, sometimes bipalmate pinnatisect; primary lateral lobes 1-paired; all lobes linear, oblong-linear, lanceolate, or long ovate, margin entire, apex acute or obtuse. Upper stem leaves 3-partite or entire. Capitulum solitary at branch tips. Involucres campanulate, 5–7 mm in diam.; phyllaries in 4 or 5 rows, margin broadly brown scarious, outer ones rhomboid-ovate, ca. 2 mm, abaxially densely or sparsely sericeous, middle and inner ones broadly elliptic, 4–5 mm, middle ones densely or sparsely sericeous. Florets yellow, exterior with sessile glands; marginal female florets 5, corolla narrowly tubular, ca. 2.5 mm, apex 4-denticulate; disk florets many, corolla tubular, ca. 3 mm. Achenes ca. 1 mm. Fl. and fr. Jun–Aug.

• Rocky slopes. S Nei Mongol (Otog Qi).

7. Ajania tibetica (J. D. Hooker & Thomson ex C. B. Clarke) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 410. 1961.

西藏亚菊 xi zang ya ju

Tanacetum tibeticum J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 154. 1876; *Chrysanthemum tibeticum* (J. D. Hooker & Thomson ex C. B. Clarke) S. Y. Hu.

Subshrubs, 4–20 cm tall. Old branches dark brown; young branches densely sericeous. Leaves petiolate; leaf blade elliptic or oblanceolate, 1–2 × 0.7–1.5 cm, both surfaces gray-white, densely tomentose, 2-pinnatisect; primary lateral segments 2-paired; ultimate segments narrowly elliptic; leaves below synflorescence pinnatifid. Synflorescence a terminal flat-topped panicle, 1–2 cm in diam. Involucres campanulate, 4–6 mm in diam.; phyllaries in 4 rows, apex obtuse, outer ones triangular-ovate or lanceolate, ca. 3 mm, abaxially sparsely sericeous, middle and inner ones elliptic or lanceolate-elliptic, 4–5 mm, middle ones sparsely sericeous, inner ones glabrous abaxially. Florets yellow; marginal female florets: corolla narrowly tubular, ca. 2.5 mm, apex 2–4-denticulate; disk florets many, corolla tubular. Achenes ca. 2.2 mm. Fl. and fr. Aug–Sep. $2n = 18$.

Mountain slopes; 3900–4700 m. Sichuan, Xizang [India, Kazakhstan, Pakistan].

8. Ajania purpurea C. Shih, Acta Phytotax. Sin. 17(2): 115. 1979.

紫花亚菊 zi hua ya ju

Chrysanthemum purpureiflorum H. Ohashi & Yonekura.

Subshrubs, 4–25 cm tall, with thick woody rootstock. Old branches pale brown; young branches densely tomentose. Leaves petiolate; leaf blade elliptic or obliquely elliptic, 1–2 × 0.8–1.5 cm, both surfaces gray-white, densely and thickly tomentose, palmately 3–5-fid or lobed, or palmate-pinnately 3–5-fid or -lobed; lobes elliptic or narrowly elliptic. Synflorescence a terminal flat-topped cyme, 1.5–2 cm in diam. Capitula 5–10. Involucres campanulate, ca. 5 mm in diam.; phyllaries in 4 rows, abaxially tomentose, especially outer and middle ones, scarious margin dark purple, outer ones narrowly ovate or elliptic-ovate, ca. 3.5 mm, middle and inner ones narrowly elliptic to lanceolate, ca. 5 mm. Florets purple above middle; marginal female florets 6, corolla narrowly subulate, ca. 2 mm, apex 3- or 4-denticulate; disk florets many, corolla tubular. Achenes ca. 2.5 mm. Pappus absent.

• Alpine meadows, thickets, gravel mounds; 4800–5300 m. Xizang.

9. Ajania trilobata Poljakov in Schischkin & Bobrov, Fl. URSS 26: 880. 1961.

矮亚菊 ai ya ju

Chrysanthemum trilobatum (Poljakov) H. Ohashi & Yonekura.

Subshrubs, 5–15 cm tall; roots woody, ca. 1.5 cm in diam. Flowering and sterile branches gray-white, densely pubescent. Petiole ca. 1 cm; leaf blade suborbicular or flabelliform, 3–5 × 4–5 mm, both surfaces gray-white, densely pubescent, 2-palmatisect; primary lateral segments 3–6; ultimate segments ovate or elliptic, apex obtuse or rounded. Synflorescence a terminal flat-topped cyme. Capitula (1–)3–8(–10). Involucres campanulate, (4.5–)5–7(–8) mm in diam.; phyllaries in 3 rows, scarious margin brown, outer ones ovate, ca. 2 mm, abaxially sparsely pubescent, inner ones broadly elliptic to lanceolate, 2–4 mm, abaxially glabrous. Florets yellow; marginal female florets 5, corolla narrowly tubular, ca. 2 mm, apex 3-denticulate; disk florets many, corolla tubular, 2.2–3 mm. Achenes ca. 2 mm. Pappus absent. Fl. and fr. Jul–Aug.

• Fissures of rocks by rivers; ca. 3200 m. Xinjiang (C Tian Shan).

10. Ajania scharnhorstii (Regel & Schmalhausen) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 409. 1961.

单头亚菊 dan tou ya ju

Tanacetum scharnhorstii Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 620. 1878; *Chrysanthemum scharnhorstii* (Regel & Schmalhausen) B. Fedtschenko; *Hippolytia scharnhorstii* (Regel & Schmalhausen) Poljakov.

Subshrubs, 4–10 cm tall, with thick woody rootstock ca. 2 cm in diam. Flowering and sterile branches gray-white, densely and thickly pubescent. Petiole 1–2 mm; leaf blade suborbicular or flabelliform, 3–5 × 5–6 mm, both surfaces gray-white, densely pubescent, bipalmatisect; primary lateral segments 3–7; ultimate segments ovate or elliptic, apex obtuse or rounded. Synflorescence a solitary terminal capitulum. Involucres campanulate, 7–10 mm in diam.; phyllaries in 4 rows, scarious margin brown, outer ones ovate, ca. 3 mm, abaxially sparsely pubescent, middle and inner ones broadly elliptic to oblanceolate, 3–5 mm, middle ones sparsely pubescent abaxially, inner ones glabrous abaxially. Florets yellow; marginal female florets 5, corolla narrowly tubular, ca. 2.5 mm, apex 3- or 4-denticulate; disk florets many, corolla tubular, ca. 3.5 mm. Achenes ca. 2 mm. Fl. and fr. Jul–Aug.

• Fissures of rocks on mountain slopes, calcareous talus slopes, thickets; 3900–5100 m. Gansu, Qinghai, Xinjiang (C Tian Shan), Xizang.

11. Ajania brachyantha C. Shih, Acta Phytotax. Sin. 17(2): 114. 1979.

短冠亚菊 duan guan ya ju

Chrysanthemum brachyanthum (C. Shih) H. Ohashi & Yonekura.

Herbs, perennial, 30–40 cm tall, with slender fibrous roots. Stems much branched above middle. Lower branches long, spreading; upper branches ascending; stem and branches gray-white, pubescent, especially in upper part. Basal and lower leaves pinkish at anthesis. Middle stem leaves sessile; leaf blade broadly obovate-elliptic or elliptic, 1.5–2 × ca. 1 cm, both surfaces gray-white, densely appressed pubescent or villous, 2-pinnatisect; primary lateral segments 2- or 3-paired; ultimate segments narrowly elliptic, oblanceolate, or falcate, apex acute. Upper leaves and leaves below synflorescence small, pinnatifid or palmatifid. Synflorescence a terminal compound flat-topped panicle. Capitula many. Involucres broadly campanulate, 5–6 mm in diam.; phyllaries in 3 rows, scarious margin broad, dark brown, outer ones narrowly elliptic, ca. 2 mm, abaxially sparsely villous, middle and inner ones elliptic or oblanceolate, ca. 4 mm, middle ones sparsely villous abaxially, inner ones glabrous abaxially. Florets yellow; marginal female florets 6, corolla narrowly tubular, ca. 1.2 mm, apex truncate or obliquely truncate; disk florets many, corolla tubular. Fl. Aug.

• Mountain slopes; 3500–3600 m. Xizang (Nyêmo).

12. Ajania przewalskii Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 422. 1955.

细裂亚菊 xi lie ya ju

Chrysanthemum przewalskii (Poljakov) H. Ohashi & Yonekura.

Herbs, perennial, 35–80 cm tall; rhizomes short, procumbent, with slender fibrous roots; cataphylls brown, ovate. Stems erect, shortly branched at apex, red-purple, pubescent, especially in upper part. Petiole ca. 1 cm; leaf blade broadly ovate or ovate, 2–5 × 1.5–4 cm, abaxially gray-white, densely pubescent, adaxially green, glabrous or sparsely pubescent, 2-pinnatisect; primary lateral segments 2–4-paired, dense, 3–5 mm apart; ultimate segments linear-lanceolate or narrowly elliptic. Leaves below synflorescence small. Synflorescence a large, terminal, compound flat-topped panicle. Capitula many. Involucres campanulate, 2.5–3 mm in diam.; phyllaries in 4 rows, scarious margin brown, outer ones ovate or lanceolate, ca. 1.5 mm, abaxially puberulent, middle and inner ones elliptic to oblanceolate or lanceolate, ca. 2.5 mm, abaxially glabrous. Florets yellow, exterior with sessile glands; marginal female florets 4–7, corolla narrowly tubular, apex 3-denticulate; disk florets many, corolla tubular. Achenes ca. 0.8 mm. Fl. and fr. Jul–Sep. $2n = 36$*.

• Grasslands, forest margins, on rocks; 2800–4500 m. Gansu, Nei Mongol, Ningxia, Qinghai, Sichuan.

13. Ajania adenantha (Diels) Y. Ling & C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 13. 1980.

丽江亚菊 li jiang ya ju

Tanacetum adenanthum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 187. 1912; *Chrysanthemum adenanthum* (Diels) Handel-Mazzetti.

Herbs, perennial, 20–30 cm tall; rhizomes short, with slender fibrous roots; cataphylls brown, ovate or ovate-lanceolate; indumentum of medifixed hairs. Stems erect, long branched, pubescent, especially in upper part and on peduncles. Middle stem leaves: petiole 3–5 mm; leaf blade ovate, broadly ovate, or broadly cuneate, 1.5–2 × 0.5–2 cm, abaxially gray-white, densely appressed pubescent, adaxially pale green, sparsely pubescent, 2-pinnatisect; primary lateral segments 1- or 2-paired; ultimate segments linear; lower and upper leaves 3–5-pinnatisect. Synflorescence a terminal flat-topped panicle. Capitula many. Involucres campanulate, 4–5 mm in diam.; phyllaries in 4 or 5 rows, scarious margin brown, apex rounded or obtuse, outer ones ovate-lanceolate or ovate, ca. 1.5 mm, abaxially pubescent, middle and inner ones elliptic or ovate-elliptic, 3–3.5 mm, middle ones pubescent abaxially. Florets yellow or orange, lower parts with sessile glands; marginal female florets ca. 7, corolla narrowly tubular, apex acutely 3- or 4-denticulate; disk florets many, corolla tubular.

• Mountain slopes, stony alpine meadows; 3000–3700 m. Hebei, NW Yunnan (Lijiang).

14. Ajania remotipinna (Handel-Mazzetti) Y. Ling & C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 13. 1980.

疏齿亚菊 shu chi ya ju

Chrysanthemum remotipinnum Handel-Mazzetti, Acta Horti Gothob. 12: 265. 1938.

Herbs, perennial, 30–70 cm tall, with slender fibrous roots. Stems erect, much branched, densely or sparsely pubescent. Middle stem leaves: petiole 1–2 cm; leaf blade elliptic, ovate, or obovate, 3.5–5 × 2–3.5(–4) cm, abaxially gray-white, densely and thickly appressed villous, adaxially green, sparsely appressed pubescent, 2-pinnatisect; primary lateral segments 1- or 2-paired, remote, at ca. 1 cm intervals; ultimate segments narrowly elliptic or falcate. Lower and upper stem leaves gradually smaller. Synflorescence a terminal, rather large, compound flat-topped panicle, 3–5 cm in diam. Involucres campanulate, 2.5–3.5 mm in diam.; phyllaries in 4 rows, scarious margin yellow-brown or deep brown, apex obtuse or rounded, outer ones triangular-lanceolate, ca. 3 mm, abaxially sparsely pubescent, middle and inner ones elliptic, ca. 4 mm, abaxially glabrous. Florets yellow, exterior with sessile glands; marginal female florets 8, corolla narrowly tubular, ca. 1.8 mm, apex 2- or 3-denticulate; disk florets many, corolla tubular, ca. 2.5 mm. Achenes ca. 1 mm. Fl. and fr. Aug–Oct.

• Mountain slopes; 200–3800 m. Gansu, Shaanxi, Shanxi, Sichuan, Xizang.

15. Ajania myriantha (Franchet) Y. Ling ex C. Shih in C. Shih & G. X. Fu, Acta Phytotax. Sin. 17(2): 114. 1979.

多花亚菊 duo hua ya ju

Tanacetum myrianthum Franchet, Bull. Annuel Soc. Philom. Paris, sér. 8, 3: 144. 1891; *Chrysanthemum mairei* (H. Léveillé) Handel-Mazzetti; *C. myrianthum* (Franchet) Y. Ling;

C. myrianthum var. *sericocephalum* Handel-Mazzetti; *C. myrianthum* var. *wardii* (C. Marquand & Airy Shaw) Handel-Mazzetti; *C. oresbium* (W. W. Smith) Handel-Mazzetti; *Dendranthema myrianthum* (Franchet) Kitamura; *T. mairei* H. Léveillé; *T. myrianthum* var. *wardii* C. Marquand & Airy Shaw; *T. oresbium* W. W. Smith.

Herbs, perennial, 25–100 cm tall, with slender fibrous roots. Stems erect; upper parts pubescent. Middle stem leaves: petiole 0.3–1 cm; leaf blade ovate or oblong, 1.5–3 × 1–2.5 cm, abaxially white or gray-white, densely and thickly appressed pubescent, adaxially green, glabrous or sparsely pubescent, 2-pinnatisect; primary lateral segments 2–4-paired, at ca. 5 mm intervals; ultimate segments elliptic, lanceolate, or obliquely triangular. Upper stem leaves gradually smaller; leaves below synflorescence pinnatisect. Synflorescence a terminal flat-topped panicle, 3–5 cm in diam., rarely a compound corymb to 25 cm in diam. Capitula many. Involucres campanulate, 2.5–3 mm in diam.; phyllaries in 4 rows, scarious margin brown, apex rounded or obtuse, outer ones ovate, ca. 1 mm, abaxially glabrous or sparsely pubescent, middle and inner ones elliptic or lanceolate, 2–2.5 mm, middle ones abaxially glabrous or sparsely pubescent. Florets yellow, exterior with sessile glands; marginal female florets 3–6, corolla narrowly tubular, ca. 1.5 mm, apex (2–)4- or 5-denticulate; disk florets many, corolla tubular, ca. 2 mm. Achenes ca. 1 mm. Fl. and fr. Jul–Oct.

Mountain slopes, river valleys; 2200–3600 m. Gansu, Hubei, Qinghai, Sichuan, Xizang, Yunnan [Bhutan].

16. Ajania tenuifolia (Jacquemont ex Candolle) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 411. 1961.

细叶亚菊 xi ye ya ju

Tanacetum tenuifolium Jacquemont ex Candolle, Prodr. 6: 129. 1838; *Ajania roborowskii* Muldashev; ?*A. roborowskii* var. *tsinghaica* Muldashev; *Chrysanthemum roborowskii* (Muldashev) H. Ohashi & Yonekura; ?*C. roborowskii* var. *tsinghaicum* (Muldashev) H. Ohashi & Yonekura; *C. stenolobum* Handel-Mazzetti.

Herbs, perennial, 9–25 cm tall; rhizomes slender, with slender fibrous roots. Stems many, procumbent and erect; procumbent stems with many brown ovate cataphylls; erect stems branched from base, upper parts and peduncles appressed pubescent, hairs medifixed. Middle stem leaves: petiole 0.4–0.8 cm; leaf blade suborbicular, triangular-ovate, or flabelliform, 1–2 × 1–2 cm, abaxially white or gray-white, densely appressed villous, adaxially pale green, sparsely villous, 2-pinnatisect; primary lateral segments 2- or 3-paired; ultimate segments narrowly elliptic or oblanceolate. Proximal and distal stem leaves gradually smaller. Synflorescence a terminal flat-topped cyme, 2–3 cm in diam. Capitula few. Involucres campanulate, ca. 4 mm in diam.; phyllaries in 4 rows, apex obtuse, scarious margin distinctly divided into dark brown inner zones and narrow colorless outer zone, outer ones lanceolate, ca. 2.5 mm, abaxially sparsely pubescent, middle and inner ones elliptic to oblanceolate, 3–4 mm, abaxially glabrous. Florets dark or orange yellow, exterior with sessile glands; marginal female florets 7–13, corolla narrowly tubular, ca. 2 mm, apex 2- or 3-denticulate; disk florets 30–60, corolla 3–4 mm. Achenes ca. 1 mm. Fl. and fr. Aug–Oct. $2n = 36$*.

• Grasslands on mountain slopes; 2200–4600 m. Gansu, Jiangsu, Qinghai, Sichuan, Xizang, Yunnan.

Ajania roborowskii var. *tsinghaica* is known to us only from the protologue. It appears to be a depauperate form with less divided leaves.

17. Ajania breviloba (Franchet ex Handel-Mazzetti) Y. Ling & C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 13. 1980.

短裂亚菊 duan lie ya ju

Chrysanthemum pallasianum (Fischer ex Besser) Komarov var. *brevilobum* Franchet ex Handel-Mazzetti, Symb. Sin. 7: 1112. 1936; *C. brevilobum* (Franchet ex Handel-Mazzetti) Handel-Mazzetti; *Dendranthema brevilobum* (Franchet ex Handel-Mazzetti) Kitamura.

Herbs, perennial, 8–50 cm tall; rhizomes slender, with slender fibrous roots; cataphylls brown, triangular-ovate. Stems erect, usually not branched, sometimes branched from base, purple-red, pubescent, especially upper part and below synflorescence. Middle stem leaves: petiole 0.5–1 cm; leaf blade ovate, suborbicular, or flabelliform, 1.5–3 × 1.5–2 cm, abaxially gray-white, densely and thickly appressed pubescent, adaxially green or pale green, sparsely pubescent or subglabrous, 2-pinnatisect or irregularly 3–5-bipalmate-pinnatisect; primary lateral segments 3- or 4-paired; ultimate segments elliptic or lanceolate-elliptic; proximal and distal stem leaves trisect, 5-palmatisect or biternatisect. Synflorescence a flat-topped panicle, or compound panicle, 2–7 cm in diam. Capitula many or few. Involucres campanulate, 4–5 mm in diam.; phyllaries in 4 rows, abaxially sparsely pubescent, scarious margin brown, outer ones lanceolate-elliptic, ca. 4 mm, middle and inner ones elliptic to long obovate, 3–5 mm. Florets yellow, exterior with sessile glands; marginal female florets 4, corolla narrowly tubular, ca. 2.8 mm, apex minutely 3-denticulate; disk florets many, corolla narrowly tubular, ca. 3 mm. Achenes ca. 2 mm. Fl. and fr. Sep–Oct.

• Open places in forests, gravelly places on mountain slopes; 2800–4100 m. Hubei, Jilin, Shaanxi, Yunnan.

The usual basionym given for this species, *Tanacetum pallasianum* (Fischer ex Besser) Trautvetter & C. A. Meyer "var. *brevilobum* Franchet" (Diels, Notes Roy. Bot. Gard. Edinburgh 7: 26. 1912), is a nomen nudum and was therefore not validly published (*Vienna Code*, Art. 32.1(d)).

18. Ajania khartensis (Dunn) C. Shih in C. Shih & G. X. Fu, Acta Phytotax. Sin. 17(2): 115. 1979.

铺散亚菊 pu san ya ju

Tanacetum khartense Dunn, Bull. Misc. Inform. Kew 1922: 150. 1922; *Ajania mutellina* (Handel-Mazzetti) Y. Ling; *Chrysanthemum khartense* (Dunn) H. Ohashi & Yonekura; *C. mutellinum* (Handel-Mazzetti) Handel-Mazzetti; *Dendranthema mutellinum* (Handel-Mazzetti) Kitamura; *T. mutellinum* Handel-Mazzetti.

Herbs, perennial, 10–20 cm tall, with slender fibrous roots. Flowering and sterile stems many, diffuse, densely or sparsely

villous or pubescent. Middle stem leaves: petiole ca. 5 mm; leaf blade orbicular, suborbicular, flabelliform, or broadly cuneate, 0.8–1.5 × 1–1.8 cm, both surfaces gray-white, densely or thickly appressed pubescent, bipalmatisect or 3–5-palmatisect; primary lateral segments 1(or 2)-paired; ultimate segments elliptic. Lower and uppermost stem leaves trisect. Synflorescence a terminal flat-topped cyme, 2–4 cm in diam. Capitula few, (1–)3–5 or many (to 15). Involucres campanulate, 6–10 mm in diam.; phyllaries in 4 rows, abaxially densely or sparsely pubescent, scarious margin dark brown or gray-brown, apex obtuse or slightly rounded, outer ones lanceolate or linear-lanceolate, 3–4 mm, middle and inner ones broadly lanceolate, narrowly elliptic, or oblanceolate, 4–5 mm. Florets yellow; marginal female florets 6–8, corolla narrowly tubular, 3- or 4-denticulate; disk florets many, corolla tubular. Achenes ca. 1.2 mm. Fl. and fr. Jul–Sep.

Mountain slopes; 2500–5300 m. Gansu, Nei Mongol, Ningxia, Qinghai, Sichuan, Xizang, Yunnan [N India].

19. Ajania sericea C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 14. 1980.

密绒亚菊 mi rong ya ju

Chrysanthemum delavayanum H. Ohashi & Yonekura.

Herbs, perennial, ca. 35 cm tall, with 1 flowering stem and 1 or 2 sterile stems; rhizomes short, with slender fibrous roots. Flowering stem erect, most parts densely and thickly sericeous-tomentose. Middle stem leaves: petiole 2–4 mm; leaf blade suborbicular or flabelliform, ca. 0.8 × 1.5 cm, both surfaces gray-white, densely and thickly tomentose, 3-pinnatisect or subtripalmate-pinnatisect; primary lateral segments 2-paired; ultimate segments lanceolate or narrowly elliptic. Lower and upper stem leaves smaller. Synflorescence a terminal flat-topped panicle, 2–4 cm in diam. Capitula few or moderate in number. Involucres campanulate, 3–4 mm in diam.; phyllaries in 4 rows, scarious margin pale brown, outer ones linear or lanceolate, ca. 2.5 mm, abaxially densely and thickly tomentose, middle and inner ones oblanceolate or narrowly elliptic, ca. 3 mm, middle ones densely and thickly tomentose abaxially, inner ones glabrous abaxially. Florets yellow; marginal female florets: corolla tubular, ca. 1.5 mm, apex 4- or 5-denticulate; disk florets many, corolla tubular, ca. 2 mm. Fl. May.

• Yunnan (Eryuan).

20. Ajania tripinnatisecta Y. Ling & C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 14. 1980.

多裂亚菊 duo lie ya ju

Chrysanthemum tripinnatisectum (Y. Ling & C. Shih) H. Ohashi & Yonekura.

Herbs, perennial, ca. 65 cm tall, with slender fibrous roots. Stems solitary, erect; synflorescence branches short; upper parts and peduncles appressed pubescent. Middle stem leaves sessile; leaf blade ovate or elliptic, 3–3.5 × 2–3 cm, abaxially gray-white, densely appressed pubescent, adaxially green, sparsely pubescent, 3-pinnatisect; primary lateral segments 3-paired; ultimate segments lanceolate or elliptic. Upper stem leaves progressively smaller. Synflorescence a terminal compound flat-topped panicle. Capitula many. Involucres campanulate, 3–4 mm in diam.; phyllaries in 4 rows, scarious margin yellow-brown, outer ones elliptic, ca. 2.5 mm, abaxially pubescent, middle and inner ones elliptic or oblanceolate, 3–4 mm, abaxially glabrous. Florets yellow, exterior with sessile glands; marginal female florets 7, corolla narrowly tubular, ca. 2 mm, acutely 3-denticulate; disk florets many, corolla tubular, ca. 3 mm. Achenes ca. 1 mm. Fl. and fr. Oct.

• Mountain slopes; 3200–3300 m. Sichuan (Hongyuan).

21. Ajania elegantula (W. W. Smith) C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 15. 1980.

云南亚菊 yun nan ya ju

Tanacetum elegantulum W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 10: 201. 1918; *Chrysanthemum elegantulum* (W. W. Smith) S. Y. Hu.

Herbs, perennial, 25–50 cm tall, with small woody rootstock. Stems many, slender, unbranched, erect or ascending, thinly silvery gray tomentose. Stem leaves ca. 2 × 1.5 cm, both surfaces gray tomentulose, 3-pinnatisect; ultimate segments linear, 2–3 × 0.5–0.6 mm. Distal leaves less dissected, those subtending synflorescence linear, ca. 1 cm. Synflorescence a terminal flat-topped panicle; peduncles to 1.4 cm, grayish white. Immature capitula 3–4 mm in diam. Outer phyllaries linear or lanceolate, 2–3 mm, grayish white tomentulose; middle and inner ones lanceolate or elliptic, abaxially ± tomentulose, adaxially straw-colored scarious.

• Yunnan.

Ajania elegantula seems to be known only from the original immature collections and was regarded as insufficiently known in the FRPS account of *Ajania*. However, the elegant, finely dissected leaves are very distinctive, and it seems justifiable to accept it as a good species.

22. Ajania nubigena (Wallich ex Candolle) C. Shih in C. Shih & G. X. Fu, Acta Phytotax. Sin. 17(2): 116. 1979.

黄花亚菊 huang hua ya ju

Tanacetum nubigenum Wallich ex Candolle, Prodr. 6: 130. 1838; *Chrysanthemum nubigenum* (Wallich ex Candolle) Handel-Mazzetti; *Dendranthema nubigenum* (Wallich ex Candolle) Kitamura.

Herbs, perennial, ca. 30 cm tall, with slender fibrous roots. Stems unbranched or branched from base or lower part, densely pubescent. Middle stem leaves: petiole 3–5 cm; leaf blade orbicular or broadly ovate, ca. 1 × 1 cm, both surfaces gray-white, densely pubescent, tripinnatisect or inconspicuously tripinnatisect; primary lateral segments 2-paired; ultimate segments linear. Distal stem leaves progressively smaller. Synflorescence a terminal compound flat-topped panicle, ca. 3 cm in diam.; synflorescence branches and peduncles white, densely pubescent. Capitula many. Involucres campanulate, ca. 5 mm in diam.; phyllaries in 4 rows, abaxially sparsely pubescent, scarious margin dark brown, apex obtuse or rounded, outer ones linear-lanceolate, ca. 2.5 mm, middle and inner ones narrowly elliptic or oblanceolate, 3–4 mm. Florets yellow, exterior with

sessile glands; marginal female florets 8, corolla narrowly tubular, ca. 2 mm, apex obtusely 3-denticulate; disk florets: corolla tubular, ca. 3 mm. Fl. Aug.

Mountain slopes; 3900–4100 m. Gansu, Sichuan, Xizang (Gyirong), Yunnan [Bhutan, India, Nepal].

"Artemisia nubigena" (Wallich, Numer. List, no. 3233. 1831) belongs here but is a nomen nudum and was therefore not validly published (*Vienna Code*, Art. 32.1(d)).

23. Ajania parviflora (Grüning) Y. Ling, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 15. 1980.

小花亚菊 xiao hua ya ju

Chrysanthemum parviflorum Grüning, Repert. Spec. Nov. Regni Veg. 12: 312. 1913; *Tanacetum davidii* Krascheninnikov; *T. parviflorum* (Grüning) H. W. Kung.

Subshrubs, 7–25 cm tall. Old branches short, with flowering and sterile stems. Flowering stems unbranched or shortly fascicular inflorescence-branched at apices of branches, sparsely puberulent. Middle leaves petiolate; leaf blade ovate, ca. 2.5 × 2 cm, abaxially pale gray-white, densely pubescent, adaxially green, sparsely pubescent, 2-pinnatisect; primary lateral segments 1- or 2-paired; ultimate segments linear; proximal and distal leaves 3–5-pinnatisect. Synflorescence a terminal clustered flat-topped cyme. Capitula 5–10. Involucres cylindric, 2.5–3 mm in diam.; phyllaries in 4 rows, rigidly herbaceous, scarious margin hyaline, straw-colored, glossy, apex acute, outer ones lanceolate, ca. 1.5 mm, abaxially puberulent, middle and inner ones narrowly elliptic, ca. 3.5 mm, abaxially glabrous. Florets yellow; marginal female florets 4, corolla tubular, ca. 3.5 mm, apex 5-lobed; disk florets many, corolla tubular. Achenes ca. 1.5 mm.

Low mountains, hills; ca. 1400 m. Hebei, Nei Mongol, Shanxi [Mongolia].

24. Ajania trifida (Turczaninow) Muldashev, Bot. Zhurn. (Moscow & Leningrad) 68: 213. 1983.

女蒿 nü hao

Artemisia trifida Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 196. 1832; *Chrysanthemum trifidum* (Turczaninow) Krascheninnikov; *Hippolytia trifida* (Turczaninow) Poljakov; *Tanacetum trifidum* (Turczaninow) Candolle.

Subshrubs, small, to 20 cm tall. Flowering stems slender, long, gray-white, appressed pubescent. Basal leaves in rosette, leaves petiolate; leaf blade spatulate or cuneate, including cuneate-attenuate petiole, 0.5–3.5 × 0.5–0.8 cm, both surfaces gray-green, appressed white pubescent, 3-parted or -lobed; lobes short, linear or oblong-linear, apex obtuse or rounded. Middle and upper leaves usually simple. Synflorescence a terminal clustered flat-topped panicle; peduncle 0.2–1.5 cm, appressed pubescent. Capitula 3–14. Involucres narrowly campanulate, 3–4 mm in diam.; phyllaries in 5 rows, glossy, yellowish, rigidly herbaceous, scarious margin narrow, white, outer ones ovate or elliptic, 2–2.5 mm, middle and inner ones oblong to oblanceolate, 4–4.5 mm. Corolla yellow, 3–4 mm. Achenes subterete, 1.5–3 mm. Fl. and fr. Jun–Aug.

Stony desert steppes, stony mountain slopes; 900–1400 m. Nei Mongol [Mongolia].

Tzvelev (Fl. URSS 26: 412. 1961) placed this species within *Ajania* rather than *Hippolytia* on the basis of the heterogamous capitula and densely leafy woody stems without condensed vegetative shoots.

25. Ajania potaninii (Krascheninnikov) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 424. 1955.

川甘亚菊 chuan gan ya ju

Tanacetum potaninii Krascheninnikov, Repert. Spec. Nov. Regni Veg. 26: 28. 1929; *Ajania dentata* X. D. Cui; *Chrysanthemum potaninii* (Krascheninnikov) Handel-Mazzetti; *T. potaninii* var. *nanum* Krascheninnikov; *T. potaninii* var. *suffruticosum* Krascheninnikov; *T. rockii* Mattfeld ex Rehder & Kobuski.

Subshrubs, ca. 70 cm tall. Old branches dark gray; flowering branches sparsely appressed pubescent. Lower and middle stem leaves: petiole ca. 0.5 cm; leaf blade broadly ovate, ovate, orbicular, or broadly elliptic, 1.5–2.5 × 1–2 cm, abaxially white or gray-white, densely and thickly appressed pubescent, adaxially green or gray-green, glabrous or very sparsely pubescent, margin serrate or occasionally inconspicuously 3–5-lobed, apex truncate or acute. Uppermost stem leaves spatulate, orbicular, or narrowly elliptic, small. Synflorescence a terminal compound flat-topped panicle, 2–8 cm in diam. Capitula many. Involucres campanulate, 2.5–3 mm in diam.; phyllaries in 4 rows, straw-colored, glossy, scarious margin hyaline, outer ones ovate or triangular-lanceolate, ca. 1.5 mm, abaxially sparsely pubescent, apex obtuse or rounded, middle and inner ones elliptic or lanceolate, 2–2.5 mm, middle ones abaxially sparsely pubescent, inner ones abaxially glabrous. Marginal female florets 6, corolla narrowly tubular, ca. 2 mm, apex 2–4-denticulate; disk florets: corolla tubular, ca. 2.5 mm. Achenes ca. 1.2 mm. Fl. and fr. Aug–Nov.

• Mountain slopes, forests, river valleys, hills; 2000–2300 m. Gansu, Shaanxi, Sichuan.

26. Ajania amphisericea (Handel-Mazzetti) C. Shih, Acta Phytotax. Sin. 32: 366. 1994 [*"amphiseriacea"*].

灰叶亚菊 hui ye ya ju

Chrysanthemum potaninii (Krascheninnikov) Handel-Mazzetti var. *amphisericeum* Handel-Mazzetti, Acta Horti Gothob. 12: 271. 1938.

Subshrubs, 18–35 cm tall. Old branches gray-brown; flowering branches sparsely appressed pubescent. Middle stem leaves: petiole ca. 3 mm; leaf blade orbicular or broadly elliptic, 0.7–2 × 0.5–1.5 cm, both surfaces gray-white, densely tomentose, margin undivided, serrate. Uppermost leaves orbicular or narrowly elliptic, small. Synflorescence a terminal flat-topped panicle, 1–4 cm in diam. Capitula many. Involucres campanulate, ca. 3 mm in diam.; phyllaries in 4 rows, straw-colored, scarious margin hyaline, apex obtuse or rounded, outer ones ovate or triangular-lanceolate, ca. 2.5 mm, abaxially pubescent, middle and inner ones elliptic or lanceolate, ca. 3 mm, middle ones pubescent abaxially, inner ones glabrous abaxially. Florets yellow; marginal female florets ca. 13, corolla narrowly tubular,

ca. 3 mm, apex 4-denticulate; disk florets many, corolla tubular, ca. 4 mm. Achenes ca. 2 mm. Fl. and fr. Sep–Nov.

• Mountain slopes; 1700–2300 m. Sichuan (Kangding, Tianquan).

27. Ajania truncata (Handel-Mazzetti) Y. Ling ex C. Shih, Acta Phytotax. Sin. 32: 366. 1994.

深裂亚菊 shen lie ya ju

Chrysanthemum truncatum Handel-Mazzetti, Acta Horti Gothob. 12: 270. 1938.

Subshrubs, 15–35 cm tall. Old branches gray-brown; flowering branches sparsely appressed tomentose. Middle stem leaves: petiole 0.2–0.6 cm; leaf blade ovate or broadly ovate, ca. 1.2 × 1.2 cm, both surfaces gray-white, adaxially densely tomentose, pinnatisect; lateral segments 1- or 2-paired. Distal leaves and leaves below synflorescence smaller, undivided. Synflorescence a terminal compound flat-topped panicle, 1–2.5 cm in diam. Capitula many. Involucres campanulate, 2.4–3 mm in diam.; phyllaries in 4 rows, straw-colored, abaxially glabrous, scarious margin hyaline, apex obtuse or rounded, outer ones ovate or triangular-lanceolate, ca. 2 mm, middle and inner ones elliptic, ca. 3 mm. Florets yellow; marginal female florets ca. 16, corolla narrowly tubular, ca. 2 mm, apex 4-denticulate; disk florets: corolla tubular, ca. 3 mm. Achenes ca. 1 mm. Fl. and fr. Sep–Oct.

• Streamsides, wastelands, slopes; 1900–2100 m. Sichuan (Jinchuan).

28. Ajania hypoleuca Y. Ling ex C. Shih, Acta Phytotax. Sin. 32: 366. 1994.

下白亚菊 xia bai ya ju

Chrysanthemum hypoleucum (Y. Ling ex C. Shih) H. Ohashi & Yonekura.

Subshrubs, ca. 55 cm tall. Young branches white pubescent. Middle and distal stem leaves: petiole ca. 5 mm; leaf blade ovate, subovate, or ovate-elliptic, 1.2–2.5 × 1.3–2 cm, abaxially gray-white, densely and thickly tomentose, with sessile glands beneath indumentum, adaxially green, glabrous, with sessile glands, pinnately 3–5-paired, base truncate or subtruncate. Leaves below synflorescence similar, but smaller. Synflorescence a terminal flat-topped panicle, 1–5 cm in diam.; synflorescence branches and peduncles white tomentose. Capitula many. Involucres campanulate, ca. 3.5 mm in diam.; phyllaries in 4 rows, straw-colored, glossy, abaxially glabrous, scarious margin hyaline, apex obtuse or rounded, outer ones elliptic, ca. 1 mm, middle and inner ones elliptic to obovate-elliptic, ca. 3 mm. Florets yellow; marginal female florets 5 or 6, corolla narrowly tubular, minutely 3-denticulate; disk florets many, corolla tubular. Achenes ca. 0.6 mm. Fl. and fr. Jul.

• Roadsides; 600–700 m. Gansu, Sichuan.

29. Ajania achilleoides (Turczaninow) Poljakov ex Grubov, Novosti Sist. Vyssh. Rast. 9: 926. 1972.

蓍状亚菊 shi zhuang ya ju

Artemisia achilleoides Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 195. 1832; *Chrysanthemum achilleoides* (Turczaninow) Handel-Mazzetti; *Tanacetum achilleoides* (Turczaninow) Candolle.

Subshrubs, 10–20 cm tall. Old branches short. Flowering branches appressed pubescent, especially in upper part. Middle stem leaves: petiole 2–3 mm; leaf blade ovate or cuneate, 1–1.5 × 0.5–1 cm, both surfaces white or gray-white, densely appressed pubescent, 2-pinnatisect; primary lateral segments 2-paired; ultimate segments linear or linear-elliptic. Proximal and distal leaves gradually smaller. Synflorescence a terminal flat-topped panicle, ca. 2 cm in diam. Capitula few to many. Involucres campanulate, ca. 3 mm in diam.; phyllaries in 4 rows, glossy, straw-colored, scarious margin hyaline, apex obtuse or rounded, outer ones elliptic-lanceolate, ca. 2 mm, abaxially puberulent, middle and inner ones ovate to lanceolate, ca. 2.5 mm, middle ones puberulent abaxially, inner ones glabrous abaxially. Florets yellow, exterior with sessile glands; marginal female florets 6, corolla narrowly tubular, ca. 2 mm, apex acutely 4-denticulate; disk florets: corolla tubular, ca. 2.2 mm. Achenes ca. 1 mm. Fl. and fr. Aug–Sep.

Desert steppes, steppes; ca. 200 m. Nei Mongol [Mongolia].

30. Ajania nitida C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 15. 1980.

光苞亚菊 guang bao ya ju

Chrysanthemum nitidum (C. Shih) H. Ohashi & Yonekura.

Herbs, perennial, ca. 30 cm tall. Stems erect, upper parts inflorescence-branched, pubescent. Middle stem leaves sessile, with divided pseudostipules; leaf blade ovate or oblanceolate, 1–1.5 × 0.3–0.6 cm, both surfaces gray-white, densely pubescent, bipalmate-pinnately 3–5-sect; primary lateral segments 1- or 2-paired; ultimate segments elliptic or triangular; leaves below synflorescence small, 3-sect or undivided. Synflorescence a terminal compound lax flat-topped panicle. Capitula many. Involucres campanulate, 3–4 mm in diam.; phyllaries in 4 rows, straw-colored, glossy, scarious margin hyaline, outer ones lanceolate, ca. 1 mm, sparsely pubescent, middle and inner ones ovate, elliptic, or ovate-elliptic, 2–2.7 mm, abaxially glabrous. Florets yellow; marginal female florets 8, corolla narrowly tubular, apex 3- or 4-denticulate; disk florets many, corolla tubular. Fl. Sep.

• Dry mountain slopes; ca. 3900 m. Sichuan.

31. Ajania fruticulosa (Ledebour) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 428. 1955.

灌木亚菊 guan mu ya ju

Tanacetum fruticulosum Ledebour, Icon. Pl. 1: 10. 1829; *Chrysanthemum aureoglobosum* (W. W. Smith & Farrer) Handel-Mazzetti; *C. neofruticulosum* Y. Ling; *T. aureoglobosum* W. W. Smith & Farrer.

Subshrubs, 8–40 cm tall. Old branches straw-colored. Flowering branches gray-white or gray-green, densely or sparsely pubescent. Middle stem leaves petiolate, with entire pseudostipules; leaf blade orbicular, triangular-ovate, reniform, or broadly ovate, 0.5–3 × 1–2.5 cm, both surfaces gray-white or

pale green, densely pubescent, bipalmately 3–5-sect or bipalmate, pinnately 3–5-sect; primary lateral segments 1- or 2-paired; ultimate segments linear-subulate, broadly linear, or narrowly oblanceolate. Lower and upper leaves narrowly oblanceolate, gradually smaller, palmately 3–5-sect. Synflorescence a terminal flat-topped panicle. Capitula few to many. Involucres campanulate, 3–4 mm in diam.; phyllaries in 4 rows, straw-colored, glossy, scarious margin hyaline, rarely brown, apex obtuse or rounded, outer ones ovate or lanceolate, ca. 1 mm, abaxially sparsely pubescent, middle and inner ones elliptic, 2–3 mm, abaxially glabrous. Florets yellow, exterior with sessile glands; marginal female florets 5–8, corolla narrowly tubular, ca. 2 mm, apex 3(–5)-denticulate; disk florets many, corolla tubular, 2–3 mm. Achenes 1.2–1.5 mm. Fl. and fr. Jun–Oct.

Deserts, desert steppes; 500–4400 m. Gansu, Jiangsu, Nei Mongol, Qinghai, Shaanxi, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia, Turkmenistan].

32. Ajania nematoloba (Handel-Mazzetti) Y. Ling & C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 16. 1980.

丝裂亚菊 si lie ya ju

Chrysanthemum nematolobum Handel-Mazzetti, Acta Horti Gothob. 12: 271. 1938.

Subshrubs, ca. 30 cm tall. Old branches short; young branches pale purple or pale green, glabrous. Lower and middle stem leaves sessile; leaf blade broadly ovate or cuneate, 1–2 × 1–4 cm, both surfaces green or pale green, glabrous or very sparsely puberulent, biternately palmatisect or palmate-pinnatisect; primary lateral segments 1-paired; ultimate segments filiform. Upper leaves small, 3–5-sect. Synflorescence a terminal flat-topped panicle. Capitula few to many. Involucres campanulate, 2.5–3 mm in diam.; phyllaries in 4 rows, straw-colored, glossy, abaxially glabrous, scarious margin hyaline, outer ones ovate, ca. 1 mm, middle and inner ones broadly obovate, 2.5–3 mm. Florets yellow; marginal female florets 5, corolla narrowly tubular, ca. 1.5 mm, apex laterally acutely 2-denticulate; disk florets: corolla tubular, ca. 2 mm. Achenes nearly 1 mm. Fl. and fr. Sep–Oct.

• Mountain slopes; 1700–2300 m. Gansu, Nei Mongol, Qinghai.

33. Ajania pallasiana (Fischer ex Besser) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 420. 1955.

亚菊 ya ju

Artemisia pallasiana Fischer ex Besser, Tent. Abrot. 61. 1832; *Chrysanthemum pallasianum* (Fischer ex Besser) Komarov; *Pyrethrum pallasianum* (Fischer ex Besser) Maximowicz; *Tanacetum pallasianum* (Fischer ex Besser) Trautvetter & C. A. Meyer.

Herbs, perennial, 30–60 cm tall. Stems erect, solitary or fascicled, shortly branched, appressed pubescent, especially on upper parts including peduncles. Basal and lower stem leaves withered at anthesis. Middle stem leaves with petiole 0.5–1 cm; leaf blade ovate, narrowly elliptic, or rhomboid, 2–4 × 1–2.5 cm, abaxially white or gray-white, appressed densely and thickly pubescent, adaxially green, glabrous, bipalmate or bipalmate-pinnately 3–5-sect; primary lateral segments 1- or 2-paired; ultimate segments linear or linear-lanceolate. Upper stem leaves similar, progressively smaller. Synflorescence a terminal compound flat-topped panicle, 3–5 cm in diam. Capitula few to many. Involucres broadly campanulate, 6–7 mm in diam.; phyllaries in 4 rows, straw-colored, glossy, abaxially glabrous, outer ones narrowly elliptic, 2.5–3 mm, apex with rounded waxy hyaline appendage, middle and inner ones long ovate, ca. 4 mm. Florets yellow, exterior with sessile glands; marginal female florets ca. 3, corolla tubular, ca. 3.5 mm, apex 5-denticulate; disk florets many, corolla tubular, ca. 3.5 mm, apex 5-lobed. Achenes ca. 1.8 mm. Fl. and fr. Aug–Sep. $2n = 36$.

Thickets, mountain slopes; 200–2900 m. Gansu, Heilongjiang, Jilin, Liaoning, Shaanxi [Korea, Mongolia, Russia].

34. Ajania fastigiata (C. Winkler) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 428. 1955.

新疆亚菊 xin jiang ya ju

Artemisia fastigiata C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 373. 1891; *Chrysanthemum fastigiatum* (C. Winkler) H. Ohashi & Yonekura.

Herbs, perennial, 30–90 cm tall. Stems erect, solitary or fascicled, branched or shortly branched from middle or above, pubescent. Lower stem leaves withered at anthesis. Middle stem leaves: petiole ca. 1 cm, leaf blade broadly triangular-ovate, 3–4 × 2–3 cm, both surfaces gray-white, densely appressed pubescent, 2-pinnatisect; primary lateral segments 2- or 3-paired; ultimate segments narrowly elliptic or oblanceolate. Upper stem leaves similar, progressively smaller. Synflorescence a terminal flat-topped panicle. Capitula many. Involucres campanulate, 2.5–4 mm in diam.; phyllaries in 4 rows, abaxially glabrous, scarious margin hyaline, apex obtuse, outer ones linear, 2.5–3.5 mm, middle and inner ones elliptic or oblanceolate, 3–4 mm. Florets yellow; marginal female florets 8, corolla narrowly tubular, ca. 1.5 mm, apex 3-denticulate; disk florets many, corolla tubular, 1.8–2.5 mm. Achenes 1–1.5 mm. Fl. and fr. Aug–Oct.

Steppes, semideserts, forest understories; 900–2300 m. Xinjiang [Afghanistan, Kazakhstan].

35. Ajania gracilis (J. D. Hooker & Thomson) Poljakov in Schischkin & Bobrov, Fl. URSS 26: 407. 1961.

纤细亚菊 xian xi ya ju

Tanacetum gracile J. D. Hooker & Thomson in J. D. Hooker, Fl. Brit. India 3: 318. 1881; *Chrysanthemum gracile* (J. D. Hooker & Thomson) B. Fedtschenko (1915), not (Schultz Bipontinus) Masferrer y Arquimbau (1881); *C. hookeri* Kitamura.

Subshrubs, 15–45(–60) cm tall, with thick woody root. Stems strongly branched at base and woody for much of length, densely grayish pubescent, hairs adpressed, bifid. Lower stem leaves withered at anthesis. Middle stem leaves 2–3 cm; petiole rather long, wingless, base sometimes with linear pseudostipules; leaf blade rounded triangular, ca. 2.5 cm wide, both surfaces gray-green, appressed pubescent, twice ternately divi-

ded; ultimate segments oblong to linear, to 1.5 mm wide. Upper stem leaves reduced, subsessile, 3–5-lobed. Synflorescence a terminal flat-topped panicle. Capitula 20–60. Involucres 2.5–3 mm in diam.; phyllaries herbaceous, abaxially subglabrous, scarious margin broad, light or brown, apex broadened, middle and inner phyllaries 2–3 × as long as outer, to 4 mm. Florets 15–25, corolla tubular; marginal female florets few; disk florets: corolla 1.5–2 mm. Achenes 1.2–1.5 mm.

Stony slopes; above 3000 m. Ningxia, Xizang [Kyrgyzstan, Tajikistan (Pamirs)].

148. AJANIOPSIS C. Shih, Acta Phytotax. Sin. 16(2): 86. 1978.

画笔菊属 hua bi ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, annual. Leaves alternate, biternately pinnatisect, 2-pinnatisect, or trisect. Synflorescences cymose; capitula many or few, in ± flat-topped panicles, rather small, heterogamous, disciform. Involucres obovoid, 4–5 mm in diam.; phyllaries in 2 rows. Receptacle convex, epaleate. Marginal florets in 1 row, female; corolla pitcher-shaped, tapering above; limb yellow, apex minutely 2-toothed, apically pilose with straight erect hairs. Disk florets many, bisexual; corolla tubular, apex 5-lobed. Anther bases obtuse; apical appendage subtriangular. Style branches truncate at apex. Achenes obovoid, 5- or 6-ribbed. Pappus absent.

• One species: China.

1. Ajaniopsis penicilliformis C. Shih, Acta Phytotax. Sin. 16(2): 87. 1978.

画笔菊 hua bi ju

Plants 5–10 cm tall. Stems few branched from base, branches prostrate in lower part, upper part ascending, white villous. Middle stem leaves: petiole ca. 0.5 mm; leaf blade broadly cuneate or suborbicular, 0.5–0.7 × ca. 1 cm, both surfaces densely villous, biternately pinnatisect or 2-pinnatisect; primary lateral segments 1-paired; ultimate segments linear or broadly linear, apex acute. Proximal and distal leaves small. Synflorescence a flat-topped terminal panicle. Capitula many or few. Involucres obovoid, 4–5 mm in diam.; phyllaries in 2 rows, abaxially densely villous, scarious margin dark, outer ones elliptic, 3–3.5 mm, inner ones spatulate or oblanceolate, ca. 3 mm. Florets yellow, apically pilose with erect straight hairs; marginal female florets 7 or 8, corolla ascidiform, ca. 2 mm, tapering above; disk florets 12, corolla tubular, ca. 2.5 mm. Achenes obovoid, ca. 1.8 mm, 5- or 6-ribbed. Pappus absent. Fl. and fr. Sep.

• Steep slopes; 4600–5000 m. Xizang (Nanmulin).

149. BRACHANTHEMUM Candolle, Prodr. 6: 44. 1838.

短舌菊属 duan she ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Subshrubs, ± procumbent, woody at base, pubescent with basifixed, medifixed, or stellate hairs. Leaves alternate or subopposite, few lobed. Synflorescences cymose; capitula solitary or in ± flat-topped cymes or panicles, heterogamous, radiate, rarely homogamous and discoid. Involucres campanulate, hemispheric, or obconical; phyllaries in 4 or 5 rows, rigidly herbaceous, scarious margin white or brown. Receptacle flat or convex to conical, epaleate. Marginal florets female, fertile, rarely absent; lamina yellow, rarely white. Disk florets yellow, bisexual; corolla tubular, apex 5-lobed. Anther bases obtuse; apical appendage lanceolate. Style branches linear, apex truncate. Achenes terete, 5-striate. Corona absent.

Ten species: C Asia, China, Mongolia; six species (one endemic) in China.

1a. Capitula homogamous, ray florets absent; phyllaries abaxially prominently gland-dotted ..... 6. *B. gobicum*
1b. Capitula heterogamous, ray florets present; phyllaries abaxially not or only obscurely gland-dotted.
2a. Plants with appressed stellate hairs ..... 5. *B. pulvinatum*
2b. Plants with simple or medifixed hairs.
3a. Most leaves palmately 3(–5)-lobed.
4a. Leaves sessile or subsessile, leaf blade obliquely elliptic or suborbicular, ca. 0.6 × 0.5 cm; achenes ca. 2.8 mm ..... 1. *B. mongolicum*
4b. Leaves rather long petiolate, leaf blade almost orbicular, to 1.5(–2) × ca. 1.5 cm including petiole; achenes 1.8–2.2 mm ..... 2. *B. fruticulosum*
3b. Most leaves pinnately 4–7-lobed, uppermost leaves sometimes palmately 3-lobed.
5a. Capitula (1–)3–15(–20), 2–4 crowded at apex, remainder on long divergent peduncles ..... 3. *B. titovii*
5b. Capitula 1(–5) on long erect peduncles ..... 4. *B. kirghisorum*

1. Brachanthemum mongolicum Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 11: 196. 1949.

蒙古短舌菊 meng gu duan she ju

Subshrubs, 5–20 cm tall; indumentum of simple or bifurcate hairs. Old branches gray, twisted; young branches appressed pubescent. Leaves sessile or subsessile, leaf blade obliquely elliptic or suborbicular, ca. 0.6 × 0.5 cm, grayish green or green, appressed pubescent, glabrescent, palmate-pinnate, 3–5-divided; segments linear-subulate. Uppermost stem leaves entire. Synflorescence an irregular flat-topped cyme. Capitula 3 or 4. Involucres obconical or campanulate, 4–6 mm in diam.; phyllaries in 4 rows, outer ones ovate, ca. 2.5 mm, scarious margin brownish, middle ones elliptic, ca. 6 mm, inner ones oblanceolate, ca. 5 mm. Ray florets ca. 8; lamina yellow, apex minutely 2-denticulate. Achenes ca. 2.8 mm. Fl. and fr. Aug.

Gobi Desert. Gansu, Xinjiang [Mongolia].

2. Brachanthemum fruticulosum Candolle, Prodr. 6: 45. 1838.

灌木短舌菊 guan mu duan she ju

Subshrubs, 5–20 cm tall; indumentum of simple or bifurcate hairs. Stems many from base, ascending or erect, woody for most of length, branched mainly above middle; young branches finely appressed, grayish tomentose. Petiole rather long, thickened at base; leaf blade almost orbicular, to 1.5(–2) × ca. 1.5 cm including petiole, grayish green, finely tomentose, inconspicuously gland-dotted, palmately 3-partite, sometimes a few pinnately 4- or 5-partite, segments linear-subulate, apices cuspidate; uppermost leaves entire, linear. Synflorescence a lax irregular flat-topped cyme. Capitula (1–)3–15(–20). Involucres cup-shaped, 4.5–6 × 5–6 mm; outer phyllaries 1/3–2/5 as long as inner, margin membranous, light colored or pale brown, inner phyllaries with much wider margin. Ray florets (3 or)4–10(–12); lamina yellowish white, broadly ovate, 2.2–3 mm. Disk florets 2–3 mm. Achenes 1.8–2.2 mm.

Stony slopes. Xinjiang [Kazakhstan].

3. Brachanthemum titovii Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 11: 196. 1949.

无毛短舌菊 wu mao duan she ju

Subshrubs, 10–35 cm tall; indumentum of simple or bifurcate hairs. Stems several from base, woody for most of length, branched mainly above middle; young branches finely appressed, grayish tomentose. Petiole rather long, thickened at base; leaf blade broadly ovate in outline, 2–2.5 × ca. 1.5 cm including petiole, grayish green, finely tomentose, inconspicuously gland-dotted, pinnatisect, segments (1 or)2 or 3(or 4) each side, subulate, apices cuspidate; upper stem leaves palmately 3-lobed, uppermost leaf entire. Synflorescence an irregular flat-topped panicle. Capitula (1–)3–10(–18), 2–4 in dense apical cluster and remainder on long peduncles. Involucres cup-shaped, 4.5–6 × 4–5 mm; outer phyllaries 1/3–2/5 as long as inner, margin membranous, rather broad, light colored or pale brown. Ray florets 1–8; lamina yellowish white, broadly ovate, 2.2–3 mm. Disk florets 2–3 mm. Achenes 2–2.5 mm.

Stony slopes, particularly on red conglomerates. Xinjiang (Tian Shan) [Kazakhstan].

4. Brachanthemum kirghisorum Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 171. 1946.

吉尔吉斯短舌菊 ji er ji si duan she ju

Subshrubs, 5–25 cm tall; indumentum of simple or bifurcate hairs. Stems many from base, woody for most of length, simple or with 1–5 long lateral branches; young branches finely appressed, grayish tomentose. Petiole rather long, thickened at base; leaf blade broadly ovate in outline, 2–2.5 × ca. 1.5 cm including petiole, grayish green, finely tomentose, inconspicuously gland-dotted, pinnatisect, segments (1 or)2 or 3(or 4) each side, subulate, apices cuspidate; upper stem leaves palmately 3-lobed, uppermost leaf entire. Capitula solitary, less often up to 5 per stem on long erect peduncles. Involucres cup-shaped, 4.5–6.5 × 5–7 mm; outer phyllaries 1/3–2/5 as long as inner, margin membranous, rather broad. Ray florets 5–12(–15); lamina ?yellowish white, broadly ovate, 2.2–3 mm. Disk florets 2–3 mm. Achenes 1.8–2.4 mm.

Stony slopes; above 1000 m. Xinjiang (Tian Shan) [Kazakhstan].

5. Brachanthemum pulvinatum (Handel-Mazzetti) C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 1. 1980.

星毛短舌菊 xing mao duan she ju

Chrysanthemum pulvinatum Handel-Mazzetti, Acta Horti Gothob. 12: 263. 1938; *Brachanthemum nanschanicum* Krascheninnikov.

Subshrubs, 15–45 cm tall; indumentum of stellate hairs. Old branches gray, twisted; young branches brownish, densely and appressed white powdery-puberulent. Petiole to 8 mm; leaf blade cuneate, elliptic, or suborbicular, 0.5–1 × 0.4–0.6 cm, gray-green, appressed powdery-puberulent, glabrescent, palmate-pinnately or pinnately 4- or 5-divided; segments linear; leaves below synflorescence 3-lobed. Synflorescence terminal, a solitary capitulum or irregular flat-topped cyme. Capitula apically solitary or 3–8; peduncles 2.5–7 cm. Involucres hemispheric or obconical, 6–8 mm in diam.; phyllaries in 4 rows, outer ones ovate or broadly ovate, ca. 2.5 mm, abaxially densely appressed powdery-puberulent, scarious margin brown, middle ones elliptic, 4–4.5 mm, abaxially densely and appressed powdery-puberulent, inner ones linear-oblanceolate, ca. 4 mm, abaxially glabrescent. Ray florets 5–15; lamina yellow, elliptic, apex minutely 2-denticulate. Achenes ca. 2 mm. Fl. and fr. Jul–Sep.

• Mountain slopes, Gobi Desert; 1200–3200 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang.

Filatova (Rast. Tsentral. Azii 14a: 38. 2007) divided this species between two species: *Brachanthemum pulvinatum* with ovate ray floret lamina and smooth phyllary margins and *B. nanschanicum* with narrower, oblong ray floret lamina and lacerate-undulate phyllary margins.

6. Brachanthemum gobicum Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 177. 1933.

戈壁短舌菊 ge bi duan she ju

Subshrubs, (15–)40–80 cm tall; indumentum "glandular pubescent." Stems few from base, much branched, woody for most of length, bark yellowish white, branching slightly divaricate, sometimes ± spine-tipped, glabrescent. Petiole rather long; leaf blade spatulate to cuneate, 1–2 cm including petiole, pinnatifid, segments 1–3 each side, narrowly triangular, puberulent or subglabrous, with sunken glands; condensed lateral shoots with linear leaves sometimes present; uppermost leaves linear, entire. Capitula solitary or few in ill-defined cyme, on long slender peduncles. Involucre narrowly campanulate, 8–10 × 4–6 mm; phyllaries convex, abaxially ± densely puberulent and prominently gland-dotted, margin white scarious, apex rounded, outer ones obovate, inner ones lanceolate. Ray florets absent. Disk florets tubular, bisexual, corolla with lower part greenish, sparsely pilose and glandular, upper part yellow. Achenes ca. 2 mm, 3-ribbed.

Nei Mongol [Mongolia].

Brachanthemum gobicum is used for livestock fodder and medicinally in Mongolia where it has been listed as "very rare" under Mongolian Law on Natural Plants (Biodiversity Conservation Action Plan; http://www.cbd.int/doc/world/mn/mn-nbsap-01-p6-en.pdf; accessed 23 Nov 2010). The material from Nei Mongol seems to be significantly larger than the 15–20 cm tall plant described in the protologue; it also appears to have more divaricate, apparently somewhat spinescent, branching. The homogamous capitula suggest that the generic placement of this species deserves closer examination.

150. CHRYSANTHEMUM Linnaeus, Sp. Pl. 2: 887. 1753, nom. cons.

菊属 ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Arctanthemum (Tzvelev) Tzvelev; *Dendranthema* (Candolle) Des Moulins; *Dendranthema* sect. *Arctanthemum* Tzvelev; *Pyrethrum* sect. *Dendranthema* Candolle.

Subshrubs or perennial herbs; indumentum absent or of basifixed or medifixed hairs. Leaves alternate, pinnately or palmately divided, serrate, or rarely entire. Synflorescence a lax irregular terminal cyme, often reduced to solitary capitulum. Capitula heterogamous, radiate, laxly corymbose or solitary. Involucres cup-shaped, rarely campanulate; phyllaries in 4 or 5 rows, scarious margin white, brown, or dark brown, or outer and middle ones herbaceous and pinnatilobed or pinnatifid. Receptacle convex to conical, epaleate. Ray florets female, fertile, in 1 or many rows (in cultivars); lamina yellow, white, or red. Disk florets many, bisexual, fertile; corolla yellow, tubular, 5-lobed. Anther obtuse at base; apical appendage lanceolate-ovate or narrowly elliptic. Achenes subterete or obovoid, faintly 5–8-ribbed. Pappus absent.

Thirty-seven species: mostly in temperate Asia; 22 species (13 endemic) in China.

The florists' chrysanthemum, 菊花 (ju hua), is an enormous hybrid complex developed over many centuries (a Chinese account published in 1630 listed over 500 cultivars) into the huge array of ornamental cultivars available today. The primary parental species is *Chrysanthemum indicum*, but the other parentage is now obscure. More recent hardier "Korean chrysanthemums" include *C. zawadskii* in their parentage. This complex is most widely known as *"C. grandiflorum"* (Broussonet, Elench. Horti Bot. Monspel. 15. 1805, supposedly based on *Anthemis grandiflora* Ramatuelle, J. Hist. Nat. 2: 233. 1792), but Broussonet's name is a nomen nudum with no reference to Ramatuelle's name; and, even if it were validly published, it would be a later homonym of *C. grandiflorum* (Desfontaines) Dumont de Courset (Bot. Cult. 2: 467. 1802). The most common alternative name is *C. morifolium* Ramatuelle (loc. cit.: 240), but this is of uncertain status and identity. Further work is therefore needed to establish the most acceptable scientific name for the complex. As is to be expected for such an important horticultural plant, there is an extensive synonymy, including: *A. apiifolia* R. Brown, *A. artemisiifolia* Willdenow, *A. stipulacea* Moench, *C. hortorum* L. H. Bailey, ?*C. morifolium* var. *gracile* Hemsley, *C. sinense* Sabine, *C. sinense* var. *hortense* Makino ex Matsumura, *C. stipulaceum* (Moench) W. Wight, *Dendranthema grandiflorum* (Ramatuelle) Kitamura, *D. morifolium* (Ramatuelle) Tzvelev, *D. sinense* (Sabine) Des Moulins, and *Matricaria morifolia* Ramatuelle.

1a. Outer and sometimes middle phyllaries herbaceous, pinnatilobed or pinnatifid.
2a. Leaves undivided or lyrate-pinnatisect, abaxially grayish white, appressed and thickly villous ..... 20. *C. argyrophyllum*
2b. Middle and proximal stem leaves bipinnate- or bipalmate-pinnately divided, abaxially green, glabrous or nearly so ..... 21. *C. mongolicum*
1b. Phyllaries with white, brown, or dark scarious margins.
3a. Capitula 0.5–1 cm in diam.; ray floret lamina 1–3 mm.
4a. Leaves 2-pinnatisect; capitula many, in dense flat-topped synflorescence ..... 18. *C. glabriusculum*
4b. Leaves pinnatisect; capitula 1–3 ..... 19. *C. dichroum*
3b. Capitula 1.5–5 cm in diam., rarely smaller; ray floret lamina (1–)5 mm or more.
5a. Leaf blade bipalmate, bipalmate-pinnatifid, bipinnatifid, or biternate-pinnatisect.
6a. Ray florets white, pink, or purple-red.
7a. Leaves bipalmate, bipalmate-pinnately divided, or biternate-pinnatisect; capitula solitary, rarely 2–5 ..... 10. *C. oreastrum*
7b. Leaves bipinnatifid; capitula many, in lax cymes, rarely solitary.
8a. Primary lobes of leaf blade pinnatilobed or pinnatifid, ultimate lobes triangular or obliquely triangular, ca. 3 mm wide ..... 16. *C. zawadskii*
8b. Primary lobes of leaf blade pinnatisect or subpinnatisect, ultimate lobes linear or narrowly linear-lanceolate, 1–2 mm wide ..... 17. *C. maximowiczii*

6b. Ray florets yellow or apricot-colored.
9a. Capitula solitary, terminal; outer phyllaries 5–7 mm.
10a. Leaves bipalmate, bipalmate-pinnately divided, or biternate-pinnatisect; stems unbranched ..... 9. *C. hypargyreum*
10b. Leaves 1- or 2-pinnatipartite; stems laxly branched above middle.
11a. Capitula 1–1.5 cm in diam., subtending bracts elliptic, 5–7 × 3–4 mm, margins coarsely toothed ..... 14. *C. foliaceum*
11b. Capitula 2.4–3 cm in diam., subtending bracts linear, 20–25 × 2–5 mm, entire ..... 15. *C. longibracteatum*
9b. Capitula several to many, ± cymose; outer phyllaries 2.5–4 mm.
12a. Leaves on both surfaces densely or sparsely pubescent ..... 11. *C. lavandulifolium*
12b. Leaves adaxially green, sparsely pubescent or glabrescent, abaxially gray-white, densely and thickly pubescent.
13a. Outer phyllaries linear or linear-oblanceolate, apex rounded scarious-ampliate, densely pubescent abaxially ..... 12. *C. potentilloides*
13b. Outer phyllaries ovate or long ovate, apex not rounded scarious-ampliate, sparsely hairy only at base or adaxially ..... 13. *C. arisanense*
5b. Leaf blade repand-remotely dentate, 1-toothed on each side, or entire, shallowly pinnatifid, or palmately to pinnately 3–7-divided.
14a. Ray florets yellow ..... 3. *C. indicum*
14b. Ray florets white, pink, or purple.
15a. Ray florets purple; leaf blade ca. 1.5 × 1 cm, shallowly pinnatifid, lateral segments often 2-paired ..... 22. *C. parvifolium*
15b. Ray florets white or pink, rarely purple; leaf blade not as above.
16a. Leaf blade repand-remotely dentate, 1-toothed on each side, or entire, densely and thickly pubescent abaxially.
17a. Leaves 3.5–7 × 2–4 cm, margin repand-dentate ..... 1. *C. vestitum*
17b. Leaves 1–1.4 × 0.7–1.5 cm, entire or 1-toothed on each side ..... 2. *C. rhombifolium*
16b. Leaf blade palmately or pinnately 3–7-divided or palmate-pinnately 3–7-divided.
18a. Rhizome thick and fleshy; achenes not slippery when wet ..... 6. *C. arcticum*
18b. Rhizome not fleshy; achenes slippery when wet.
19a. Capitula 3 or more in irregular cymes (mainland).
20a. Leaf blade reniform, suborbicular, or broadly ovate, base somewhat cordate or truncate ..... 4. *C. chanetii*
20b. Leaf blade elliptic, narrowly elliptic, or ovate, base cuneate or broadly cuneate ..... 5. *C. naktongense*
19b. Capitula solitary, on peduncles to 20 cm (Taiwan).
21a. Plants erect; leaf blade pinnately lobed, lobes crenate or dentate; ray floret lamina ca. 6 mm ..... 7. *C. horaimontanum*
21b. Plants ascending; leaf blade palmately 3- or 5-lobed, lobes subentire; ray floret lamina ca. 15 mm ..... 8. *C. morii*

1. Chrysanthemum vestitum (Hemsley) Stapf, Bot. Mag. 156: t. 9330. 1933.

毛华菊 mao hua ju

Herbs, perennial, ca. 60 cm tall, with procumbent rhizomes. Stems erect, long robust-branched in upper part or shortly corymbosely branched at apex, or spreading, densely and thickly pubescent or becoming sparsely pubescent. Lower stem leaves withered at anthesis. Middle stem leaves: petiole 0.5–1 cm; leaf blade ovate, broadly ovate, ovate-lanceolate, suborbicular, or spatulate, 3.5–7 × 2–4 cm, grayish green, abaxially densely and thickly appressed pubescent, adaxially sparsely pubescent, grayish white, margin above middle obtusely repand-dentate, rarely obtusely 2- or 3-lobed, cuneate toward base. Distal stem leaves sessile or subsessile, similar, simple. Synflorescence a lax flat-topped cyme. Capitula 3–13, 2–5 cm in diam. Involucres cup-shaped, 1–1.5 cm in diam.; phyllaries in 4 rows, abaxially densely pubescent, scarious margin brown, outer ones triangular or triangular-ovate, 3.5–4.5 mm, middle ones lanceolate-ovate, ca. 6.5 mm, inner ones obovate or oblanceolate-elliptic, 6–7 mm. Ray floret lamina white, 1.2–2 cm. Achenes ca. 1.5 mm. Fl. and fr. Aug. $2n = 54$*.

• Low mountain slopes, hills, shaded slopes, streamsides; 300–1500 m. Anhui, Henan, Hubei, Shaanxi.

1a. Stems erect; capitula 2–3 cm in diam. ..... 1a. var. *vestitum*
1b. Stems sprawling; capitula 4.5–5 cm in diam. ..... 1b. var. *latifolium*

1a. Chrysanthemum vestitum var. **vestitum**

毛华菊(原变种) mao hua ju (yuan bian zhong)

Chrysanthemum sinense Sabine var. *vestitum* Hemsley, J. Linn. Soc., Bot. 23: 439. 1888; *Dendranthema vestitum* (Hemsley) Y. Ling.

Stems erect, robust. Middle stem leaf blades ovate, broadly ovate, ovate-lanceolate, suborbicular, or spatulate, 3.5–7 × 2–4 cm. Capitula 2–3 cm in diam.

• Low mountain slopes, hills; 300–1500 m. Anhui, Henan, Hubei, Shaanxi.

1b. Chrysanthemum vestitum var. **latifolium** J. Zhou & Jun Y. Chen, Bull. Bot. Res., Harbin 30: 649. 2010.

阔叶毛华菊 kuo ye mao hua ju

Stems sprawling. Middle stem leaf blades orbicular or ovate-orbicular, 4–7 × 3–5 cm. Capitula 4.5–5 cm in diam.

• Shaded slopes, streamsides; ca. 1500 m. Anhui, ?Henan.

2. Chrysanthemum rhombifolium (Y. Ling & C. Shih) H. Ohashi & Yonekura, J. Jap. Bot. 79: 190. 2004.

菱叶菊 ling ye ju

Dendranthema rhombifolium Y. Ling & C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 2. 1980.

Subshrubs, ca. 1.5 m tall. Stems and branches densely white pubescent. Petiole ca. 5 mm; leaf blade rhomboid, 1–1.4 × 0.7–1.5 cm, abaxially white or grayish white, densely and thickly appressed pubescent, adaxially pale green or grayish green, sparsely pubescent, base cuneate, obtusely 1-triangular-dentate or obtusely shallowly lobed on each side. Leaves near synflorescence elliptic, ovate, or broadly linear, ca. 1 × 0.5–0.6 cm. Synflorescence a lax terminal cyme. Capitula few. Involucres cup-shaped, ca. 1 cm in diam.; phyllaries in 4 rows, scarious margin white or brown, outer ones linear or linear-lanceolate, 3–4 mm, adaxially densely pubescent, middle and inner ones elliptic, 4–5 mm, middle ones densely pubescent abaxially, inner ones glabrescent abaxially. Ray floret lamina white, ca. 8 mm, apex 3-denticulate. Achene ca. 1 mm. Fl. and fr. Oct.

• Mountain slopes. NE Chongqing (Wushan).

3. Chrysanthemum indicum Linnaeus, Sp. Pl. 2: 889. 1753.

野菊 ye ju

Chrysanthemum indicum var. *coreanum* H. Léveillé; *C. indicum* var. *edule* Kitamura; *C. indicum* var. *hibernum* Makino; *C. indicum* var. *litorale* Y. Ling; *C. indicum* var. *lushanense* (Kitamura) Handel-Mazzetti; *C. lushanense* Kitamura; *C. nankingense* Handel-Mazzetti; *C. procumbens* Loureiro; *C. sabinii* Lindley; *Dendranthema indicum* (Linnaeus) Des Moulins; *D. indicum* var. *huludaoense* G. Y. Zhang, L. J. Yu & Y. J. Liu; *D. nankingense* (Handel-Mazzetti) X. D. Cui; *Matricaria indica* (Linnaeus) Desrousseaux; *Pyrethrum indicum* (Linnaeus) Cassini (1826), not Sims (1813); *Tanacetum indicum* (Linnaeus) Schultz Bipontinus.

Herbs, perennial, 0.25–1 m tall, with long or short procumbent rhizomes. Stems erect or diffuse, branched, sparsely pilose. Lower leaves withered at anthesis. Middle stem leaves: petiole 1–2 cm; leaf blade ovate, long ovate, or elliptic-ovate, 3–7(–10) × 2–4(–7) cm, both surfaces pale green or olive, sparsely pubescent or less densely so abaxially, pinnatifid, pinnatilobed, or inconspicuously divided, base truncate, somewhat cordate or broadly cuneate. Synflorescence a lax terminal flat-topped cyme. Capitula many or few. Phyllaries in 5 rows, scarious margin broad, white or brown, apex obtuse or rounded, outer ones ovate or ovate-triangular, 2.5–3 mm, middle ones ovate, 6–8 mm, inner ones narrowly elliptic, ca. 1.1 cm. Ray floret lamina yellow, 1–1.3 cm, apex entire or 3-denticulate. Achenes 1.5–1.8 mm. Fl. and fr. Jun–Nov. $2n = 18$, 35–38, 36*, 40, 54.

Grasslands on mountain slopes, thickets, wet places by rivers, fields, roadsides, saline places by seashores, under shrubs; 100–2900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Taiwan, Yunnan [Bhutan, India, Japan, Korea, Nepal, Russia, Uzbekistan].

Chrysanthemum indicum is one of the main parents of the florists' chrysanthemum, *"C. grandiflorum"* (see note under genus). The natural distribution within China is not clear because of confusion with cultivated plants in the *"C. grandiflorum"* complex.

4. Chrysanthemum chanetii H. Léveillé, Repert. Spec. Nov. Regni Veg. 9: 450. 1911.

小红菊 xiao hong ju

Chrysanthemum erubescens Stapf; *C. maximoviczianum* Y. Ling; *C. maximoviczianum* var. *aristatomucronatum* Y. Ling; *Dendranthema chanetii* (H. Léveillé) C. Shih; *D. erubescens* (Stapf) Tzvelev.

Herbs, perennial, 15–60 cm tall, with procumbent rhizomes. Stems erect, branched from base or middle, but usually apically corymbosely branched, sparsely pubescent especially below capitula, rarely glabrous. Lower and middle stem leaves: petiole 3–5 cm; leaf blade reniform, suborbicular, or broadly ovate, 2–5 cm, ca. as long as wide, both surfaces green, sparsely pilose or glabrous, base slightly cordate or truncate, palmate or palmate-pinnate, 3–5-lobed, rarely -partite; lobe margins obtusely dentate, lateral lobes small, terminal ones large. Upper stem leaves elliptic or narrowly elliptic, narrowly elliptic or broadly linear near synflorescence. Synflorescence a terminal flat-topped cyme. Capitula 3–12. Involucres cup-shaped, 5–15 mm in diam.; phyllaries in 4 or 5 rows, outer ones broadly linear, 5–9 mm, abaxially sparsely villous, margin lacerate, apex rounded, broadly scarious, middle and inner ones 6–10 mm, oblanceolate or triangular-ovate to narrowly linear-elliptic, 6–10 mm, scarious margin white or brown. Ray floret lamina white, pink, or purple, 1.2–2.2 cm, apex 2- or 3-denticulate. Achenes ca. 2 mm. Fl. and fr. Jul–Oct. $2n = 36$*.

Grasslands, forest margins on mountain slopes, floodlands, by ditches; 300–2700 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Taiwan [Korea, Mongolia, Russia].

The identity of *Chrysanthemum sibiricum* (Candolle) Fischer ex Komarov var. *sinoalpinum* Nakai (J. Jap. Bot. 16: 75. 1940) is not clear.

5. Chrysanthemum naktongense Nakai, Bot. Mag. (Tokyo) 23: 186. 1909.

楔叶菊 xie ye ju

Chrysanthemum zawadskii Herbich subsp. *latilobum* (Maximowicz) Kitagawa; *C. zawadskii* var. *latilobum* (Maximowicz) Kitamura; *C. zawadskii* subsp. *naktongense* (Nakai) Y. N. Lee; *Dendranthema naktongense* (Nakai) Tzvelev; *D. zawadskii* (Herbich) Tzvelev var. *latilobum* (Maximowicz) Kitamura; *Leucanthemum sibiricum* Candolle var. *latilobum* Maximowicz.

Herbs, perennial, with procumbent rhizomes. Stems erect, 10–50 cm tall, branched above middle or apically shortly branched, rarely unbranched, sparsely pubescent, especially in upper part and near synflorescence or glabrescent to glabrous. Middle stem leaves long petiolate; leaf blade elliptic to narrowly elliptic or ovate, 1–3 × 1–2 cm, both surfaces glabrous or soon glabrescent, palmate-pinnately 3–7-lobed or -parted, base cuneate or broadly cuneate. Distal stem leaves obovate, oblanceolate, or narrowly oblanceolate, 3–5-divided or entire. Synflorescence a lax terminal flat-topped cyme. Capitula 2–9, 3.5–5 cm in diam. Involucres cup-shaped, 1–1.5 cm in diam.; phyllaries in 5 rows, abaxially sparsely villous or glabrescent, outer ones linear or linear-lanceolate, 4–6 mm, apex rounded, broadly scarious, middle and inner ones elliptic or narrowly elliptic, 4.5–6 mm, margin and apex white or brown scarious. Ray floret lamina white, pink, or pale purple, 1–1.5 cm, apex entire or 2-denticulate. Achenes ca. 2 mm. Fl. and fr. Jul–Aug. $2n = 36$.

Grasslands; 1400–1700 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi [Korea, Mongolia, Russia].

6. Chrysanthemum arcticum Linnaeus, Sp. Pl. 2: 889. 1753.

北极菊 bei ji ju

Arctanthemum arcticum (Linnaeus) Tzvelev; *Dendranthema arcticum* (Linnaeus) Tzvelev; *Leucanthemum arcticum* (Linnaeus) Candolle; *L. arcticum* subsp. *gmelinii* (Ledebour) Kitamura; *L. gmelinii* Ledebour.

Herbs, perennial, 10–30 cm tall, with thick, fleshy, creeping rhizome. Stems erect or nearly so, solitary or few, simple or with a few lateral branches, glabrous or arachnoid pubescent and glabrescent. Basal and lower stem leaves many; petiole long, thick; leaf blade oblong to suborbicular, 9–12 × 3–4 cm, both surfaces glabrous or subglabrous, palmately to pinnately 3–7-lobed, usually divided to less than half way, base broadly cuneate, margin coarsely toothed to entire. Distal stem leaves linear. Synflorescence with 1–5 capitula; peduncles long. Involucres 1.2–2.2 × 0.4–0.7 cm; phyllaries abaxially glabrous or sparsely arachnoid pubescent at base, scarious margin broad, blackish brown or brownish. Ray floret lamina white, 10–22 × 3–5 mm; disk florets 2.3–3 mm. Achenes 1.8–2.6 × ca. 0.5 mm.

Stony and sandy places, gravel beds, grassy patches along coasts. Hebei [Russia (Far East); W North America].

7. Chrysanthemum horaimontanum Masamune, Trans. Nat. Hist. Soc. Formosa 29: 26. 1939.

蓬莱油菊 peng lai you ju

Dendranthema horaimontanum (Masamune) S. S. Ying.

Herbs, perennial. Stems in clumps, erect, densely silvery sericeous. Stem leaves obovate in outline, 1–3 × 0.5–2 cm, abaxially densely silvery sericeous, adaxially sparsely hairy, pinnatifid or pinnatipartite. Uppermost and lowermost leaves smaller. Capitula ca. 2 cm in diam., solitary, long pedunculate. Involucres subglobose, ca. 5 × 10–13 mm; outer phyllaries 3–6 × 1–3 mm, inner ones 4–6 × 2–3 mm. Ray florets white; lamina ca. 6 × 2.5 mm; disk florets greenish yellow, ca. 2 mm.

• Rocky slopes; 1200–1400 m. Taiwan.

8. Chrysanthemum morii Hayata, Icon. Pl. Formosan. 8: 61. 1919.

森氏菊 sen shi ju

Dendranthema morii (Hayata) Kitamura.

Herbs, perennial, with creeping rhizomes. Stems ascending, few branched, densely silvery sericeous, glabrescent. Stem leaves with petiole 7–17 mm; leaf blade broadly ovate to obovate, 2.5–4 × 1.5–2.5 cm, abaxially densely silvery sericeous, adaxially green, appressed pubescent, glabrescent, palmately pinnatifid or 3-fid, segments dentate, base cuneate into petiole, margin dentate, apex acute to obtuse. Capitula 2.5–3 cm in diam., solitary, long pedunculate. Involucres subhemispheric, ca. 15 × 7–8 mm; phyllaries with margin brown, outer ones ovate to oblong, middle and inner ones broadly ovate. Ray florets white; lamina ca. 15 × 4 mm; disk florets greenish yellow, ca. 3.5 mm, 5-toothed. Achenes ca. 2 mm, 5-grooved.

• Limestone cliffs, rare; 400–2400 m. Taiwan.

9. Chrysanthemum hypargyreum Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 104. 1905.

黄花小山菊 huang hua xiao shan ju

Chrysanthemum licentianum W. C. Wu; *C. neo-oreastrum* C. C. Chang; *Dendranthema hypargyreum* (Diels) Y. Ling & C. Shih.

Herbs, perennial, 5–25 cm tall, with procumbent rhizomes. Stems erect, unbranched, sparsely pubescent or villous. Basal leaves: petiole to 2 cm; leaf blade flabelliform or broadly ovate, 0.4–1.6 × 0.8–1.6 cm, abaxially sparsely or densely pubescent, adaxially glabrescent to glabrous, 2-pinnatisect or bipalmate-pinnatisect; ultimate segments linear or broadly linear. Lower and middle stem leaves similar to basal leaves but smaller. Upper stem leaves usually pinnatisect, uppermost leaves 3-partite. Capitulum solitary, terminal, 2–3.5 cm in diam. Involucres cup-shaped, 1–2 cm in diam.; phyllaries in 4 rows, abaxially glabrous or sparsely villous, margin brown, outer ones linear or linear-lanceolate, 5–6 mm, middle and inner ones lanceolate or elliptic, 7–9 mm. Ray floret lamina yellow, 6–12 mm. Fl. Sep.

• Meadows on mountain slopes; 1400–3900 m. Shaanxi, Sichuan.

10. Chrysanthemum oreastrum Hance, J. Bot. 16: 108. 1878.

小山菊 xiao shan ju

Chrysanthemum sibiricum (Candolle) Fischer ex Komarov var. *alpinum* Nakai; *C. zawadskii* Herbich var. *alpinum* (Nakai)

Kitamura; *Dendranthema oreastrum* (Hance) Y. Ling; *D. sichotense* Tzvelev.

Herbs, perennial, 3–45 cm tall, with procumbent rhizomes. Stems erect, solitary, unbranched or rarely shortly 1- or 2-branched, densely villous or pubescent, lower parts glabrescent to glabrous. Basal and lower stem leaves: petiole 1–5 cm; leaf blade rhomboid, flabelliform, ovate, or broadly ovate, 0.5–2.5 × 0.5–3 cm, abaxially densely villous, biternate-pinnatisect; ultimate segments linear or broadly linear. Upper stem leaves similar but smaller; uppermost linear, entire. Capitula solitary, rarely 2 or 3, 2–4 cm in diam. Involucres cup-shaped; phyllaries in 4 rows, scarious margin deep or dark brown, outer ones linear, narrowly elliptic, or ovate, 5–9 mm, abaxially sparsely villous, middle and inner ones long ovate or oblanceolate, 6–8 mm, middle ones sparsely villous abaxially, inner ones glabrous abaxially. Ray floret lamina white or pink, apex 3-denticulate. Achenes ca. 2 mm. Fl. and fr. Jun–Aug. $2n = 54$*.

Meadows; 1800–3000 m. Hebei, Jilin, Yunnan [Korea, Russia (Far East)].

11. Chrysanthemum lavandulifolium (Fischer ex Trautvetter) Makino, Bot. Mag. (Tokyo) 23: 20. 1909.

甘菊 gan ju

Herbs, perennial. Stems 30–150 cm, erect, corymbosely branched above middle or only in upper part, pilose, especially in upper part and on synflorescence branches. Basal and lower stem leaves withered by anthesis; middle stem leaves: petiole 0.5–1 cm; leaf blade ovate, broadly ovate, elliptic-ovate, narrowly elliptic, or ovate-lanceolate, 2–7 × 1.5–4.5 cm, surfaces concolorous or nearly so, 2-pinnatisect, 2-pinnatipartite, or inconspicuously 2-pinnatipartite; primary lateral segments 2 or 3(or 4) pairs; ultimate lobes elliptic. Upper stem leaves small, tripartite or entire. Synflorescence a lax or dense cyme. Capitula 1–1.5 cm in diam. Involucres cup-shaped, 5–7 mm in diam.; phyllaries in 5 rows, margin white or pale brown scarious, outer ones linear or linear-oblong, ca. 2.5 mm, abaxially sparsely pilose, middle and inner ones ovate, narrowly elliptic, or oblanceolate, ca. 4.5 mm. Ray florets yellow; lamina 1–7.5 mm. Achenes 1.2–1.5 mm. Fl. and fr. May–Nov. $2n = 18$*, 36*.

Mountain slopes, rocks, river valleys, riverbanks, wastelands, hilly lands; 600–2800 m. Anhui, Gansu, Guizhou, Hebei, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [India, Japan, Korea, Mongolia].

The infraspecific taxonomy of *Chrysanthemum lavandulifolium* needs more detailed investigation. *Dendranthema lavandulifolium* (Fischer ex Trautvetter) Kitamura var. *aromaticum* (Q. H. Liu & S. F. Zhang) S. J. Zhou & D. K. Zang (Bull. Bot. Res., Harbin 16: 297. 1996; *D. indicum* (Linnaeus) Des Moulins var. *aromaticum* Q. H. Liu & S. F. Zhang, J. Wuhan Bot. Res. 1: 237. 1983; *C. indicum* Linnaeus var. *aromaticum* (Q. H. Liu & S. F. Zhang) J. M. Wang & Y. T. Hou, Guihaia 30: 816. 2010), described from Hubei (Shennongjia), with ray floret lamina 3.5–4 mm, appears to be somewhat intermediate between *C. lavandulifolium* var. *discoideum* and *C. lavandulifolium* var. *lavandulifolium*, and it reportedly differs from both by the aromatic, minutely glandular, abaxial leaf surface.

1a. Ray floret lamina ca. 1 mm ..... 11c. var. *discoideum*

1b. Ray floret lamina 5–7.5 mm.

2a. Leaf blade abaxially densely villous or pubescent ..... 11b. var. *tomentellum*

2b. Leaf blade abaxially sparsely pubescent ..... 11a. var. *lavandulifolium*

11a. Chrysanthemum lavandulifolium var. **lavandulifolium**

甘菊(原变种) gan ju (yuan bian zhong)

Pyrethrum lavandulifolium Fischer ex Trautvetter, Trudy Imp. S.-Peterburgsk. Bot. Sada 1: 181. 1872 [*"lavandulaefolium"*]; *Chrysanthemum bellum* Grüning; *C. bellum* var. *glabriusculum* Y. Ling; *C. bellum* var. *jucundum* (Nakai & Kitagawa) Handel-Mazzetti; *C. boreale* Makino (1909), not (Fischer ex Candolle) B. Fedtschenko (1915); *C. indicum* Linnaeus var. *acutum* Uyeki; *C. jucundum* Nakai & Kitagawa; *C. lavandulifolium* var. *acutum* (Uyeki) C. Y. Li; *C. lavandulifolium* var. *jucundum* (Nakai & Kitagawa) Kitamura; *C. lavandulifolium* var. *sianense* Kitamura; *C. namikawanum* Kitamura; *C. seticuspe* (Maximowicz) Handel-Mazzetti; *C. seticuspe* f. *boreale* (Makino) H. Ohashi & Yonekura; *C. seticuspe* var. *boreale* (Makino) Handel-Mazzetti; *C. wilsonianum* Handel-Mazzetti; *Dendranthema boreale* (Makino) Y. Ling ex Kitamura; *D. lavandulifolium* (Fischer ex Trautvetter) Kitamura; *D. lavandulifolium* var. *glabriusculum* (Y. Ling) Kitamura; *D. lavandulifolium* var. *seticuspe* (Maximowicz) C. Shih; *D. seticuspe* (Maximowicz) Kitamura; *D. seticuspe* f. *boreale* (Makino) Kitamura; *P. seticuspe* Maximowicz.

Leaves sparsely pubescent on both surfaces or adaxially glabrous. Capitula large, 1–1.5 cm in diam. Ray floret lamina 5–7.5 mm. $2n = 18$*.

Mountain slopes, rocks, river valleys, riverbanks, wastelands, hilly lands; 600–2800 m. Gansu, Hebei, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang [India, Japan, Korea, Mongolia].

11b. Chrysanthemum lavandulifolium var. **tomentellum** Handel-Mazzetti, Acta Horti Gothob. 12: 260. 1938.

毛叶甘菊 mao ye gan ju

Chrysanthemum boreale var. *tomentellum* (Handel-Mazzetti) Kitamura; *Dendranthema boreale* var. *tomentellum* (Handel-Mazzetti) Kitamura; *D. lavandulifolium* var. *tomentellum* (Handel-Mazzetti) Y. Ling & C. Shih; *D. seticuspe* var. *tomentellum* (Handel-Mazzetti) Kitamura.

Leaves abaxially densely villous. Capitula large, 1–1.5 cm in diam. Ray floret lamina 5–7.5 mm.

● Mountain slopes; 2000–2500 m. Jiangsu, Taiwan, Yunnan, Zhejiang.

11c. Chrysanthemum lavandulifolium var. **discoideum** Handel-Mazzetti, Acta Horti Gothob. 12: 259. 1938.

隐舌甘菊 yin she gan ju

Dendranthema lavandulifolium var. *discoideum* (Handel-Mazzetti) C. Shih.

Leaf blade abaxially sparsely pilose, adaxially similar or glabrous. Capitula small. Ray florets small; lamina ca. 1 mm.

● Mountain slopes; ca. 2700 m. Sichuan (Kangding).

12. Chrysanthemum potentilloides Handel-Mazzetti, Acta Horti Gothob. 12: 261. 1938.

委陵菊 wei ling ju

Dendranthema potentilloides (Handel-Mazzetti) C. Shih.

Herbs, perennial, 30–70 cm tall. Stems erect or bent at base, robust, corymbosely branched in upper parts, grayish white, densely and thickly appressed pubescent. Basal and lower stem leaves shed by anthesis. Middle stem leaves shortly petiolate, with divided auricle at base of petiole; leaf blade broadly ovate, ovate, or broadly triangular-ovate, 1.5–3 × 2–3.5 cm, abaxially grayish white, densely pubescent, adaxially green or pale green, sparsely pubescent, 2-pinnatisect; primary lateral segments 2-paired; ultimate segments elliptic, margin with few teeth or 1 tooth on one side. Distal leaves gradually smaller, similar to middle stem leaves. Synflorescence a flat-topped cyme. Capitula 1.5–2 cm in diam. Involucre cup-shaped; phyllaries in 4 rows, abaxially densely pubescent, scarious margin white or brown, outer ones linear or linear-oblanceolate, 3–4 mm, middle ones elliptic, 6–7 mm, inner ones shorter, ca. 5 mm. Ray floret lamina yellow, 8–10 mm, apex minutely 2- or 3-denticulate. Fl. summer.

• Foothills of low mountains; 1000–1500 m. Shaanxi, Shanxi.

13. Chrysanthemum arisanense Hayata, Icon. Pl. Formosan. 6: 26. 1916.

阿里山菊 a li shan ju

Dendranthema arisanense (Hayata) Y. Ling & C. Shih.

Herbs, perennial, ca. 40 cm tall, with creeping rhizomes. Stems ascending, shortly corymbosely branched from middle, densely pubescent, soon glabrescent. Lower stem leaves shed by anthesis. Middle stem leaves: petiole 1–2 cm; leaf blade ovate, 3–5 × 2–3 cm, 2-pinnatisect; primary segments 1- or 2-paired; ultimate segments obliquely triangular, abaxially grayish white, densely and thickly pubescent, adaxially green, sparsely pubescent. Distal stem leaves gradually smaller, similar to middle stem leaves. Synflorescence a terminal subumbellate panicle. Capitula many, ca. 1.2 cm in diam. Involucre cup-shaped, ca. 7 mm in diam.; phyllaries in 4 rows, scarious margin broad, white or brown, outer ones ovate or narrowly ovate, 3–4 mm, middle ones elliptic or narrowly elliptic, 4–4.5 mm, inner ones narrowly elliptic or broadly linear, ca. 3 mm. Ray floret lamina yellow, ca. 5 mm. Fl. summer. $2n = 18$*.

• Jiangsu, Taiwan.

14. Chrysanthemum foliaceum (G. F. Peng, C. Shih & S. Q. Zhang) J. M. Wang & Y. T. Hou, Guihaia 30: 816. 2010.

叶状菊 ye zhuang ju

Dendranthema foliaceum G. F. Peng, C. Shih & S. Q. Zhang, Acta Phytotax. Sin. 37: 600. 1999.

Herbs, perennial, 50–80 cm tall. Stems erect, sparsely long branched above middle; stems and branches densely gray pubescent. Basal and lower stem leaves not seen. Middle stem leaves ovate or broadly ovate in outline, 2–3 × 1–1.5 cm, shallowly 2-pinnatitpartite, abaxially gray pubescent, adaxially subglabrous; lateral lobes 2- or 3-paired; ultimate lobes elliptic or toothlike; upper stem leaves smaller, elliptic or ovate, pinnatipartite to 3-lobed, lobes toothed. Capitula solitary, terminal on lateral branches, 1–1.5 cm in diam.; subtending bracts elliptic, 5–7 × 3–4 mm, shallowly pinnatipartite, margin coarsely toothed. Involucre coryliform, 9–10 mm wide; phyllaries in 3 rows, outer ones narrowly elliptic, ca. 6 × 2 mm, margin hyaline-membranous, apex rounded, middle ones elliptic, ca. 4 × 1.8 mm, inner ones narrowly elliptic, ca. 8 × 2.2 mm. Ray floret lamina apricot-colored, apex 3-toothed; disk florets many, also apricot-colored. Achenes cylindric, ca. 1 mm. Fl. Sep–Oct.

• Roadsides; 100–300 m. Shandong (Jinan).

15. Chrysanthemum longibracteatum (C. Shih, G. F. Peng & S. Y. Jin) J. M. Wang & Y. T. Hou, Guihaia 30: 816. 2010.

长苞菊 chang bao ju

Dendranthema longibracteatum C. Shih, G. F. Peng & S. Y. Jin, Acta Phytotax. Sin. 37: 598. 1999.

Herbs, perennial, 60–80 cm tall. Stem erect, sparsely long branched above middle; stems and branches densely gray pubescent. Basal and lower stem leaves not seen. Middle stem leaves subsessile, blade broadly ovate or (?narrowly) elliptic in outline, 1–5 × 1–2 cm, shallowly 2-pinnatipartite, abaxially gray pubescent, adaxially subglabrous; lateral lobes primarily 2-jugate, ultimate lobes elliptic; upper stem leaves smaller, pinnatipartite or 3-partite. Capitula terminal, solitary, 2.4–3 cm in diam.; subtending bracts many, linear, 20–25 × 2–5 mm. Involucre coryliform, 5–7 mm in diam.; phyllaries in 3 rows, outer ones linear or narrowly elliptic, ca. 7 × 2 mm, margin hyaline-membranous, apex obtuse or acuminate, middle and inner ones narrowly oblong, ca. 8 × 2 mm. Ray floret lamina apricot-colored, apex 2- or 3-toothed; disk florets many, apricot-colored. Achenes pyramidal, ca. 1 mm. Fl. and fr. Oct.

• Woodland margins, along paths; ca. 100 m. Shandong (Jinan).

16. Chrysanthemum zawadskii Herbich, Addit. Fl. Galic. 44. 1831.

紫花野菊 zi hua ye ju

Chrysanthemum gmelinii Ledebour; *C. hwangshanense* Y. Ling; *C. maximoviczianum* Y. Ling var. *dissectum* Y. Ling; *C. naktongense* Nakai var. *dissectum* (Y. Ling) Handel-Mazzetti; *C. sibiricum* (Candolle) Fischer ex Komarov; *C. sibiricum* var. *acutilobum* (Candolle) Komarov; *C. sibiricum* var. *gmelinii* (Ledebour) Nakai; *C. zawadskii* subsp. *acutilobum* (Candolle) Kitagawa; *Dendranthema zawadskii* (Herbich) Tzvelev; *Leucanthemum sibiricum* Candolle; *L. sibiricum* var. *acutilobum* Candolle; *Pyrethrum zawadskii* (Herbich) Nyman.

Herbs, perennial, 15–60 cm tall. Stems erect, upper parts with a few corymbose branches, rarely unbranched, lower and middle parts purple-red, sparsely pubescent, rather densely so in upper part and below synflorescence. Lower and middle stem leaves: petiole 1–4 mm; leaf blade ovate, broadly ovate, broadly triangular, or subrhomboid, 1.4–4 × 1–3.5 cm, 2-pinnatisect, surfaces concolorous, sparsely pubescent or glabrous; primary lateral segments 2 or 3 pairs; ultimate segments triangular or obliquely triangular, apex acute. Upper stem leaves elliptic or

broadly linear, gradually smaller, pinnatipartite or entire. Synflorescence a lax flat-topped cyme. Capitula 2–5, 1.5–4.5 cm in diam. Involucres cup-shaped; phyllaries in 4 rows, abaxially glabrous or sparsely pubescent only in outer ones, scarious margin white or brown, outer ones linear or linear-lanceolate, 3.5–8 mm, middle and inner ones elliptic or narrowly elliptic, 3–7 mm. Ray floret lamina white or purple-red, 1–2 cm, apex entire or minutely emarginate. Achenes ca. 1.8 mm. Fl. and fr. Jul–Sep. $2n = 54^*, 72$.

Mountain slopes, streamsides, forest understories, grasslands, open places in forests; 800–1800 m. Anhui, Gansu, Hebei, Heilongjiang, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Mongolia, Russia].

Chrysanthemum zawadskii played a significant role in the development of the frost-hardy "Korean chrysanthemums."

17. Chrysanthemum maximowiczii Komarov, Izv. Imp. Bot. Sada Petra Velikago 16: 179. 1916.

细叶菊 xi ye ju

Dendranthema maximowiczii (Komarov) Tzvelev.

Herbs, biennial. Stems 8–30 cm tall, erect, solitary, branched above middle, lower parts sparsely pilose. Lower and middle stem leaves shortly petiolate; leaf blade ovate or broadly ovate, 2–2.5 × 2.5–3 cm, 2-pinnatisect; primary lateral segments 2-paired; ultimate segments linear or narrowly linear, apex long acuminate. Distal stem leaves and leaves below synflorescence pinnatisect. Synflorescence a lax flat-topped cyme. Capitula 2–4. Involucres shallowly cup-shaped, 1–1.5 cm in diam.; phyllaries in 4 rows, scarious margin white or brown, outer ones linear, 5–6 mm, abaxially sparsely pubescent, middle and inner ones elliptic to oblanceolate, 7–8 mm, middle ones abaxially sparsely pubescent or glabrous, inner ones abaxially glabrous. Ray floret lamina white or pink, 1–1.5 cm, apex minutely 3-denticulate. Fl. Jul–Sep.

Mountain slopes, nearby lakes, sand dunes; 1200–1300 m. Nei Mongol [Korea, Russia].

18. Chrysanthemum glabriusculum (W. W. Smith) Handel-Mazzetti, Symb. Sin. 7: 1112. 1936.

拟亚菊 ni ya ju

Tanacetum glabriusculum W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 10: 202. 1918; *Ajania glabriuscula* (W. W. Smith) Y. Ling; *Chrysanthemum brachyglossum* Y. Ling; *Dendranthema glabriusculum* (W. W. Smith) C. Shih.

Herbs, perennial, 60–80 cm tall. Stems erect, branched above middle, pubescent especially in middle and upper parts. Middle stem leaves ovate, obovate, or elliptic, 2.5–6 × 1.5–3 cm, 2-pinnatisect, abaxially gray-white, densely and thickly appressed pubescent, adaxially green or pale green, sparsely pubescent or glabrous; primary lateral segments 2-paired; ultimate segments lanceolate or obliquely triangular. Synflorescence a terminal flat-topped compound panicle. Capitula many. Involucres campanulate, 5–10 mm in diam.; phyllaries in 4 rows, abaxially sparsely pubescent along midvein, scarious margin brown or white, outer ones lanceolate or triangular-lanceolate, 2–3 mm, middle and inner ones narrowly elliptic, 4–5.5 mm. Ray floret lamina yellow, 1–2.5 mm, apex 2- or 3-denticulate or entire. Fl. Sep–Oct. $2n = 18^*$.

• Mountain slopes; 900–2600 m. Shaanxi, Sichuan, Yunnan.

19. Chrysanthemum dichroum (C. Shih) H. Ohashi & Yonekura, J. Jap. Bot. 79: 188. 2004 [*"dichrum"*].

异色菊 yi se ju

Dendranthema dichroum C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 8. 1980 [*"dichrum"*].

Herbs, perennial, ca. 30 cm tall, with robust rhizomes. Primary stems inconspicuous, much branched from base, densely pubescent, leafy. Petiole ca. 5 mm; leaf blade oblique, elliptic or narrowly elliptic, 1–1.5 × 0.5–1 cm, pinnatisect, abaxially white or gray-white, densely appressed pubescent, adaxially green, glabrous or nearly so, lateral segments 1-paired, narrowly elliptic or lanceolate, terminal segments similar to lateral ones, 2-dentate on one side, 1-dentate on other; apex cuneate-attenuate; leaves below capitula linear, entire. Synflorescences terminal on branches. Capitula usually solitary (or up to 3), small; peduncles densely appressed pubescent. Involucres cup-shaped, ca. 5 mm in diam.; phyllaries in 3 rows, abaxially densely pubescent, scarious margin broad, outer ones lanceolate, ca. 1.5 mm, apex rounded, brown, scarious, middle and inner ones elliptic, ca. 2.5 mm, middle ones densely pubescent abaxially, inner ones glabrous abaxially. Ray floret lamina yellow, ca. 3 mm. Achenes ca. 1 mm. Fl. and fr. Aug.

• Mountain slopes. Hebei (Neiqiu).

In the protologue, the epithet is given as *"dichrum,"* which cannot be translated. It seems rather likely that it must be a typographical error for *"dichroum,"* perhaps referring to the 2-colored leaf blades mentioned in the protologue.

20. Chrysanthemum argyrophyllum Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 465. 1935.

银背菊 yin bei ju

Dendranthema argyrophyllum (Y. Ling) Y. Ling & C. Shih.

Herbs, perennial, 10–35 cm tall. Stems erect or ascending, robust branched, rarely unbranched, gray-white, densely and thickly villous. Basal leaves small, leaf blade orbicular or suborbicular; lower and middle stem leaves: petiole 2–3.5 cm; leaf blade orbicular, suborbicular, broadly elliptic, broadly ovate, or oblanceolate, 2–3 × 2.5–3.5 cm, abaxially silvery, densely and thickly appressed villous, adaxially green, glabrous or glabrescent, undivided or lyrate-pinnatipartite, base cordate or truncate, margin dentate or double-dentate. Upper stem leaves smaller, oblanceolate or narrowly obovate, coarsely toothed or lyrate-pinnatipartite. Synflorescence a terminal flat-topped cyme. Capitula (1–)3 or 4, 3–4 cm in diam. Involucre cup-shaped, 2–3 cm in diam.; phyllaries in 5 rows, abaxially densely appressed pubescent, scarious margin brown or white, outer ones large, herbaceous, elliptic or oblanceolate, pinnatifid, 1–1.5 cm, middle and inner ones broadly linear, linear-lanceolate, or elliptic, 8–9 mm. Ray floret lamina white, ca. 10 mm. Achenes ca. 2.2 mm. Fl. and fr. Aug–Sep.

• On rocks of mountain slopes; 1400–2100 m. Henan, Shaanxi.

21. Chrysanthemum mongolicum Y. Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 463. 1935.

蒙菊 meng ju

Dendranthema mongolicum (Y. Ling) Tzvelev.

Herbs, perennial, 20–30 cm tall. Stems fascicled, branched from middle or base, lower part purple-red, sparsely pilose. Lower and middle stem leaves: petiole 1.5–2 cm; leaf blade broadly ovate, subrhomboid, or elliptic, 1–2 × 1.5–1.8 cm, 2-pinnatisect or inconspicuously bipalmate-pinnatisect, both surfaces glabrous or sparsely pubescent; primary lateral segments 1- or 2-paired; ultimate segments triangular, apex aristate-acute. Upper stem leaves narrowly elliptic, pinnatifid; lateral lobes 2–4(–8)-paired. Synflorescence a flat-topped cyme. Capitula (1 or)2–7, 3–4.5 cm in diam. Involucres cup-shaped, 1–2 cm in diam.; phyllaries in 5 rows, abaxially glabrous, scarious margin white, outer ones leaflike, narrowly elliptic, 1–1.3 cm, pinnatilobed or pinnatifid, middle and inner ones narrowly elliptic, ca. 8 mm. Ray floret lamina pink or white, 15–20 mm. Achenes ca. 2 mm. Fl. and fr. Aug–Sep. $2n = 36, 54, 72$.

Rocky mountain slopes; 1500–2500 m. Nei Mongol [Mongolia, Russia].

22. Chrysanthemum parvifolium C. C. Chang, Bull. Fan Mem. Inst. Biol., Bot. 7: 159. 1936.

小叶菊 xiao ye ju

Dendranthema parvifolium (C. C. Chang) C. Shih.

Herbs, to 100 cm or more. Stems striate, pale brown, corymbosely branched above middle, branches slender, ascending, internodes shorter than leaves. Leaves ovate in outline, ca. 1.5 × 1 cm, abaxially densely hairy, adaxially shortly pilosulose, shallowly pinnatifid, lateral segments often 2-paired, subovate, entire or 1- or 2-denticulate, acute or shortly apiculate, base cuneate into indistinct petiole, apex subacuminate. Ray florets purple, small; disk florets yellow.

• Rocky slopes, near small rivers. Guizhou.

Chrysanthemum parvifolium seems to be known only from the type (*Cavalerie 4233*, P). It was likened by the author to *C. vestitum*.

151. ARTEMISIA Linnaeus, Sp. Pl. 2: 845. 1753.

蒿属 hao shu

Lin Yourun (林有润 Ling Yeou-ruenn, Ling Yuou-ruen); Christopher J. Humphries, Michael G. Gilbert

Herbs, annual or perennial, subshrubs, or shrubs, usually strongly and pleasantly aromatic, indumentum absent or of basifixed, medifixed, gland-tipped or viscid hairs. Leaves alternate, pinnate, rarely palmately divided or entire. Synflorescences racemose, sometimes spicate, usually grouped into panicles; capitula usually many, often secund, usually small, shortly pedunculate to sessile, heterogamous, disciform. Involucres globose, ovoid, or ellipsoid; phyllaries in 3 or 4 rows, completely scarious or herbaceous with broad to narrow scarious margin. Receptacle convex or flat, epaleate, glabrous or pubescent. Marginal florets in 1(or 2) series, 3–10 or more, female; corolla tubular, rarely vasiform, cup-shaped, or conical, apex 2(–4)-toothed; style exserted, apex acute. Disk florets several to many, in 2 or more series, male or bisexual; corolla tubular, apex 5-toothed. Anthers with 2 obtuse basal appendages, apical appendage acute, triangular. Style ca. as long as or longer than corolla, divergent, and with a truncate or folding and pedunculate apex, or sometimes shorter than corolla, not divergent, apex clavate or funnelform. Achenes obovoid, ovoid, or oblong, faintly striate. Corona absent or minute.

About 380 species: mainly in the N Hemisphere, also in Africa, Australia, and Central and South America; 186 species (82 endemic) in China.

Many species are rich in polyacetylenes, flavonoids, terpenoids, and cyanogenic glycosides and are well-known medicinal plants. Drugs based on artemisinin, originally derived from *Artemisia annua*, are particularly important for the treatment of chloroquine-resistant strains of malaria. *Artemisia abrotanum* Linnaeus, *A. absinthium*, *A. dracunculus*, and *A. vulgaris* are widely cultivated as culinary and medicinal herbs. Some are used to stabilize sand in desert or semidesert areas or as herbage for feeding livestock.

A possible record of *Artemisia quinqueloba* Trautvetter from China (Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 685. 1927) cannot be confirmed, as the specimen on which it was based, "Songoria, Schrenk" (B), is no longer extant.

1a. Disk florets male, ovaries usually minute or absent; style shorter than corolla, usually not divergent, 2-cleft, with clavate or funnelform apex.
  2a. Lobules of leaf blade filiform, narrowly linear, lanceolate, or subulate and less than 1.5 mm wide, or pectinate and 1–2.5 × 1–2.5 mm, or leaf blade lanceolate or linear-lanceolate; ovaries of disk florets usually minute ..... 6. *A.* sect. *Dracunculus* (p. 719)
  2b. Lobules of leaf blade broadly linear to lanceolate or elliptic, more than (1–)1.5 mm wide, or leaf blade spatulate or obovate; ovaries of disk florets usually absent ..... 7. *A.* sect. *Latilobus* (p. 731)
1b. Disk florets bisexual, ovaries well developed; style ca. as long as or longer than corolla, branches divergent, recurved at apex.
  3a. Receptacle pubescent or chaffy, sometimes hairs deciduous; corolla of female florets usually vasiform or narrowly conical, (2–)4-toothed ..... 1. *A.* sect. *Absinthium* (p. 677)
  3b. Receptacle glabrous; corolla of female florets narrowly tubular or rarely narrowly conical, 2- or 3(or 4)-toothed or without teeth.

4a. Phyllaries scarious throughout, glabrescent, midvein not green ..... 5. *A.* sect. *Albibractea* (p. 717)
4b. Phyllaries scarious only at margin, midvein green or sometimes brown.
5a. Plants glandular or viscid pubescent ..... 4. *A.* sect. *Viscidipubes* (p. 711)
5b. Plants not glandular or viscid, puberulent or glabrescent.
6a. Capitula globose, rarely ovoid; lobules of leaf blade less than 1(–1.5) mm wide, if wider then pectinate ..... 2. *A.* sect. *Abrotanum* (p. 685)
6b. Capitula ellipsoid or oblong, rarely subglobose, campanulate, or hemispheric; lobules of leaf blade more than (1.5–)2 mm wide ..... 3. *A.* sect. *Artemisia* (p. 694)

1. Artemisia sect. **Absinthium** (Miller) Candolle in Candolle & Lamarck, Fl. Franç. 4: 189. 1805.

蒿萝蒿组 shi luo hao zu

Absinthium Miller, Gard. Dict. Abr., ed. 4. 1754; *Absynthium* G. Gaertner, B. Meyer & Scherbius.

Shrubs, subshrubs, or annual, biennial, or perennial herbs, tomentose or puberulent, rarely arachnoid, without glandular or viscid hairs (sessile glands often present). Leaves 1–3-pinnatisect; lobes or lobules linear or filiform, serrate. Capitula globose or subglobose. Phyllary margin scarious. Receptacle pubescent or chaffy, hairs sometimes deciduous. Marginal florets (2–)4–30, sometimes in 2 series and up to 70; corolla vasiform or narrowly conical, (2–)4-toothed. Disk florets (8–)20–120, bisexual; ovaries well developed; style ca. as long as or longer than corolla, branches divergent, recurved at apex.

About 50 species: N Hemisphere, mostly in Asia and Europe, five species in North America, a few species in Africa and Central and South America; 23 species (three endemic) in China.

Most species contain monoterpenoids.

1a. Annual or biennial herbs; main root solitary, vertical, tapered or ± fusiform; basal leaves (including petiole) usually less than 8 cm.
2a. Synflorescence a simple erect terminal raceme; capitula 5–10(–15) mm in diam. ..... 1. *A. macrocephala*
2b. Synflorescence a panicle with spreading lateral branches; capitula 1.5–4(–6) mm in diam.
3a. Capitula 3–6 mm in diam.; marginal female florets 5–30, bisexual florets 30–120.
4a. Plants 50–150 cm tall; middle stem leaf blades 4–8(–13) × 3–6(–15) cm; female florets 20–30, often in double series, bisexual florets 80–120 ..... 2. *A. sieversiana*
4b. Plants 25–40 cm tall; middle stem leaf blades 1.5–2 × 1–1.5 cm; female florets 5–20 in single series, bisexual florets 30–50 ..... 22. *A. succulentoides*
3b. Capitula 1.5–3(–4) mm in diam.; marginal female florets 3–6, bisexual florets 18–28.
5a. Basal leaf blades 8–15 × 8–15 cm ..... 19. *A. nakaii*
5b. Basal leaf blades 3–4.5(–5) × 2–4 cm.
6a. Capitula 2–3(–4) mm in diam.; bisexual florets 18–28 ..... 20. *A. anethifolia*
6b. Capitula 1.5–2(–2.5) mm in diam.; bisexual florets 8–16 ..... 21. *A. anethoides*
1b. Perennial herbs, subshrubs, or shrubs; roots several, not fusiform (if biennials with single fusiform root then basal leaves 11–18 cm); basal leaves usually more than 8 cm.
7a. Disk florets 8–20.
8a. Plants 15–25(–30) cm tall, densely gray or yellowish tomentose ..... 16. *A. younghusbandii*
8b. Plants 25–80 cm tall, gray or yellowish arachnoid tomentose or silky pubescent, lower parts sometimes glabrescent.
9a. Middle stem leaf blades 3–5 × 3–5 cm; marginal female florets 2–5 ..... 18. *A. fauriei*
9b. Middle stem leaf blades 0.5–2 × 0.8–2.8 cm; marginal female florets 4–10.
10a. Ultimate leaf lobules narrowly spatulate, linear, or linear-oblanceolate, 1–3 × 0.5–1.5 mm ..... 9. *A. xerophytica*
10b. Ultimate leaf lobules elliptic-oblanceolate or elliptic-lanceolate, 6–12 × 1–1.5 mm ..... 10. *A. rutifolia*
7b. Disk florets 20–80.
11a. Leaf blade entire or with apex crenately 3–5-lobed ..... 12. *A. lagocephala*
11b. Leaf blade 1–3-pinnatisect.
12a. Capitula 2–4(–5) mm in diam.
13a. Basal to middle stem leaves with petiole 2–12 cm; plants 60–150 cm tall ..... 5. *A. absinthium*
13b. Basal to middle stem leaves sessile or with petiole to 2 cm; plants 20–70 cm tall.
14a. Middle stem leaves sessile, gland-dotted ..... 11. *A. obtusiloba*
14b. Middle stem leaves with petiole 5–20 mm, not gland-dotted.
15a. Bisexual florets 20–30; perennial herbs or occasionally subshrubs with slender rootstock; plants densely yellowish or pale yellow sericeous ..... 6. *A. frigida*
15b. Bisexual florets 35–50; subshrubs with a thick woody rhizome ca. 1 cm or more in diam.; plants arachnoid puberulent, glabrescent ..... 23. *A. persica*

12b. Capitula 4–10 mm in diam.
16a. Plants densely yellowish to yellow sericeous-tomentose; corolla with multicellular hairs; basal leaves 5–10 cm, with 7–13 pairs of lateral segments ..... 17. *A. stracheyi*
16b. Plants pubescent or glabrescent; corolla glabrous; basal leaves less than 5 cm, with 3–7 pairs of lateral segments, or leaves 3-cleft.
17a. Plants 10–20 cm tall.
18a. Middle stem leaves with petiole 2–3 cm, blade pubescent, later glabrescent, greenish, abaxially gland-dotted; phyllary margin black scarious ..... 13. *A. disjuncta*
18b. Middle stem leaves with petiole 0.4–1 cm, blade densely gray or yellowish tomentose, or glabrescent, abaxially not gland-dotted; phyllary margin brown scarious.
19a. Perennial herbs; middle stem leaves with (3 or)4(or 5) pairs of segments, segments serrate or with lobules 2–8 × 0.6–1 mm, pubescent, soon glabrescent; phyllaries with brown scarious margin, glabrescent ..... 14. *A. niitakayamensis*
19b. Caespitose dwarf subshrubs; middle stem leaves with 2(or 3) pairs of segments, 3–5-lobulate, lobules 1–2 × 0.5–1 mm; leaves and phyllaries densely yellowish or gray tomentose ..... 15. *A. minor*
17b. Plants 20–70 cm tall.
20a. Middle stem leaves (1–)1.5–4 cm, densely yellowish or white sericeous-tomentulose; middle lobes 1.5–4 mm wide.
21a. Plants 40–60(–75) cm tall; middle stem leaves elliptic or ovate; phyllary with narrow, white scarious margin ..... 3. *A. sericea*
21b. Plants 20–40(–50) cm tall; middle stem leaves suborbicular or orbicular-reniform; phyllary with wide, brown scarious margin ..... 4. *A. aschurbajewii*
20b. Middle stem leaves 0.8–1.5 cm, tomentose, pubescent, or glabrescent; middle lobe less than 1 mm wide.
22a. Middle stem leaves with 5–7 pairs of segments, distal lobes pinnatisect or 3-lobulate, proximally not lobed, pubescent, glabrescent; phyllaries pubescent ..... 8. *A. rupestris*
22b. Middle stem leaves with 2 or 3(–5) pairs of segments, segments parted or lobulate; leaves and phyllaries yellowish sericeous-tomentose or pubescent or glabrescent ..... 7. *A. argyrophylla*

1. Artemisia macrocephala Jacquemont ex Besser, Bull. Soc. Imp. Naturalistes Moscou 9: 28. 1836.

大花蒿 da hua hao

Artemisia griffithiana Boissier; *A. sieversiana* Ehrhart ex Willdenow var. *pygmaea* Krylov.

Herbs, annual, 10–30(–50) cm tall, occasionally ± woody at base, gray puberulent or pubescent. Stems usually not branched or only shortly branched. Basal and middle stem leaves: petiole 5–12 mm; leaf blade ovate, 2–4 × 1–1.5 cm, 2-pinnatisect; segments 2 or 3 pairs, basal and middle segments 3–5-sect; lobules narrowly linear or filiform, 1–4 × 0.5–1 mm. Uppermost leaves and leaflike bracts sessile, 3-lobed or entire, leaves or lobes linear. Synflorescence a lax, simple, erect raceme. Capitula shortly pedunculate, nodding. Involucre subglobose, 5–10(–15) mm in diam.; receptacle hemispheric, densely pubescent. Marginal female florets 40–70 in 1 or 2 series; corolla vasiform or narrowly conical, (2–)4-toothed. Disk florets 80–100, bisexual. Achenes ovoid or obovoid-ellipsoid. Fl. and fr. Aug–Oct. $2n = 18, 36$.

Steppes, hills, waste areas, dry places, saline or gravelly soils; 1500–5500 m. Gansu, Ningxia, Qinghai, Xinjiang, Xizang [Afghanistan, India, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan; SW Asia].

2. Artemisia sieversiana Ehrhart ex Willdenow, Sp. Pl. 3: 1845. 1803.

大籽蒿 da zi hao

Absinthium sieversianum (Ehrhart ex Willdenow) Besser; *Artemisia chrysolepis* Kitagawa; *A. koreana* Nakai; *A. moxa* Candolle; *A. scaposa* Kitagawa; *A. sieversiana* var. *blinii* H. Léveillé; *A. sieversiana* var. *grandis* Pampanini; *A. sieversiana* f. *microcephala* Pampanini; *A. sieversiana* f. *nana* Pampanini; *A. sparsa* Kitagawa; *Carpesium gigas* H. Léveillé & Vaniot.

Herbs, annual or biennial, 50–150 cm tall, gray pubescent or glabrescent. Basal and middle stem leaves: petiole (1–)2–4 cm; leaf blade broadly ovate or ovate-orbicular, 4–8(–13) × (2–)3–6(–15) cm, 2- or 3-pinnatisect or -partite, segments 2 or 3 pairs, lobules linear or linear-lanceolate, 2–10 × 1–1.5(–2) mm, rarely lacerate, apex acute or obtuse. Uppermost leaves and bracts sessile, pinnatisect or entire, leaves or lobes elliptic-lanceolate or lanceolate. Synflorescence a long, narrow panicle to 10–30 × 5–10 cm; branches ± erect, 5–10 cm, remote. Capitula many, remote, pedunculate or ± sessile, subtended by linear bracteoles. Involucre hemispheric or subglobose, (3–)4–6 mm in diam.; receptacle hemispheric, densely white pubescent. Marginal female florets 20–30 in (1 or)2 series; corolla conical, (2–)4-toothed. Disk florets 80–120, bisexual. Achenes oblong. Fl. and fr. Jun–Oct. $2n = 18$.

Roadsides, waste places, steppes, hillsides, forest margins; sea level to 4200 m. Gansu, N Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, E and W Sichuan, Xinjiang, Xizang, W Yunnan [Afghanistan, India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Turkmenistan, Uzbekistan; E Europe].

The essential oils from *Artemisia sieversiana* are used in anti-inflammatory and hemostatic medicines.

3. Artemisia sericea (Besser) Weber ex Stechmann, Artemis. 16. 1775.

绢毛蒿 juan mao hao

Absinthium sericeum Besser, Bull. Soc. Imp. Naturalistes Moscou 1: 237. 1829; *A. grandiflorum* Besser; *A. nitens* Steven ex Besser; *Artemisia holosericea* Ledebour; *A. holosericea* var. *grandiflora* Ledebour; *A. holosericea* var. *parviflora* Ledebour; *A. nitens* (Steven ex Besser) Steven ex Krascheninnikov; *A. sericea* var. *gmeliniana* Besser; *A. sericea* var. *grandiflora* (Ledebour) Candolle; *A. sericea* var. *ledebouriana* Besser; *A. sericea* var. *nitens* (Steven ex Besser) Candolle; *A. sericea* var. *pallasiana* Besser; *A. sericea* f. *parviflora* (Ledebour) Pampanini; *A. sericea* var. *parviflora* (Ledebour) Candolle.

Subshrubs or perennial herbs, 40–60(–75) cm tall, with thick, creeping rhizomes. Stems single to several, usually not branched, gray sericeous or stems glabrescent. Basal leaves deciduous by anthesis. Middle stem leaves: petiole 5–8 mm; leaf blade elliptic or ovate, 3–5 × 2–4 cm, 2-pinnatisect; segments 4(–6) pairs, distal lobes 3-lobulate or subpalmatisect; lobules linear or linear-lanceolate, 10–17 × 1.5–2 mm, apex acute. Uppermost leaves and bracts pinnatisect or 3–5-sect. Synflorescence a ± narrow, racemelike panicle. Capitula shortly pedunculate, nodding. Involucre hemispheric, (4–)5–6(–9) mm in diam.; phyllaries with narrow white scarious margin; receptacle hemispheric, densely pubescent. Marginal female florets 10–14; corolla narrowly conical or tubular, 2- or 3-toothed. Disk florets 40–80, bisexual; corolla limb puberulent. Achenes ellipsoid or ellipsoid-ovoid. Fl. and fr. Jul–Oct. $2n = 18$.

Forest margins, hills, steppes, canyons, waste areas; 600–1600 m. Nei Mongol, Ningxia, N Xinjiang [India, Kazakhstan, Mongolia, N Pakistan, Russia; E Europe].

4. Artemisia aschurbajewii C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 332. 1890 [*"aschurbajewi"*].

褐头蒿 he tou hao

Artemisia sericea (Besser) Weber var. *turkestanica* C. Winkler.

Herbs, perennial, ± caespitose, 20–40(–50) cm tall, puberulent. Stems several, usually not branched. Basal and middle stem leaves: petiole 8–12 mm; leaf blade suborbicular or orbicular-reniform, 1–2.5(–3.5) × 1–2(–3) cm, 2-pinnatisect; segments 3–5 pairs, 3-lobulate; lobules lanceolate, 5–10 × 2–4 mm, margin serrate, rarely entire, apex obtuse. Uppermost leaves and bracts 3-lobed; lobes linear or linear-lanceolate. Synflorescence a racemelike panicle, compact near apex and lax near base. Capitula shortly pedunculate, nodding. Involucre globose or subglobose, 5–7 mm in diam.; phyllaries with wide brown scarious margin; receptacle hemispheric, densely pubescent. Marginal female florets 10–15; corolla narrowly conical or tubular, 2- or 3-toothed. Disk florets 40–60, bisexual; corolla limb puberulent. Achenes ellipsoid. Fl. and fr. Jul–Oct. $2n = 36$.

Deserts or subalpine steppes, rocky hills; 1200–3500 m. NW Gansu, Qinghai, Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

5. Artemisia absinthium Linnaeus, Sp. Pl. 2: 848. 1753.

中亚苦蒿 zhong ya ku hao

Herbs, perennial, 60–150 cm tall, somewhat woody at base, gray sericeous or puberulent. Stems 1–3. Basal leaves: petiole 6–12 cm; leaf blade ovate-elliptic or ovate, 8–12 × 7–9 cm, 2- or 3-pinnatisect; segments 4 or 5 pairs, pinnately lobed; lobules lanceolate-elliptic or -linear, 8–15 × 2–4(–7) mm, apex obtuse. Middle stem leaves: petiole 2–6 cm; leaf blade ovate or elliptic-ovate, 2-pinnatisect; lobules linear-lanceolate, (8–)10–25 × 2–3(–5) mm. Uppermost leaves 4–6 × 2–4 cm, pinnatisect or 5-lobed; leaflike bracts 3-lobed or entire; lobes lanceolate or linear-lanceolate. Synflorescence usually a broad conical panicle; primary branches straight, ascending or ± oblique spreading, up to 30 cm and secondary branches up to 12 cm. Capitula shortly pedunculate, nodding. Involucre globose or subglobose, 2.5–3.5(–4) mm in diam.; receptacle hemispheric, densely pubescent. Marginal female florets 15–25; corolla yellow, obliquely 2-toothed. Disk florets 30–70(–90), bisexual; corolla yellow. Achenes oblong, 0.8–1 mm, with apical corona or not. Fl. and fr. Aug–Sep. $2n = 18$.

Hillsides, steppes, scrub, forest margins, often in locally moist situations; 1100–1500 m. Jiangsu, NW and W Xinjiang [Afghanistan, India, Japan, Kazakhstan, Kyrgyzstan, Pakistan, Russia; N Africa, SW Asia, Europe, North America].

Artemisia absinthium is used in anti-inflammatory and anthelmintic medicines.

6. Artemisia frigida Willdenow, Sp. Pl. 3: 1838. 1803.

冷蒿 leng hao

Herbs, perennial, or occasionally subshrubs, (10–)30–60(–70) cm tall, densely yellowish or pale yellow sericeous, sometimes stem bases glabrescent. Stems several, woody at base, shortly branched or not. Lower stem leaves: petiole 5–20 mm; leaf blade oblong or obovate-oblong, 0.8–1.5 × 0.8–1.5 cm, 2(or 3)-pinnatisect; segments (2–)4 pairs; lobules linear-lanceolate or lanceolate. Middle stem leaves: blade oblong or obovate-oblong, 5–7 × 5–7 mm, 1- or 2-pinnatisect; lobules lanceolate to linear-lanceolate, 2–3 × 0.5–1.5 mm. Uppermost leaves and bracts pinnately or 3–5-lobed. Synflorescence a spike or raceme, sometimes branched to form a panicle. Capitula nodding. Involucre hemispheric, globose, or ovoid, (2–)2.5–4.5 mm in diam.; receptacle densely white pubescent. Marginal female florets 8–13; corolla limb yellow or purple. Disk florets 20–30, bisexual. Achenes oblong or ellipsoid-obovate, with a minute apical corona. Fl. and fr. Jun–Oct. $2n = 18, 36$; ($n = 9+3b, 18, 18+2b, 36$).

Steppes, subalpine meadows, dry hillsides, stable dunes, dry waste

areas; 1000–4000 m. Gansu, Hebei, W Heilongjiang, N Hubei, W Jilin, W Liaoning, Nei Mongol, Ningxia, Qinghai, N Shaanxi, Xinjiang, Xizang [Kyrgyzstan, Mongolia, Russia, Tajikistan; SW Asia, E Europe].

1a. Stems 30–60 cm; synflorescence branched; capitula 2–3 mm in diam.; corolla limb yellow ..... 6a. var. *frigida*
1b. Stems 10–20 cm; synflorescence rarely branched; capitula 3.5–4.5 mm in diam.; corolla limb purple ..... 6b. var. *atropurpurea*

6a. Artemisia frigida var. **frigida**

冷蒿(原变种) leng hao (yuan bian zhong)

Absinthium frigidum (Willdenow) Besser; *A. frigidum* var. *fischerianum* Besser; *A. frigidum* var. *willdenowianum* Besser; *Artemisia frigida* var. *fischeriana* (Besser) Candolle; *A. frigida* var. *intermedia* Trautvetter; *A. frigida* var. *mongolica* Kitamura; *A. frigida* var. *willdenowiana* (Besser) Candolle.

Stems 30–60(–70) cm. Synflorescence branched to form a panicle. Capitula globose or ovoid, 2–3 mm in diam. Corolla limb yellow.

Steppes, subalpine meadows, dry hillsides, stable dunes, dry waste areas; 1000–4000 m. Gansu, W Heilongjiang, N Hubei, W Jilin, W Liaoning, Nei Mongol, Ningxia, Qinghai, N Shaanxi, Xinjiang, Xizang [Kyrgyzstan, Mongolia, Russia, Tajikistan; SW Asia, E Europe].

6b. Artemisia frigida var. **atropurpurea** Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 655. 1927.

紫花冷蒿 zi hua leng hao

Stems 10–20 cm. Synflorescence a simple raceme, ± spikelike. Capitula hemispheric, 3.5–4.5 mm in diam. Corolla limb purple.

• Dry hills; 2000–2600 m. Gansu, Ningxia, Xinjiang.

So many differences exist between these two varieties of *Artemisia frigida* that there is a case for recognizing them as distinct species.

7. Artemisia argyrophylla Ledebour, Fl. Altaic. 4: 166. 1833.

银叶蒿 yin ye hao

Herbs, perennial, or subshrubs, 30–50 cm tall, ± woody at base, densely silvery or hoary pubescent. Lower and middle stem leaves: petiole 5–10 mm; leaf blade obovate-elliptic or elliptic, 0.5–0.8 × 0.5–0.8 cm, 1- or 2-pinnatisect; segments 2 or 3 pairs, distal lobes 2–4-lobulate; lobules elliptic or elliptic-lanceolate, 2–4 × 0.5–1.5 mm, recurved or flat, apex obtuse. Uppermost leaves and leaflike bracts pinnatisect. Synflorescence a somewhat broad panicle. Capitula sessile or shortly pedunculate, nodding. Involucre subglobose or subovoid-campanulate, 4–7 mm in diam. Marginal female florets 5–10; corolla limb purple or yellow, white puberulent. Disk florets 20–40, bisexual. Achenes oblong or obovoid-oblong, with apical corona or not. Fl. and fr. Jul–Oct.

Steppes, dry areas, hills; ca. 2400 m or below. W Gansu, SW Nei Mongol, Ningxia, Xinjiang [Mongolia, Russia].

1a. Capitula sessile; corolla limb purple ..... 7a. var. *argyrophylla*
1b. Capitula pedunculate; corolla limb yellow ..... 7b. var. *brevis*

7a. Artemisia argyrophylla var. **argyrophylla**

银叶蒿(原变种) yin ye hao (yuan bian zhong)

Artemisia frigida Willdenow var. *argyrophylla* (Ledebour) Trautvetter.

Stems densely silvery to hoary pubescent. Capitula sessile. Corolla limb purple.

Steppes, dry areas; below 2000 m. W Gansu, SW Nei Mongol, Ningxia, E Xinjiang [Mongolia, Russia].

7b. Artemisia argyrophylla var. **brevis** (Pampanini) Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 7. 1988.

小银叶蒿 xiao yin ye hao

Artemisia brevis Pampanini, Rendiconti Seminario Fac. Sci. Univ. Cagliari 8: 165. 1938.

Stems flexuous, ascending, shortly branched or not, puberulent or glabrescent. Synflorescence a narrow, racemelike panicle. Capitula shortly pedunculate. Corolla limb yellow.

• Hills; ca. 2400 m. Xinjiang.

8. Artemisia rupestris Linnaeus, Sp. Pl. 2: 847. 1753.

岩蒿 yan hao

Absinthium rupestre (Linnaeus) Schrank; *A. rupestre* var. *oelandicum* Besser; *A. rupestre* var. *thuringiacum* Besser; *A. viride* Besser; *A. viridifolium* (Ledebour) Besser; *Artemisia dentata* Willdenow; *A. rupestris* var. *oelandica* (Besser) Candolle; *A. rupestris* var. *thuringiaca* (Besser) Candolle; *A. rupestris* var. *viridifolia* (Ledebour) Candolle; *A. rupestris* var. *viridis* (Besser) Candolle; *A. viridifolia* Ledebour.

Herbs, perennial, usually caespitose, 20–50 cm tall, ± woody at base, pubescent, glabrescent. Stems brown or dark brown, shortly branched or not. Leaves thinly textured. Lower stem leaves petiolate. Middle stem leaves ovate-elliptic or oblong, 1.5–3(–5) × 1–2(–2.5) cm, pinnatisect; segments 5–7 pairs, pectinate, ± clasping; lobules linear-lanceolate or linear, 1–6 × 0.5–1.5 mm. Uppermost leaves and leaflike bracts pinnatisect or 3-lobed. Synflorescence a spikelike or racemelike panicle. Capitula pedunculate or sessile, nodding. Involucre globose or subglobose, 4–7 mm in diam.; phyllaries pubescent, scarious margin lacerate; receptacle hemispheric, pubescent. Marginal female florets 8–16; corolla vasiform or narrowly conical, 3- or 4-toothed. Disk florets 30–70, bisexual. Achenes oblong or oblong-ovoid, usually with a minute apical crown. Fl. and fr. Jul–Oct. $2n = 18, 34$.

Dry hills, desert or semidesert steppes, grassy marshlands, dry river valleys, riverbeds, scrub, forest margins; 1100–2900 m. Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan; E and N Europe].

The whole plant is used in anti-inflammatory and hemostatic medicines.

9. Artemisia xerophytica Krascheninnikov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 24. 1922.

内蒙古旱蒿 nei meng gu han hao

Shrubs, dwarf, caespitose, 30–40 cm tall, with thick woody roots, rootstocks, and branches, densely gray or yellowish sericeous, glabrescent at base; stems brown or brownish. Leaves ± leathery. Middle stem leaves: petiole 3–5 mm; leaf blade ovate or suborbicular, 1–1.5 × 0.4–0.6 cm, 2-pinnatisect, segments 2 or 3 pairs, distal lobes 3–5-lobulate; lobules narrowly spatulate, linear, or linear-oblanceolate, 1–3 × 0.5–1.5 mm. Uppermost leaves and leaflike bracts sessile, pinnatisect or 3–5-lobed. Synflorescence a panicle. Capitula shortly pedunculate. Involucre subglobose, 3.5–4.5 mm in diam.; phyllaries yellowish pubescent; receptacle pubescent. Marginal female florets 4–10. Disk florets 10–20, bisexual; corolla limb puberulent. Achenes obovoid-oblong. Fl. and fr. Aug–Oct.

Gobi Desert, semidesert steppes, dunes; 1700–3500 m. N Gansu, Nei Mongol, Ningxia, N Qinghai, N Shaanxi, N Xinjiang [Mongolia].

Artemisia xerophytica is used in windbreaks and for sand stabilization. It is also an important source of herbage for livestock.

10. Artemisia rutifolia Stephen ex Sprengel, Syst. Veg. 3: 488. 1826.

香叶蒿 xiang ye hao

Subshrubs or shrubs, caespitose, 20–80 cm tall, strongly aromatic, silky puberulent, glabrescent; rootstock woody, much branched, 1.5–2.5 cm thick. Stem branches 20–30 cm. Lower and middle stem leaves: petiole 0.3–1 cm; leaf blade suborbicular or reniform, 0.5–2 × 0.8–3 cm, 2-ternately lobed or nearly 2-palmatisect; segments 1 or 2 pairs; lobules narrowly elliptic-oblanceolate or elliptic-lanceolate, 6–12 × 1–1.5 mm, recurved or flat. Uppermost leaves and leaflike bracts palmatisect, 3-lobed, or entire. Synflorescence a racemelike panicle, ± oblong, 15–20 × 3–4 cm; branches 4–6(–8) cm, obliquely erect. Capitula pedunculate, nodding. Involucre globose or subglobose, 3–9 mm in diam.; receptacle with deciduous paleaceous hairs. Florets 15–40, yellow, pinkish tinged; corolla glandular and hairy. Marginal female florets 5–10; corolla narrowly tubular, 2-toothed. Disk florets (10–)12–15(–28), bisexual; corolla limb puberulent or glabrescent. Achenes ellipsoid-obovoid, ca. 1.25 mm. Fl. and fr. Jul–Oct.

Hills, dry river valleys, basins, steppes, semideserts, Gobi Desert; 1300–5000 m. Nei Mongol, Qinghai, Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan; SW Asia].

1a. Involucre 4–9 mm in diam. ..... 10c. var. *ruoqiangensis*
1b. Involucre 3–4 mm in diam.
2a. Leaves reniform or semiorbicular, 10–20 mm, lobules recurved ..... 10a. var. *rutifolia*
2b. Leaves suborbicular, 5–10 mm, lobules flat ..... 10b. var. *altaica*

10a. Artemisia rutifolia var. **rutifolia**

香叶蒿(原变种) xiang ye hao (yuan bian zhong)

Artemisia falconeri C. B. Clarke; *A. turczaninoviana* Besser; *A. turczaninoviana* var. *dasyantha* Schrenk; *A. turczaninoviana* var. *falconeri* (C. B. Clarke) O. Fedtschenko.

Leaf blade reniform or semiorbicular, 1–2 cm; lobules recurved. Involucre 3–4 mm in diam.

Hills, dry river valleys, basins, steppes; 1300–5000 m. Qinghai, Xinjiang, Xizang [Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan; SW Asia].

10b. Artemisia rutifolia var. **altaica** (Krylov) Krascheninnikov in Krylov, Fl. Zapadnoi Sibiri 11: 2789. 1949.

阿尔泰香叶蒿 a er tai xiang ye hao

Artemisia turczaninoviana var. *altaica* Krylov, Fl. Altai 3: 61. 1904.

Leaf blade suborbicular, 5–10 × 5–10 mm; lobules flat, strict. Involucre 3–4(–5) mm in diam.

Semideserts, Gobi Desert. E and N Xinjiang [W Mongolia].

10c. Artemisia rutifolia var. **ruoqiangensis** Y. R. Ling, Guihaia 12: 312. 1992.

诺羌香叶蒿 nuo qiang xiang ye hao

Leaf blade suborbicular, 5–10 × 5–10 mm; lobules recurved. Involucre 4–9 mm in diam.

● Semidesert steppes, Gobi Desert; 3100–4200 m. SE Xinjiang (Ruoqiang).

11. Artemisia obtusiloba Ledebour, Fl. Altaic. 4: 68. 1833.

钝裂蒿 dun lie hao

Herbs, perennial, caespitose, 10–35 cm tall, with woody rootstocks and branches, shortly branched or not, densely gray pubescent, glabrescent, purple or brown. Leaves and phyllaries densely pubescent, sometimes glabrescent; leaves usually gland-dotted. Middle stem leaves sessile, with pseudostipules; leaf blade oblong, broadly ovate, or obovate, 0.3–2 × 0.2–1.5(–1.7) cm, 1- or 2-pinnatisect and panduratisect; segments 2–4 pairs, distal lobes falcate, usually 3–5-palmatisect; lobules linear, linear-lanceolate, or elliptic-lanceolate, 1.5–6 × 0.5–1.5 mm, rarely lacerate, apex obtuse. Uppermost leaves and leaflike bracts pinnatisect or entire. Synflorescence a ± narrow spikelike panicle. Capitula sessile. Involucre globose or broadly ovoid, 1.5–3(–4) mm in diam.; phyllaries yellowish pubescent; receptacle pubescent or glabrous. Marginal female florets 6–12. Disk florets 15–30, bisexual; corolla limb puberulent or glabrescent. Achenes ellipsoid. Fl. and fr. Jul–Aug.

Dry hills, semidesert steppes, roadsides, saline-alkaline soils, rocky slopes, canyons; below 1700 m. N Xinjiang [Kazakhstan, Mongolia, Russia].

Krasnoborov (Fl. Sibir. 13: 138–140. 1997) recognized four subspecies within *Artemisia obtusiloba*, the typical subspecies plus three further subspecies endemic to Siberia: *A. obtusiloba* subsp. *altaica* (Krascheninnikov) Krasnoborov, *A. obtusiloba* subsp. *martjanovii* (Krascheninnikov ex Poljakov) Krasnoborov, and *A. obtusiloba* subsp. *subviscosa* (Turczaninow ex Besser) Krasnoborov.

1a. Receptacle pubescent; leaf blade 0.6–2 × 0.5–1.5(–1.7) cm ..... 11a. var. *obtusiloba*

1b. Receptacle glabrous; leaf blade 0.3–0.7 × 0.2–0.5 cm ..... 11b. var. *glabra*

11a. Artemisia obtusiloba var. **obtusiloba**

钝裂蒿(原变种) dun lie hao (yuan bian zhong)

Artemisia obtusiloba var. *gracilis* Ledebour.

Middle stem leaves: blade oblong or broadly ovate, 0.6–2 × 0.5–1.5(–1.7) cm, 2-pinnatisect and panduratisect; segments 2 or 3 pairs, lobules linear, linear-lanceolate, or elliptic-lanceolate, 1.5–3 × 0.5–1.5 mm, rarely lacerate, apex obtuse. Involucre 2–3(–4) mm in diam.; receptacle pubescent. Marginal female florets 6–12. Disk florets 20–30.

Dry hills, semidesert steppes, roadsides, saline-alkaline soils; 900–1700 m. N Xinjiang [Kazakhstan, Mongolia, Russia (W Siberia)].

11b. Artemisia obtusiloba var. **glabra** Ledebour, Fl. Altaic. 4: 70. 1833.

亮绿蒿 liang lü hao

Artemisia glabella Karelin & Kirilov; *A. obtusiloba* var. *glabella* (Karelin & Kirilov) Poljakov.

Middle stem leaves: blade ovate or obovate, 0.3–0.7 × 0.2–0.5 cm, 1- or 2-pinnatisect; segments (2 or)3 or 4 pairs; lobules linear or linear-lanceolate, 3–6 × 0.5–1.5 mm. Involucre 1.5–2.5(–3.5) mm in diam.; receptacle glabrous. Female florets 6–10. Disk florets 15–25. Achenes ellipsoid. Fl. and fr. Jul–Sep.

Rocky slopes, steppes, canyons; low elevations. N Xinjiang [Russia].

Artemisia obtusiloba var. *glabra* has been treated as a distinct species belonging to *A.* sect. *Abrotanum* because it lacks the hairy receptacle characteristic of *A.* sect. *Absinthium*. In all other characters it is a good match with *A. obtusiloba*.

12. Artemisia lagocephala (Fischer ex Besser) Candolle, Prodr. 6: 122. 1838.

白山蒿 bai shan hao

Absinthium lagocephalum Fischer ex Besser, Bull. Soc. Imp. Naturalistes Moscou 1: 233. 1829; *Artemisia besseriana* Ledebour; *A. besseriana* var. *integrifolia* Ledebour; *A. besseriana* var. *triloba* Ledebour; *A. kruhsiana* Besser; *A. lagocephala* var. *besseriana* (Ledebour) Pampanini; *A. lagocephala* f. *integrifolia* (Ledebour) Pampanini; *A. lagocephala* f. *triloba* (Ledebour) Pampanini; *A. lagocephala* var. *triloba* (Ledebour) Herder.

Subshrubs or herbs, caespitose, 40–80 cm tall, with woody rootstock, shortly branched, densely gray or brownish pubescent. Lowermost and middle stem leaves sessile, spatulate, elliptic-oblanceolate, or lanceolate, 3–6 × 0.3–1 cm, 3–5-crenately cleft or entire apically, cuneate basally, lacerate and serrate. Upper leaves and leaflike bracts lanceolate or linear-lanceolate, apex obtuse or acute. Synflorescence a racemelike panicle. Capitula pedunculate. Involucre hemispheric or subglobose, 4–6 mm in diam.; receptacle hemispheric, pubescent. Marginal female florets 7–10; corolla 3(or 4)-toothed. Disk florets 30–80, bisexual; corolla limb puberulent. Achenes ellipsoid or obovoid. Fl. and fr. Aug–Oct. $2n = 18$.

Hills, rocky slopes, ridges, outer forest margins, roadsides, forest steppes; below 2600 m. Heilongjiang, Jilin, E Nei Mongol, Sichuan [E Russia].

Material of this species has sometimes been included within *Artemisia chinensis* (here treated as *Crossostephium chinensis*). Komarov (Fl. Manshur. 3: 668. 1907) placed material of this taxon within *A. stelleriana* Besser. Krasnoborov (Fl. Sibir. 13: 136–137. 1997) recognized *A. kruhsiana* as distinct:

Artemisia kruhsiana is distinguished by florets glabrous (vs. florets pubescent with slender crispate hairs in *A. lagocephala*); leaves white tomentose abaxially, fairly deeply once or twice trisect on vegetative shoots (vs. radical leaves gray tomentose abaxially, rather shallowly 3-lobate, with 3 teeth or entire in *A. lagocephala*); and plants to 40 cm tall (vs. plants 40–80 cm tall in *A. lagocephala*).

13. Artemisia disjuncta Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 176. 1946.

矮丛光蒿 ai cong guang hao

Herbs, perennial, caespitose, 10–15 cm tall, with woody rootstock, usually not branched. Basal and lower stem leaves: petiole 20–30 mm, ± clasping; basal leaf blades oblong or elliptic, 4–6 × 2–4 cm, abaxially gland-dotted, 2- or 3-pinnatipartite or -sect; segments 3 or 4 pairs; lobes 2- or 3-partite; lobules elliptic-lanceolate or lanceolate, occasionally 1–3-serrate; rachis narrowly winged. Uppermost leaves oblong, 1(or 2)-pinnatipartite, 10–20 × 5–18 mm, leaflike bracts minute, pinnatipartite or entire. Synflorescence racemelike. Capitula nodding; peduncle 5–15 mm. Involucre subglobose, 5–8 mm in diam.; phyllaries glabrescent, scarious margin black; receptacle convex, pubescent. Marginal female florets 8–12. Disk florets 30–50, bisexual; corolla limb puberulent. Achenes ovoid-ellipsoid. Fl. and fr. Aug–Oct.

Slopes or rocky hills; 1700–2700 m. E Xinjiang [W Mongolia].

14. Artemisia niitakayamensis Hayata, Bot. Mag. (Tokyo) 20: 16. 1906.

玉山艾 yu shan ai

Herbs, perennial, 10–20 cm tall, with ± woody rootstock and branches, most parts puberulent, glabrescent. Basal and middle stem leaves: petiole 5–10 mm; leaf blade ovate or obovate, 1–2.5 × 0.7–1.6 cm, 2-pinnatisect; segments (3 or)4(or 5) pairs, serrate or lobulate; lobules 2–4 pairs, pectinate, 2–8 × 0.6–1 mm. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect or -partite or entire, lobes or entire leaves lanceolate. Synflorescence racemelike. Capitula few, apically congested; peduncle 5–20 mm. Involucre hemispheric, 7–10 mm in diam.; phyllaries glabrescent, scarious margin brown, lacerate; receptacle convex, pubescent. Marginal female florets 10–18, (2 or)3- or 4-toothed. Disk florets 40–60, bisexual. Achenes oblong or obovoid-oblong. Fl. and fr. Aug–Sep.

• Alpine situations; 3000–3800 m. Taiwan.

15. Artemisia minor Jacquemont ex Besser, Bull. Soc. Imp. Naturalistes Moscou 9: 22. 1836.

垫型蒿 dian xing hao

Artemisia sieversiana Ehrhart ex Willdenow var. *tibetica*

C. B. Clarke; *A. tibetica* (C. B. Clarke) J. D. Hooker & Thomson.

Herbs or dwarf subshrubs, caespitose, 10–15 cm tall, with horizontally creeping thick woody rootstock and branches, stems covered with broad dry leaf bases, most parts densely gray or yellowish silky-villous. Basal and middle stem leaves: petiole 0.4–0.8 cm; leaf blade suborbicular, flabellate, or reniform, (0.4–)0.6–1.2 × 0.5–1 cm, 2-pinnatisect; segments in 2(or 3) pairs, narrowly oblanceolate, 3–5-lobulate; lobules linear or linear-lanceolate, 1–2 × 0.5–1 mm, apex obtuse. Uppermost leaves and leaflike bracts minute, pinnatisect or 3-lobed or entire. Synflorescence spikelike or racemelike. Capitula usually 6–9, subsessile, remote, secund. Involucre hemispheric or subglobose, (3–)5–10 mm in diam.; outer phyllaries sparsely hairy, scarious margin broad, lacerate, purple or dark brown, apex acute; receptacle hemispheric, pubescent. Florets many, all fertile. Marginal female florets 10–18, (2 or)3- or 4-toothed. Disk florets 50–80, bisexual; corolla limb purple. Achenes brown, obovoid, ca. 0.8 mm. Fl. and fr. Jul–Oct.

Slopes, canyons, peaks, shores of salt lakes, saline soils, rocky grasslands, waysides; 3000–5800 m. W Gansu, W Qinghai, S Xinjiang, Xizang [N India, N Pakistan; SW Asia (Iran)].

16. Artemisia younghusbandii J. R. Drummond ex Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 708. 1927.

藏白蒿 zang bai hao

Herbs or subshrubs, caespitose, 15–25(–30) cm tall, with thick woody stock and branches, much branched, densely gray or yellowish tomentose. Basal and middle stem leaves: petioles 2–4 mm; leaf blades ovate, broadly ovate, or subreniform, 5–10 × 5–8 mm, 1(or 2)-pinnatisect; segments 2 or 3 pairs, entire or lobulate; lobes or lobules minute, lanceolate or elliptic-lanceolate, 1–2 × 0.5–1 mm. Uppermost leaves and leaflike bracts pinnatisect, 3-lobed, or entire. Synflorescence a broad panicle. Capitula nodding. Involucre hemispheric or broadly ovoid, (2.5–)3–4 mm in diam.; receptacle conical, pubescent. Marginal female florets 4–8. Disk florets 8–14; corolla limb purple, glabrous. Achenes obovoid-ellipsoid. Fl. and fr. Jul–Oct.

• Canyons, hills, rocky slopes, waysides; 4000–4700 m. Xizang.

17. Artemisia stracheyi J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 164. 1876.

冻原白蒿 dong yuan bai hao

Artemisiella stracheyi (J. D. Hooker & Thomson ex C. B. Clarke) Ghafoor.

Herbs, perennial, caespitose, 15–45 cm tall, with thick woody root and stock, usually not branched, densely gray yellow or yellowish sericeous-tomentose, fetid. Basal leaves: petiole 5–8 cm, ± clasping; leaf blade narrowly ovate, oblong, or elliptic, 5–10 × 1–2 cm, 2- or 3-pinnatisect; segments 7–13 pairs, 1–3-lobulate; lobules narrowly linear-lanceolate or linear, 3–5 × 1–1.5 mm. Middle and uppermost leaves 1- or 2-pinnatisect; leaflike bracts pinnatisect or entire. Synflorescence racemelike, sometimes dense and spikelike. Capitula shortly pedunculate, nodding. Involucre hemispheric, 6–10 mm in diam.; receptacle hemispheric, deciduously pubescent. Marginal female florets 4–10. Disk florets 50–60, bisexual; corolla with adhering multicellular hairs. Achenes obovoid. Fl. and fr. Jul–Nov. $2n = 18$.

Hills, floodlands, lakesides, rocky slopes, meadows, shrublands; 4300–5200 m. Xizang [N India, N Pakistan].

18. Artemisia fauriei Nakai, Bot. Mag. (Tokyo) 29: 7. 1915.

海州蒿 hai zhou hao

Artemisia fukudo Makino var. *mokpensis* Pampanini; *A. haichowensis* C. C. Chang.

Herbs, perennial, 20–40 cm tall, root solitary; most parts gray and arachnoid tomentose, glabrescent. Basal leaves ± in rosette, soon withering; petiole 5–13 cm; leaf blade ovate or broadly ovate, 11–18 × 8–16 cm, 3- or 4-pinnatisect; lobules filiform, (10–)15–30 × 0.5–1.5 mm. Middle and upper stem leaves: leaf blade broadly ovate, 3–5 × 3–5 cm, 2- or 3-pinnatisect; segments 3 or 4 pairs; lobules filiform, 5–15 × 0.5–1.5 mm. Uppermost leaves and leaflike bracts 3–5-pinnatisect or entire; lobes of entire leaves 1–3 cm. Synflorescence a panicle with ascending main branches and many short lateral racemes. Capitula pedunculate, nodding. Involucre ovoid or obovoid, 2–3(–4) mm in diam.; receptacle pubescent. Marginal female florets 2–5. Disk florets 8–15, bisexual. Achenes obovoid, slightly compressed. Fl. and fr. Aug–Oct.

Coastal beaches, sand banks of sea and river mouths; near sea level. Hebei, Jiangsu, Shandong [Japan, Korea].

The original concept of *Artemisia fauriei* also included *Faurie 361*, now the type of *A. nakaii*, which differs by its biennial habit and basal leaves with shorter, 6–15 mm, filiform lobules.

19. Artemisia nakaii Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 682. 1927.

矮滨蒿 ai bin hao

Herbs, biennial, 30–60 cm tall, long branched, densely arachnoid and sericeous pubescent or glabrescent. Basal leaves ± forming rosettes; petiole 4–10 cm; leaf blade suborbicular or ovate, 8–15 × 8–15 cm, 3-pinnatisect; lobules filiform, 6–15 mm. Lower and middle stem leaves: leaf blade orbicular or ovate, 1.5–8 × 0.8–1.5 cm, 1- or 2-pinnatisect; segments 2 or 3 pairs; lobules linear or filiform, 4–15 × ca. 0.5 mm. Uppermost leaves and leaflike bracts 1(or 2)-pinnatisect. Synflorescence a narrow to broad panicle. Capitula nodding. Involucre ellipsoid or obconical, (2–)3(–4) mm in diam.; phyllaries minutely tomentose, ± glabrescent; receptacle white pubescent. Marginal female florets 2–5. Disk florets 8–16, bisexual. Achenes obovoid-ellipsoid. Fl. and fr. Aug–Oct.

Sand banks along rivers, grasslands; low elevations. Hebei, Liaoning, SE Nei Mongol [Korea].

Artemisia nakaii is based on the gathering *Faurie 361*, originally included within *A. fauriei*, which differs by its perennial habit and basal leaves with longer, (10–)15–30 mm, filiform lobules.

20. Artemisia anethifolia Weber ex Stechmann, Artemis. 29. 1775.

碱蒿 jian hao

Absinthium divaricatum Fischer ex Besser; *Artemisia anethifolia* var. *erectiflora* Candolle; *A. anethifolia* f. *gracilis* Pampanini; *A. anethifolia* var. *multicaulis* (Ledebour) Candolle; *A. anethifolia* f. *shansiensis* Pampanini; *A. anethifolia* var. *stelleriana* Candolle; *A. multicaulis* Ledebour.

Herbs, annual or biennial, 20–55 cm tall, stems sometimes very slender; all parts pubescent, often glabrescent. Basal leaves elliptic or ovate-elliptic in outline, 3–4.5 × 1.5–2.5(–3) cm, 2- or 3-pinnatisect; segments 3 or 4 pairs, distal lateral lobes lobulate; lobules filiform, 6–12 × 0.5–1.5 mm. Uppermost leaves and leaflike bracts 3–5-lobed or entire. Synflorescence a broad panicle with flowering shoots from most upper nodes. Capitula closely to widely spaced, pedunculate, often bracteolate. Involucre hemispheric or broadly ovoid, wider than long, 2–3(–4) mm in diam.; phyllaries ± densely puberulent, sometimes ± glabrescent; receptacle convex, white pubescent. Marginal female florets 3–6. Disk florets 18–28, bisexual; corolla limb yellow or red. Achenes ellipsoid or obovoid. Fl. and fr. Aug–Oct.

Slopes, dry canyons, saline soils, saline steppes, wastelands, stable dunes, *Hippophae* thickets; 800–2500 m. Gansu, Hebei, W Heilongjiang, Nei Mongol, Ningxia, Qinghai, Shaanxi, N Shanxi, Xinjiang [Mongolia, Russia].

This species is used as herbage for feeding livestock.

21. Artemisia anethoides Mattfeld, Repert. Spec. Nov. Regni Veg. 22: 249. 1926.

莳萝蒿 shi luo hao

Artemisia anethifolia Weber ex Stechmann var. *anethoides* (Mattfeld) Pampanini; *A. zhaodongensis* G. Y. Chang & M. Y. Liou.

Herbs, annual or biennial, 30–60(–90) cm tall, gray pubescent. Basal and lowermost stem leaves: leaf blade ovate or elliptic-ovate, 3–4(–5) × 2–4 cm, 3(or 4)-pinnatisect; lobules filiform or linear-lanceolate. Middle stem leaves: leaf blade ovate or broadly ovate in outline, 2–4 × 1–3 cm, 2- or 3-pinnatisect; segments (1 or)2 or 3 pairs; lobules filiform, 2–5 × 0.3–0.5 mm. Uppermost leaves and leaflike bracts 3-lobed or entire. Synflorescence a narrow panicle, to 15 × 3 cm, most nodes producing racemes or flowering branches to form a broad compound panicle. Capitula many, pedunculate, bracteolate, nodding. Involucre subglobose, 1.5–2(–2.5) mm in diam.; phyllaries and receptacle densely pubescent. Marginal female florets 3–6. Disk florets 8–16, bisexual. Achenes obovoid. Fl. and fr. Jul–Oct.

Hills, slopes, saline soils, sand banks of rivers and lakes, roadsides, wastelands, steppes, semidesert steppes, desert forests; low elevations to 3300 m. Gansu, Hebei, Heilongjiang, N Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, N Shandong, Shanxi, N Sichuan, Xinjiang [Mongolia, Russia].

Artemisia anethoides is used for feeding livestock.

22. Artemisia succulentoides Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 504. 1980.

肉质叶蒿 rou zhi ye hao

Herbs, annual or biennial, 25–40 cm tall, puberulent, glabrescent. Middle stem leaves: petiole 1.5–2.5 cm; leaf blade ovate, 1.5–2 × 1–1.5 cm, 1- or 2-pinnatisect; segments 2 or 3 pairs, deeply pectinately serrate; teeth obtuse, gland-tipped. Middle and upper stem leaves pinnatifid or entire. Uppermost leaves linear; leaflike bracts linear or linear-lanceolate, 10–25 × 1–1.5 mm. Synflorescence a broad panicle. Capitula nodding. Involucre globose or hemispheric, 3–5 mm in diam.; receptacle densely white pubescent. Marginal female florets 5–20. Disk florets 30–50, bisexual; corolla limb puberulent. Achenes minute. Fl. and fr. Aug–Oct.

• Grasslands, sandy riverbanks; 3700–3800 m. Xizang (Lhasa).

23. Artemisia persica Boissier, Diagn. Pl. Orient., ser. 1, 6: 91. 1846.

伊朗蒿 yi lang hao

Herbs or subshrubs, 25–70 cm tall, much branched, arachnoid pubescent, glabrescent, with thick and woody rootstock and basal branches, branchlets ascending or erect, spine-tipped or not, densely leafy. Lower and middle stem leaves: petiole 0.5–1 cm; leaf blade suborbicular or ovate, 1.2–3.5(–4.5) × (0.8–)1.5–2.5 cm, 2- or 3-pinnatisect; segments 3–5 pairs; lobules minute, pectinately linear-lanceolate or linear, 4–6 × ca. 0.5 mm. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect. Synflorescence a ± cylindric to conical panicle, to 30 × 8–12 cm; branches ascending to obliquely erect, 6–20 cm. Capitula secund, nodding; peduncles (1–)2–4 mm. Involucre hemispheric, 3–4(–5) mm in diam.; phyllaries densely arachnoid pubescent in middle, margin scarious, apex obtuse; receptacle densely pubescent, glabrescent. Florets 40–50, all yellow. Marginal female florets 10–15; corolla compressed, gland-dotted. Disk florets 35–50, bisexual; corolla limb purple, densely long puberulent or glabrescent. Achenes light brown, ellipsoid-ovoid or ovoid, ca. 1 mm. Fl. and fr. Jul–Oct. $2n = 18$.

Rocky slopes, sandy beaches; 2900–4000 m. W Qinghai, Xizang [Afghanistan, N India, Kazakhstan, Kyrgyzstan, Myanmar, N Pakistan, Tajikistan; SW Asia (Iran)].

1a. Branchlets not spine-tipped ..... 23a. var. *persica*
1b. Branchlets spine-tipped ..... 23b. var. *subspinescens*

23a. Artemisia persica var. **persica**

伊朗蒿(原变种) yi lang hao (yuan bian zhong)

Artemisia togusbulakensis O. Fedtschenko.

Branchlets not spine-tipped.

Rocky slopes, sandy beaches; 2900–4000 m. W Qinghai, Xizang [Afghanistan, N India, Kazakhstan, Kyrgyzstan, Myanmar, N Pakistan, Tajikistan; SW Asia (Iran)].

Artemisia persica is used as an anti-inflammatory, a hemostatic, or for aiding digestion.

23b. Artemisia persica var. **subspinescens** (Boissier) Boissier, Fl. Orient. 3: 374. 1875.

微刺伊朗蒿 wei ci yi lang hao

Artemisia subspinescens Boissier, Diagn. Pl. Orient., ser. 1, 6: 91. 1846.

Branches and branchlets with hard, thorny tips.

Xizang [Afghanistan; SW Asia (S Iran)].

2. Artemisia sect. **Abrotanum** (Duhamel du Monceau) Besser, Bull. Soc. Imp. Naturalistes Moscou 1: 222. 1829.

艾蒿组 ai hao zu

Abrotanum Duhamel du Monceau, Traité Arbres Arbust. 1: 19. 1755.

Herbs, annual or perennial, rarely subshrubs, pubescent, tomentose, or glabrous, rarely arachnoid, without glandular or viscid hairs (sessile glands often present). Leaves 2–4-pinnatisect; lobules pectinate, filiform, narrowly linear, or lanceolate, less than 1(–1.5) mm wide. Capitula hemispheric, globose, or subglobose, rarely ovoid. Phyllary margins scarious, midvein green or sometimes colored. Receptacle glabrous. Marginal florets (1–)3–20; corolla narrowly tubular or rarely narrowly conical, 2- or 3(or 4)-toothed or without teeth. Disk florets (7–)10–80, bisexual, ovaries well developed; style ca. as long as or longer than corolla, branches divergent, recurved at apex.

About 65 species: N Hemisphere, mostly in Asia and Europe, a few species extending into N Africa, Oceania, and the Americas; 30 species (seven endemic) in China.

Most species contain mainly monoterpenoids and also a few sesquiterpenoids. This section has been confused with *Artemisia* sect. *Artemisia*.

1a. Leaves pinnatisect, with ultimate lobules filiform, linear-filiform, filiform-clavate, narrowly lanceolate, or linear-lanceolate, (5–)10+ × 0.5–1(–1.5) mm, apex acute.
2a. Herbs annual, biennial, or short-lived perennial; rootstock a simple taproot, sometimes ± fusiform.
3a. Herbs biennial or short-lived perennial; capitula obconical, 4–5 mm in diam. .... 52. *A. fukudo*
3b. Herbs annual; capitula ovoid or subglobose, 2–3 mm in diam.
4a. Middle stem leaves pinnatisect, segments 2(or 3) pairs; plants pubescent, ± glabrescent ..... 53. *A. przewalskii*
4b. Middle stem leaves 2- or 3-pinnatisect, segments (2 or)3 or 4 pairs; plants glabrous or nearly so.
5a. Stem branches short or absent; middle stem leaves (1 or)2-pinnatisect, segments (2 or)3 or 4 pairs; capitula 2–10 grouped, in narrow panicles ..... 46. *A. palustris*
5b. Stem branches divaricate; middle stem leaves 2- or 3-pinnatisect, segments 4 or 5 pairs; capitula 2–5 grouped, in broad lax panicles ..... 47. *A. aurata*
2b. Herbs perennial, subshrubs, or shrubs; rootstock often branched, ± woody.
6a. Middle stem leaves 2- or 3-pinnatisect, lobules narrowly linear, densely silvery gray or yellowish sericeous-tomentose; corolla limb puberulent ..... 49. *A. austriaca*
6b. Middle stem leaves 1- or 2-pinnatisect, lobules linear, filiform, or filiform-clavate, pubescent or arachnoid pubescent, sometimes glabrescent later, or densely white tomentose abaxially; corolla limb glabrous.
7a. Stem much branched; middle stem leaves 2–4 cm, 2(or 3)-pinnatisect; abaxial leaf surface and phyllaries densely white tomentose ..... 50. *A. brachyloba*
7b. Stem shortly capitellate branched or not; middle stem leaves 0.8–2.5(–3) cm, 1- or 2-pinnatisect; leaves and phyllaries puberulent or leaves glabrescent.
8a. Stem terete; lobules of middle stem leaves filiform, apex acute ..... 44. *A. adamsii*
8b. Stem 4-ribbed; lobules of middle stem leaves filiform-clavate or linear-filiform, apex obtuse ..... 45. *A. dalai-lamae*
1b. Leaves pinnatipartite or pinnatisect, with ultimate lobules pectinate, serrate, or smoothly obtusely lacerate, less than 5(–8) × 1.5(–2) mm, or lobules minute but then lobes 1–2 mm wide with obtuse apex.
9a. Herbs annual or biennial; stem solitary, more than 20 cm; rootstock a simple taproot, sometimes ± fusiform.
10a. Leaves ± succulent, middle stem leaves 1- or 2-pinnatisect, segments 1 or 2 pairs, with obtuse apex, entire or 1–3-crenate or cleft ..... 51. *A. succulenta*
10b. Leaves thinly papery, middle stem leaves 2- or 3-pinnatisect, segments 2 or more pairs, lobes or lobules acute or obtuse apically.
11a. Basal leaves many, forming rosettes, segments more than 20 pairs; phyllaries with brown or purple-brown scarious margins; marginal female florets 3–8 ..... 41. *A. hedinii*
11b. Basal leaves not forming distinct rosettes, segments 3–8(–10) pairs; marginal female florets 10–12.
12a. Involucre 5–7 mm in diam.; phyllaries puberulent; disk florets 80–150; middle stem leaf segments 3 or 4 pairs, lobes serrate ..... 38. *A. shangnanensis*
12b. Involucre 1.5–5(–7) mm in diam.; phyllaries glabrescent; disk florets 10–40; middle stem leaf segments 4–10 pairs, lobes pectinate.
13a. Lower stem leaf petioles 2–6 cm; leaf blades minutely and lanceolately pectinate; synflorescence narrow and spikelike ..... 42. *A. tournefortiana*
13b. Lower stem leaf petioles less than 2 cm; leaf blades pectinate; synflorescence broader, often a conical, compound panicle.

14a. Middle stem leaves abaxially gray-yellowish or yellowish and gland-dotted; leaf rachis usually not pectinate, midvein obvious, slightly prominent; capitula 1.5–2.5 mm in diam. ..... 40. *A. annua*

14b. Middle stem leaves abaxially green, not gland-dotted; leaf rachis pectinate, midvein flat; capitula 3.5–5(–7) mm in diam. ..... 39. *A. caruifolia*

9b. Herbs perennial or subshrubs; stems several or many, rarely solitary; roots usually woody, or herbs dwarf, less than 20 cm and with thick stock and ± fusiform root.

15a. Herbs dwarf perennial, main root ± fusiform; stem usually less than 15 cm tall; leaves 1(or 2)-palmatisect, segments 1 or 2 pairs, without lobules or occasionally with 2 or 3 minute lobules; synflorescence spikelike ..... 48. *A. caespitosa*

15b. Herbs perennial or subshrubs, roots woody; stem more than 15 cm tall; leaves 1(or 2)-pinnatisect, segments 3 or more pairs; synflorescence paniculate, racemelike, or spikelike.

16a. Capitula broadly ovoid; phyllaries gray arachnoid pubescent; lobes of leaves suborbicularly and obtusely serrate ..... 31. *A. baimaensis*

16b. Capitula hemispheric, globose, or subglobose; phyllaries puberulent, later glabrescent; lobes of leaves pectinate, or lobules lanceolate or linear-lanceolate, rarely linear-falcate.

17a. Middle stem leaves 1- or 2-pinnatipartite, lobules pectinate.

18a. Subshrubs; stem more than 70 cm; lobules of leaves elliptic or lanceolate and serrate; capitula 4–6 mm in diam. ..... 32. *A. medioxima*

18b. Herbs perennial; stem 20–70 cm; lobules of leaves pectinate; capitula 3–4 mm in diam. ..... 35. *A. latifolia*

17b. Middle stem leaves 2- or 3(or 4)-pinnatisect, lobules serrate.

19a. Capitula hemispheric, rarely subglobose, 4–7 mm in diam., in racemes, spikes, or panicles.

20a. Herbs perennial; corolla limb puberulent.

21a. Middle stem leaves pinnatisect, segments 5–7(or 8) pairs, lobes pectinate or deeply serrate; phyllaries with entire broad brown scarious margins ..... 36. *A. phaeolepis*

21b. Middle stem leaves 2-pinnatisect or -partite, segments 4(or 5) pairs, lateral mid-lobes deeply 2–4-serrate; phyllaries with lacerate brown scarious margins ..... 43. *A. tsugitakaensis*

20b. Subshrubs; corolla limb often glabrous.

22a. Petioles of middle stem leaves 6–16 cm; leaves 1(or 2)-pinnatisect, lobes minutely irregularly pectinate-serrate ..... 34. *A. maximovicziana*

22b. Petioles of middle stem leaves less than 3 cm; leaves 2 or 3(or 4)-pinnatisect, lobules minutely serrate.

23a. Middle stem leaves ± sessile, 2(or 3)-pinnatisect, lobules minutely linear or linear-lanceolate or falcate, 0.5(–1) mm wide; capitula sessile or shortly pedunculate; phyllaries pubescent ..... 24. *A. macrantha*

23b. Middle stem leaves petiolate, 2 or 3(or 4)-pinnatisect, lobules minute, pectinate, linear, elliptic, or ovate, (0.5–)1–1.5 mm wide; capitula pedunculate; phyllaries glabrescent or puberulent.

24a. Middle stem leaves 3(or 4)-pinnatisect, segments 5–8 pairs, abaxial midvein obviously convex; peduncles 2–4 mm; phyllaries glabrescent ..... 26. *A. polybotryoidea*

24b. Middle stem leaves 2(or 3)-pinnatisect, segments 3(or 4) pairs, abaxial midvein not convex; peduncles 4–15 mm; phyllaries puberulent ..... 27. *A. aksaiensis*

19b. Capitula subglobose, 2.5–4 mm in diam., in panicles.

25a. Middle stem leaves with 6–8 pairs of segments, abaxially white tomentulose ..... 37. *A. tanacetifolia*

25b. Middle stem leaves with 3–5 pairs of segments, abaxially pubescent or glabrescent.

26a. Plants with short, woody vegetative shoots and slender, virgate synflorescences; petiole of middle stem leaves 0.3–0.5 cm; capitula with 16–20 disk florets ..... 33. *A. freyniana*

26b. Plants much branched with most shoots fertile; petiole of middle stem leaves 0.8–5 cm; capitula usually with 20–60 disk florets (*A. vestita* with 12–20).

27a. Leaf blade 0.3–0.7 × 0.2–0.5 cm ..... 11. *A. obtusiloba* (see *A.* sect. *Absinthium*)
27b. Leaf blade 2–10 × 0.7–8 cm.
28a. Lobules of middle stem leaves entire, apex obtuse ..... 25. *A. pontica*
28b. Lobules of middle stem leaves serrate or pectinate, apex acute.
29a. Middle stem leaves abaxially yellow arachnoid pubescent, lobules linear or narrowly lanceolate; capitula with 40–60 disk florets ..... 29. *A. stechmanniana*
29b. Middle stem leaves abaxially gray pubescent, often glabrescent, lobules serrate or pectinate; capitula with 12–40 disk florets.
30a. Middle stem leaves triangular or elliptic-ovate in outline, lobules with triangular teeth; phyllaries puberulent or glabrescent; capitula with 20–40 disk florets ..... 28. *A. gmelinii*
30b. Middle stem leaves ovate, elliptic-ovate, or suborbicular in outline, lobules deeply serrate; phyllaries densely pubescent; capitula with 12–20 disk florets ..... 30. *A. vestita*

24. Artemisia macrantha Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 573. 1815.

亚洲大花蒿 ya zhou da hua hao

Subshrubs or herbs, 20–100 cm tall, with woody rootstock and branches, densely white pubescent. Branches 8–18 cm. Lower and middle stem leaves: leaf blade ovate or oblong, 4–8 × 2–7 cm, 2(or 3)-pinnatisect; segments (3 or)4 or 5 pairs, lobules minute, linear or linear-lanceolate, serrate, teeth 3–5(–8) × 0.5(–1) mm, apex acute, sometimes falcately curved. Uppermost leaves and leaflike bracts pinnatisect or entire; lobes or entire leaves linear-lanceolate and longer than those of flowering branches. Synflorescence a ± narrow panicle. Involucre subglobose or hemispheric, 4–7 mm in diam.; phyllaries with scarious margin brown; receptacle convex. Marginal female florets 10–20. Disk florets 30–38 or more, bisexual; corolla limb puberulent. Achenes ellipsoid-ovoid. Fl. and fr. Aug–Oct. $2n$ = 108.

Canyons, steppes, meadows, shrublands, waysides; low elevations to 1500 m. W Nei Mongol, E Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

25. Artemisia pontica Linnaeus, Sp. Pl. 2: 847. 1753.

西北蒿 xi bei hao

Subshrubs or herbs, 30–60(–100) cm tall, with woody rootstock and basal branches, densely pubescent, or stem glabrescent, much branched. Basal leaves in rosettes. Leaves abaxially sparsely pubescent; basal and lower stem leaves: leaf blades ovate or broadly ovate, 2–5 × 1.5–3 cm, 2- or 3-pinnatisect. Middle stem leaves 2-pinnatisect; segments 3 or 4 pairs; lobules elliptic or linear, 3–5 × 0.5–1 mm, obtuse apically. Uppermost leaves and leaflike bracts pinnatisect or entire; lobes of entire leaves linear or linear-lanceolate. Synflorescence a ± narrow panicle. Capitula many, nodding. Involucre globose, 2.5–3(–3.5) mm in diam. Marginal female florets 8–12. Disk florets 30–40, bisexual; corolla limb puberulent or later glabrescent. Achenes obovoid. Fl. and fr. Jul–Oct. $2n$ = 18.

Rocky slopes, dry valleys, steppes, hills; low to middle elevations. Gansu, Ningxia, E and N Xinjiang [Kazakhstan, Russia; C and E Europe, North America].

26. Artemisia polybotryoidea Y. R. Ling, Bull. Bot. Res., Harbin 5(2): 1. 1985.

甘新青蒿 gan xin qing hao

Herbs, perennial, caespitose, 50–60 cm tall, with woody rootstock and branches, much branched. Leaves abaxially glabrescent or puberulent, gland-dotted; middle stem leaves: petiole 2.5–3.5 cm; leaf blade ovate or elliptic, 4–5.5 × 2.5–3.5 cm, 3(or 4)-pinnatisect; segments 5–8 pairs; lobules minute, pectinate or shortly linear, 1–3 × (0.5–)1–1.5 mm; rachis serrate, occasionally serrulate, midrib obviously prominent abaxially. Uppermost leaves and leaflike bracts 2- or 3-pinnatisect. Synflorescence of many axillary conical to cylindric panicles forming large compound panicle. Capitula many. Involucre globose, 4–5 mm in diam.; phyllaries glabrescent. Marginal female florets 8–12. Disk florets 25–35, bisexual. Achenes obovoid. Fl. and fr. Aug–Oct.

● Hills, waysides; 1000–1500 m. Gansu, Xinjiang.

27. Artemisia aksaiensis Y. R. Ling, Bull. Bot. Res., Harbin 5(2): 3. 1985.

阿克塞蒿 a ke sai hao

Herbs or subshrubs, caespitose, 40 cm tall or more, with woody rootstock and branches, gray puberulent or sparsely puberulent or glabrescent, much branched. Leaves gland-dotted. Lower and middle stem leaves: petiole 1–2 cm; leaf blade ovate, 2–2.5 × 1.5–2 cm, 2(or 3)-pinnatisect; segments 3(or 4) pairs; lobules minute, elliptic or ovate, 3 or 4 pairs, 2–4 × 1–1.5 mm, occasionally with 1 or 2 teeth. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect. Synflorescence a broad panicle. Capitula peduncle 5–15 mm, rarely less than 4 mm. Involucre hemispheric or globose, 5–8 mm in diam.; phyllaries white puberulent. Marginal female florets 6–11. Disk florets 12–18, bisexual. Achenes obovoid. Fl. and fr. Aug–Oct.

● Hills; 3100–3800 m. W Gansu.

28. Artemisia gmelinii Weber ex Stechmann, Artemis. 30. 1775 [*"gmelini"*].

细裂叶莲蒿 xi lie ye lian hao

Subshrubs, caespitose, 50–100(–150) cm tall, from woody rhizomes, densely pubescent, or glabrescent. Stems branched from upper parts. Leaves gland-dotted. Middle stem leaves: petiole 1–5 cm, triangular- or elliptic-ovate, 2–10 × 2–8 cm, 2- or 3-pinnatisect; segments 3–5 pairs; lobules serrate or pectinate; rachis serrate. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect or entire; lobes linear or linear-lanceolate. Synflorescence a broad panicle. Capitula nodding. Involucre globose, 2–3.5(–5) mm in diam.; phyllaries puberulent, sometimes glabrescent. Marginal female florets 10–12; corolla narrowly tubular, ca. 1.3 mm, densely gland-dotted. Disk florets 20–40, bisexual; corolla ca. 1.8 mm. Achenes ellipsoid-ovoid or ellipsoid-conical. Fl. and fr. Aug–Oct. $2n = 18, 36$.

Hills, waysides, shrublands, slopes, often dominant on S slopes, roadsides, forest steppes, steppes, meadows, dry floodlands, wastelands; 1000–4900 m or below. Anhui, Gansu, Guangdong, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang; one variety widespread throughout China [Afghanistan, N India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, N Pakistan, Russia, Tajikistan, Uzbekistan; E Europe].

Poljakov (Fl. URSS 26: 465. 1961) showed that *Artemisia sacrorum* and the type of *A. gmelinii* are conspecific. Most material previously identified as *A. gmelinii* by Chinese authors belongs to *A. stechmanniana*.

1a. Leaves 2(or 3)-pinnatisect, sparsely pubescent adaxially, densely pubescent abaxially ..... 28b. var. *messerschmidiana*
1b. Leaves 2- or 3-pinnatisect, gray pubescent on both surfaces, sometimes glabrescent.
2a. Leaves glabrescent ..... 28a. var. *gmelinii*
2b. Leaves persistently pubescent ..... 28c. var. *incana*

28a. Artemisia gmelinii var. **gmelinii**

白莲蒿(原变种) bai lian hao (yuan bian zhong)

Artemisia gmelinii var. *intermedia* (Ledebour) Krascheninnikov; *A. gmelinii* var. *legitima* Besser; *A. iwayomogi* Kitamura; *A. messerschmidiana* Besser f. *laxiflora* Nakai; *A. messerschmidiana* var. *viridis* Besser; *A. sacrorum* Ledebour; *A. sacrorum* f. *intermedia* (Ledebour) Pampanini; *A. sacrorum* subsp. *intermedia* (Ledebour) Kitamura; *A. sacrorum* var. *intermedia* Ledebour; *A. sacrorum* var. *laciniiformis* Nakai; *A. sacrorum* var. *latiloba* Ledebour; *A. sacrorum* subf. *laxiflora* (Nakai) Pampanini; *A. sacrorum* subsp. *laxiflora* (Nakai) Kitagawa; *A. vestita* Wallich ex Besser var. *viridis* (Besser) Wang & H. T. Ho ex H. C. Fu.

Leaves 2- or 3-pinnatisect, both surfaces gray pubescent, later glabrescent.

Hills, waysides, shrublands, slopes, often dominant on S slopes, roadsides, forest steppes; 1500–4900 m. Anhui, Gansu, Guangdong, Hebei, Henan, Hubei, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang [Afghanistan, N India, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, N Pakistan, Russia, Tajikistan].

28b. Artemisia gmelinii var. **messerschmidiana** (Besser) Poljakov in Schischkin & Bobrov, Fl. URSS 26: 464. 1961 [*"Messerschmidtiana"*].

密毛白莲蒿 mi mao bai lian hao

Artemisia messerschmidiana Besser, Tent. Abrot. 27. 1832; *A. gmelinii* var. *messerschmidiana* (Besser) Poljakov; *A. sacrorum* var. *messerschmidiana* (Besser) Y. R. Ling.

Leaves 2(or 3)-pinnatisect, both surfaces gray or yellowish pubescent, abaxially densely pubescent, adaxially sparsely so.

Hills, waysides. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [Afghanistan, Japan, Korea, Mongolia, Russia].

28c. Artemisia gmelinii var. **incana** (Besser) H. C. Fu in Ma, Fl. Intramongol. 6: 152. 1982.

灰莲蒿 hui lian hao

Artemisia messerschmidiana var. *incana* Besser, Tent. Abrot. 28. 1832; *A. freyniana* (Pampanini) Krascheninnikov f. *discolor* (Komarov) Kitagawa; *A. gmelinii* var. *discolor* (Komarov) Nakai; *A. gmelinii* var. *vestita* (Komarov) Nakai; *A. sacrorum* f. *discolor* Komarov; *A. sacrorum* f. *incana* (Besser) Pampanini; *A. sacrorum* var. *incana* (Besser) Y. R. Ling; *A. sacrorum* subsp. *manshurica* Kitamura; *A. sacrorum* f. *vestita* Komarov; *A. sacrorum* subf. *vestita* (Komarov) Pampanini; *A. vestita* var. *discolor* (Komarov) Kitagawa.

Leaves 2- or 3-pinnatisect, abaxially gray pubescent to white tomentose, adaxially sparsely gray pubescent.

Hills, waysides, shrublands, slopes, often dominant on S slopes, roadsides, forest steppes; 1000–1300 m or below. Widespread throughout China [Japan, Korea, Mongolia].

29. Artemisia stechmanniana Besser, Tent. Abrot. 35. 1832.

白莲蒿 bai lian hao

Artemisia gmelinii Weber ex Stechmann var. *biebersteiniana* Besser; *A. sacrorum* f. *minor* Freyn; *A. sacrorum* var. *minor* Ledebour; *A. sacrorum* var. *santolinifolia* Pampanini; *A. sacrorum* f. *thomsonii* Pampanini; *A. sacrorum* subf. *tripinnata* Pampanini; *A. stechmanniana* var. *sibirica* Besser; *A. santolinifolia* (Pampanini) Krascheninnikov; *A. turschaninowiana* Krasnov.

Subshrubs, (7–)10–40(–80) cm tall, caespitose, with woody basal parts and branches, much branched, densely pubescent, or glabrescent except on leaves. Middle stem leaves: petiole 8–13 mm. Lower and middle stem leaves; leaf blade ovate or triangular-ovate, 2–4 × 1–2 cm, gland-dotted, gray or yellowish arachnoid pubescent, 2–4-pinnatisect; segments 4 or 5 pairs; lobules pectinately linear or linear-lanceolate, usually serrulate, teeth 1–2 × 0.2–0.5 mm. Uppermost leaves 1- or 2-pinnatisect

and leaflike bracts divided or entire; bracts lanceolate or linear-lanceolate. Synflorescence a leafy, narrowly conical panicle, 20–40 × 5–12 cm; primary branches ascending, 5–10 cm. Capitula many, shortly pedunculate or ± sessile, nodding, remote or approximate toward branch apices. Involucre globose, 3–5(–6) mm in diam.; outer phyllaries linear-oblong, green, not scarious margined, sparsely arachnoid. Marginal female florets 10–12; corolla slender, glandular, 2-toothed. Disk florets 40–60, glabrous. Achenes brown, oblong, ca. 1 mm. Fl. and fr. Aug–Oct. $2n = 18, 54$.

Hills, steppes, semidesert steppes, meadows, rocky slopes, scrub, dry floodlands, wastelands; 1500–4900 m. Gansu, Hubei, W Nei Mongol, Ningxia, Qinghai, Shaanxi, W Sichuan, Xinjiang, Xizang [Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Tajikistan, Uzbekistan; E Europe].

Chinese material of *Artemisia stechmanniana* has been incorrectly named as *A. gmelinii*.

30. Artemisia vestita Wallich ex Besser, Tent. Abrot. 25. 1832.

毛莲蒿 mao lian hao

Artemisia potentillifolia H. Léveillé (1912), not Fischer ex Sprengel (1826); *A. sacrorum* Ledebour subf. *obscura* Pampanini; *A. sacrorum* f. *platiloba* Pampanini; *A. sacrorum* var. *vestita* (Wallich ex Besser) Kitamura; *A. sacrorum* f. *wallichiana* Pampanini.

Subshrubs, caespitose, 50–120 cm tall, with woody rootstock and basal branches, arachnoid pubescent, especially on adaxial surface of leaves, much branched, strongly aromatic. Lower and middle stem leaves: petiole 0.8–2 cm; leaf blade ovate, elliptic-ovate, or suborbicular, (2–)3.5–7.5 × (1.5–)2–4 cm, 2(or 3)-pinnatisect; segments 4–6 pairs; lobules deeply serrate; teeth elliptic, 1–2 × 0.2–0.5 mm; rachis serrate. Uppermost leaves and leaflike bracts smaller, pinnatisect or entire; bracts lanceolate, sparsely pectinate. Synflorescence a ± broad panicle. Capitula many. Involucre globose or hemispheric, 2.5–3.5(–4) mm in diam. Marginal female florets 6–10. Disk florets 12–20, bisexual. Achenes oblong or obovoid. Fl. and fr. Aug–Oct. $2n = 18$.

Hills, rocky slopes, grasslands, shrublands, outer forest margins; 2000–4300 m. Gansu, NW Guangxi, Guizhou, N Hubei, Liaoning, Qinghai, W Sichuan, Xinjiang, Xizang, Yunnan [N India, Nepal, N Pakistan].

Artemisia vestita is used in anti-inflammatory and antifebrile medicines.

31. Artemisia baimaensis Y. R. Ling & Z. C. Chou, Bull. Bot. Res., Harbin 4(2): 16. 1984.

班玛蒿 ban ma hao

Subshrubs, ca. 60 cm tall or more, much branched, densely gray pubescent or arachnoid pubescent. Middle and upper stem leaves: petiole 3–5 mm; leaf blade ovate, 3–4 × 2–2.5 cm, sparsely gland-dotted, 2- or 3-pinnatisect; segments 3 or 4 pairs; lobules 3 or 4 pairs; teeth minute, elliptic, 3–5 × 1–2 mm; rachis narrowly winged. Leaflike bracts 1- or 2-pinnatisect. Synflorescence a broad panicle. Capitula many. Involucre broadly ovoid, 2.5–3 mm in diam.; phyllaries gray arachnoid pubescent. Marginal female florets 5–8. Disk florets 8–15, bisexual. Achenes ellipsoid-ovoid or ellipsoid-obovoid. Fl. and fr. Aug–Oct.

● Forest margins; ca. 3400 m. Qinghai.

32. Artemisia medioxima Krascheninnikov ex Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 405. 1955.

尖栉齿叶蒿 jian zhi chi ye hao

Subshrubs, 70–120 cm tall, shortly and capitately branched or not apically, white or gray pubescent, with a few branches. Lowermost and middle stem leaves: petiole 1.5–3 cm; leaf blades elliptic or oblong, 4–6(–9) × 2–4 cm, thin, gland-dotted, 1- or 2-pinnatisect; segments (4 or)5(or 6) pairs; lobes lanceolate or elliptic-lanceolate, pectinately serrate; teeth shortly lanceolate or linear-lanceolate, 4–10 × 1–2 mm, obtuse apically. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect. Capitula in narrow racemose or racemose-panicles, hemispheric, 4–6 mm in diam., pedunculate below and without peduncles above. Marginal female florets 8–10. Disk florets 20–40, bisexual; corolla limb puberulent or glabrescent. Achenes oblong, slightly oppressed. Fl. and fr. Jul–Oct.

Steppes, forest steppes, outer forest margins; low to middle elevations. N Hebei, Heilongjiang, E Nei Mongol, N Shanxi [E Russia].

33. Artemisia freyniana (Pampanini) Krascheninnikov, Spisok Rast. Gerb. Fl. S.S.S.R. Bot. Inst. Vsesojuzn. Akad. Nauk 11: 42. 1949.

绿栉齿叶蒿 lü zhi chi ye hao

Artemisia sacrorum Ledebour f. *freyniana* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 688. 1927.

Subshrubs, 18–35(–45) cm tall, with thick woody rootstock, with short sterile shoots, with peeling grayish brown bark, and slender, erect, flowering shoots, with branches short or absent, lower parts glabrescent, upper parts more persistently puberulent. Middle stem leaves: petiole 3–5 mm, with pinnatifid basal auricles or pseudostipules; leaf blade elliptic-ovate or elliptic, 2–3 × 0.7–1.5 cm, 2-pinnatisect, abaxially puberulent, adaxially dark green, glabrous; segments 4 or 5 pairs, elliptic, 5–15 × 3–4 mm, pectinately divided; lobules lanceolate, entire or serrulate. Uppermost leaves and leaflike bracts divided or entire; bracts linear or linear-lanceolate. Capitula in dense spicate- or racemose-panicles, globose, 2–3 mm in diam. Marginal female florets 6–8. Disk florets 16–20, bisexual. Achenes obovoid or ellipsoid. Fl. and fr. Aug–Oct.

Steppes, slopes, dry river valleys, riverbanks, outer forest margins; low to middle elevations. N Gansu, Heilongjiang, W Jilin, Nei Mongol, Ningxia [Mongolia, E Russia].

34. Artemisia maximovicziana Krascheninnikov ex Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 403. 1955.

东亚栉齿蒿 dong ya zhi chi hao

Subshrubs or herbs, 60–125 cm tall, with thick rootstock, puberulent or glabrescent. Basal and lowermost stem leaves: petiole 6–16 cm; leaf blade ovate or orbicular-ovate, 10–18 × 8–15 cm. Middle and upper leaves: leaf blade ovate or orbicular-ovate, 10–18 × 8–15 cm, 1(or 2)-pinnatipartite or -sect; segments 5 or 6 pairs; lobes linear or linear-lanceolate, pectinate to pectinate-serrate, apex acute. Leaflike bracts 3–5-lobed or entire, linear or linear-lanceolate, 45–65 × 4–8 mm. Synflorescence a long, narrow panicle. Involucre hemispheric or spherical, 4–6 mm in diam. Marginal female florets 10–15. Disk florets 30–40, bisexual. Achenes oblong or oblong-obovoid. Fl. and fr. Aug–Oct.

Steppes, dry river valleys, hills, wastelands, forest steppes; low to middle elevations. N Heilongjiang, N Nei Mongol [E Russia].

35. Artemisia latifolia Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 569. 1815.

宽叶蒿 kuan ye hao

Artemisia laciniata Willdenow var. *glabriuscula* Ledebour; *A. laciniata* var. *latifolia* (Ledebour) Maximowicz; *A. tanacetifolia* Linnaeus var. *laxa* Kitamura.

Herbs, perennial, 20–70 cm tall, shortly capitately branched or not apically, puberulent, soon glabrescent. Leaves gland-dotted; basal and middle stem leaves: petiole 3–6 cm, basal leaf blade oblong or ovate, (1 or)2-pinnatisect. Lower and middle stem leaves: leaf blade elliptic-oblong or elliptic-ovate, 4–14(–18) × 2–7(–9) cm, 1- or 2-pinnatisect; segments 5–7; lobes lanceolate or ovate-lanceolate, pectinately and deeply serrate; teeth (3–)5–13 × (1–)2–3 mm. Uppermost leaves pectinate-pinnatisect; leaflike bracts linear, entire. Synflorescence a narrow panicle. Involucre globose or hemispheric, 3–4 mm in diam.; phyllary margin brown, lacerate. Marginal female florets 5–9. Disk florets 18–25, bisexual. Achenes obovoid. Fl. and fr. Jul–Oct. $2n = 36$.

Steppes, forest steppes, outer forest margins, wastelands, shrublands, meadows, saline soils; low to middle elevations. NE Gansu, W Heilongjiang, W Jilin, W Liaoning, E and N Nei Mongol [Kazakhstan, Korea, Mongolia, Russia, Uzbekistan; SW Asia, C and E Europe].

36. Artemisia phaeolepis Krascheninnikov, Sovetsk. Bot. 5: 7. 1943.

褐苞蒿 he bao hao

Artemisia laciniata Willdenow var. *turtschaninoviana* Besser, Bull. Soc. Imp. Naturalistes Moscou 9: 48. 1836; *A. laciniata* f. *racemosa* Krylov; *A. laciniata* f. *tomentosa* Krylov, p.p.

Herbs, perennial, 15–40 cm tall, shortly and capitately branched, pubescent, soon glabrescent, strongly aromatic. Leaves gland-dotted. Basal leaves: petiole 3–5 cm; leaf blade 2- or 3-pinnatisect. Middle stem leaves: petiole 3–5 cm; leaf blade elliptic or oblong, 2–6 × 1.5–3 cm, 2-pinnatisect; segments 5–7(or 8) pairs; lobes pectinately or deeply serrate, sometimes serrulate, with thick margins; midvein prominent abaxially. Uppermost leaves 1- or 2-pinnatisect; leaflike bracts lanceolate or linear, entire. Synflorescence a narrow, racemelike panicle. Capitula few, shortly pedunculate, nodding. Involucre hemispheric, 4–6 mm in diam.; scarious phyllary margin broad, brown. Marginal female florets 12–18. Disk florets 40–80, bisexual; corolla limb puberulent. Achenes oblong or oblong-obovoid. Fl. and fr. Jul–Oct. $2n = 36$.

Hills, canyons, waysides, grassy marshlands, meadows, dry floodlands, outer margins of forests and shrublands, rocky hills, semidesert steppes; 2500–3600 m. Gansu, Nei Mongol, Ningxia, Qinghai, Shanxi, N Xinjiang, Xizang [Kazakhstan, Mongolia, Russia].

37. Artemisia tanacetifolia Linnaeus, Sp. Pl. 2: 848. 1753.

裂叶蒿 lie ye hao

Artemisia laciniata Willdenow; *A. laciniata* f. *dissecta* Pampanini; *A. laciniata* var. *glabriuscula* Ledebour, p.p.; *A. laciniata* var. *macrobotrys* (Ledebour) Maximowicz; *A. macrobotrys* Ledebour; *A. orthobotrys* Kitagawa; *A. sacrorum* Ledebour f. *japonica* Pampanini; *A. sacrorum* var. *major* Pampanini; *A. sacrorum* f. *platyphylla* Pampanini; *A. serreana* Pampanini.

Herbs, perennial, 50–70(–90) cm tall, rootstock horizontally creeping to obliquely rising, ± woody, shortly branched apically, pubescent, glabrescent. Basal leaves long petiolate. Lower and middle stem leaves: petiole 3–12 mm; leaf blade elliptic-oblong or elliptic-ovate, 3–12 × 1.5–5(–8) cm, sparsely gland-dotted, abaxially densely hairy, adaxially glabrous or sparsely hairy, 2- or 3-pinnatisect; segments 6–8 pairs; lobes pectinately lobulate; lobules elliptic-lanceolate, sometimes sparsely serrulate; rachis narrowly winged. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect or entire; bracts linear or linear-lanceolate. Synflorescence a few to many branched panicle, 10–15 × 4–8 cm. Capitula many, shortly pedunculate, nodding, approximate or not. Involucre globose or hemispheric, 2–3(–3.5) mm in diam.; phyllaries glabrous or nearly so, outermost oblong-oval, greenish, scarious margin narrow, brown with colorless edge. Florets yellow, 48–52. Marginal female florets 8–15; corolla narrowly tubular, glandular. Disk florets 30–40, bisexual; corolla limb puberulent. Achenes ellipsoid-obovoid, finely longitudinally striate. Fl. and fr. Jul–Oct.

Forest steppes, steppes, meadows, outer forest margins, saline soils, hills, shrublands; low elevations to 2400 m. Gansu, N Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, N Shaanxi, N Shanxi [Kazakhstan, Korea, Mongolia, Russia; C and E Europe, North America (Alaska, Canada)].

Artemisia tanacetifolia is used as herbage for feeding livestock.

38. Artemisia shangnanensis Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 4(2): 14. 1984.

商南蒿 shang nan hao

Herbs, annual or biennial, 80–150 cm tall, much branched, yellowish or gray-yellow puberulent. Basal and lower stem leaves: petiole 2–4 cm; leaf blade ovate-orbicular, (2 or)3-pinnatipartite. Middle stem leaves: leaf blade ovate or elliptic-ovate, 10–12 × 6–8 cm, 2- or 3-pinnatisect; segments 3 or 4 pairs, 4–5 × 2–3 cm, deeply pectinately serrate; teeth 3 or 4 pairs, more than 3 mm wide. Uppermost leaves 1- or 2-pinnatipartite; leaflike bracts elliptic-lanceolate, 3–5-lobed or entire.

Synflorescence a broad panicle. Capitula pedunculate, nodding. Involucre globose or hemispheric, 5–7 mm in diam.; phyllaries puberulent. Marginal female florets 15–20. Disk florets 80–150, bisexual. Achenes obovoid or ellipsoid. Fl. and fr. Aug–Oct.

• Hills, outer forest margins; low to middle elevations. SW Henan, Hubei, S Shaanxi, E Sichuan, N Yunnan.

39. Artemisia caruifolia Buchanan-Hamilton ex Roxburgh, Fl. Ind., ed. 1832, 3: 422. 1832 [*"carnifolia"*].

青蒿 qing hao

Herbs, annual or biennial, 30–150 cm, much branched, glabrous. Basal and lowermost stem leaves usually withering before anthesis. Middle stem leaves: petiole 5–10 mm; leaf blade oblong, oblong-ovate, or elliptic, 5–15 × 2–5.5 cm, abaxially green, 2- or 3-pinnatisect; segments 4–6 pairs, pectinate or lanceolate; lobules pectinate, acutely or acuminately serrate; rachis serrate. Uppermost leaves and leaflike bracts 1(or 2)-pinnatisect and pectinatisect. Synflorescence a moderately broad panicle. Capitula many; peduncle slender, 2–6 mm, nodding. Involucre hemispheric, 3.5–7 mm in diam.; phyllaries oblong, radiately spreading or not, scarious margin yellow. Marginal female florets 10–20; corolla ca. 1.5 mm. Disk florets 30–40, bisexual; corolla yellowish, ca. 1.8 mm. Achenes oblong or ellipsoid, ca. 1 mm. Fl. and fr. Jun–Sep.

Riverbanks, floodlands, waysides, outer forest margins, canyons, coastal beaches; low to high elevations. Anhui, Fujian, Guangdong, Guangxi, Guizhou, S Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, S Shaanxi, Shandong, E Sichuan, Yunnan, Zhejiang [N India, Japan, Korea, Myanmar, Nepal, N Vietnam].

The epithet of this species has been given both as *"caruifolia"* and as *"carvifolia"* and is based on the similarity of the leaves to those of *Carum carvi* Linnaeus (Apiaceae). Both forms are therefore orthographically correct, depending on whether they are based on the genus name or the species epithet, and there is no case for regarding either as an orthographical error. The protologue actually gives the spelling as *"carnifolia."* It seems rather likely that the "n" is an upside-down "u" and that the correct spelling should be *"caruifolia."*

Artemisia caruifolia contains abrotanine used in anti-inflammatory and antifebrile drugs.

1a. Leaf margins with acuminate teeth; involucre 3.5–4.5 mm in diam., phyllaries erect after anthesis ..... 39a. var. *caruifolia*

1b. Leaf margins with acute teeth; involucre 4.5–7 mm in diam., phyllaries radiate after anthesis ..... 39b. var. *schochii*

39a. Artemisia caruifolia var. **caruifolia**

青蒿(原变种) qing hao (yuan bian zhong)

Artemisia apiacea Hance; *A. caruifolia* var. *apiacea* (Hance) Pampanini; *A. thunbergiana* Maximowicz.

Middle stem leaves with lobes acuminate-serrate. Involucre 3.5–4.5 mm in diam.; phyllaries not radiate after anthesis.

Moist riverbanks, floodlands, waysides, outer forest margins, canyons, coastal beaches; low elevations. Anhui, Fujian, Guangdong, Guangxi, Guizhou, S Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, S Shaanxi, Shandong, E Sichuan, Yunnan, Zhejiang [N India, Japan, Korea, Myanmar, Nepal, N Vietnam].

39b. Artemisia caruifolia var. **schochii** (Mattfeld) Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 649. 1927.

大头青蒿 da tou qing hao

Artemisia schochii Mattfeld, Repert. Spec. Nov. Regni Veg. 22: 245. 1926; *A. apiacea* var. *schochii* (Mattfeld) Handel-Mazzetti.

Middle stem leaves with lobes acutely serrate. Involucre 4.5–7 mm in diam.; phyllaries radiate and florets deciduous after anthesis.

• Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Yunnan.

40. Artemisia annua Linnaeus, Sp. Pl. 2: 847. 1753.

黄花蒿 huang hua hao

Artemisia annua f. *macrocephala* Pampanini; *A. chamomilla* C. Winkler; *A. stewartii* C. B. Clarke; *A. wadei* Edgeworth.

Herbs, annual, 70–160(–200) cm tall, much branched, sparsely puberulent, soon glabrous, strongly aromatic. Leaves gland-dotted. Lowermost stem leaves: leaf blade ovate or triangular-ovate, 3–7 × 2–6 cm, 3(or 4)-pinnatipartite; segments 5–8(–10) pairs. Middle stem leaves: petiole 1–2 cm; leaf blade 2(or 3)-pinnatisect or pectinatisect; lobules deeply serrate to pectinate; teeth triangular, 1–2 × ca. 0.5 mm; rachis narrowly winged, sparsely serrate or not; midvein prominent adaxially. Uppermost leaves and leaflike bracts 1(or 2)-pinnatipartite. Synflorescence a panicle to 15 × 8 cm, produced from most nodes to form broad, conical compound panicle. Capitula many, shortly pedunculate, closely subtended by whorl of bracteoles, nodding. Involucre globose, 1.5–2.5 mm in diam.; phyllaries broad and scarious, ± glabrous. Marginal female florets 10–18. Disk florets 10–30, bisexual; corolla dark yellow or yellow. Achenes ellipsoid-ovoid. Fl. and fr. Aug–Oct. $2n = 18$.

Hills, waysides, wastelands, outer forest margins, steppes, forest steppes, dry floodlands, terraces, semidesert steppes, rocky slopes, roadsides, saline soils; 2000–3700 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [widely distributed in N Africa, Asia, Europe, and North America].

Artemisia annua contains, among other essential oils, artemisinin (青蒿素 qing hao su). It is well known in Traditional Chinese Medicine for its anti-inflammatory, antifebrile, and hemostatic properties, and artemisinin has become widely valued as an effective treatment for strains of *Plasmodium* resistant to other anti-malarial drugs.

41. Artemisia hedinii Ostenfeld in Hedin, S. Tibet 6(3): 41. 1922.

臭蒿 chou hao

Herbs, annual, 15–60(–100) cm tall, purple, capitate

branches 4–8 cm, sparsely glandular puberulent, fetid. Petioles of basal and lowermost stem leaves 4–5 cm. Basal leaves many; leaf blade rosulate or elliptic, 10–14 × 2–3.5 cm, 2-pinnatisect; segments more than 20 pairs; lobules pectinately lanceolate or triangularly serrate, 2–3 × 0.2–1 mm, acute apically. Lowermost and middle stem leaves: leaf blade elliptic, 6–12 × 2–4 cm, 2-pinnate; segments 5–10 pairs, 0.3–1.5 × 0.2–0.4 mm, lobulate and serrate; rachis serrate; midvein prominent. Uppermost leaves and leaflike bracts pinnately divided; lobes serrate. Capitula in dense narrow panicles, globose or hemispheric, 3–4(–5) mm in diam. Phyllaries with brown or purple-brown scarious margin. Marginal female florets 3–8. Disk florets 15–30, bisexual; corolla limb purple. Achenes oblong-obovoid. Fl. and fr. Jul–Oct.

Grassy marshlands, floodlands, rocky slopes, waysides, outer forest margins; 1000–4800(–5000) m. Gansu, SW Nei Mongol, Qinghai, W Sichuan, N Xinjiang, Xizang, W Yunnan [N India, Nepal, N Pakistan, Tajikistan].

Artemisia hedinii has anti-inflammatory, antifebrile, detoxifying, and hemostatic properties.

42. Artemisia tournefortiana Reichenbach, Iconogr. Bot. Exot. 1: 6. 1824.

湿地蒿 shi di hao

Herbs, annual, (40–)110–150(–200) cm tall, purple-brown, puberulent or glabrescent; capitate branches 2–5 cm. Lower and middle stem leaves: petiole 2–6 cm; leaf blade elliptic-ovate or oblong, 5–18 × 2–8 cm, 2(or 3)-pinnatisect; segments 5–8 pairs, pectinately lobulate; lobules elliptic-lanceolate, 3–5 × 3–4 mm, occasionally serrulate; rachis serrate. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect or entire; bracts linear-lanceolate, serrate. Synflorescence a dense cylindric panicle, 30–70 × 1.5–5 cm; branches ascending to erect-appressed, spicate. Capitula many, erect, almost sessile, congested. Involucre ovoid or ovoid-orbicular, 1.5–2 mm in diam.; phyllaries in 3 rows, outer glabrous, widely scarious on both sides of green midrib, obtuse; receptacle conical, glabrous. Marginal female florets 10–20; corolla greenish yellow, glandular, 2-toothed. Disk florets 10–15(–35), bisexual, basally glandular. Achenes brown, ellipsoid-ovoid, 0.8–1 mm, finely striate. Fl. and fr. Aug–Nov. $2n = 18$.

Hills, terraces, dry floodlands, waste fields, steppes, open forests, semi-marshlands; 800–1500 m. Xinjiang, Xizang [Afghanistan, Kazakhstan, Mongolia, N Pakistan; SW Asia (Caucasus, Iran, Turkey); introduced in Europe].

The name *Artemisia biennis* Willdenow has been misapplied to the species treated here as *A. tournefortiana*, e.g., in Fl. Pakistan (207: 132. 2002).

Artemisia tournefortiana is used in NW China as a source of anti-inflammatory, antifebrile, anthelmintic, and antitoxic drugs.

43. Artemisia tsugitakaensis (Kitamura) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 2(2): 43. 1982.

雪山艾 xue shan ai

Artemisia niitakayamensis Hayata var. *tsugitakaensis* Kitamura, Acta Phytotax. Geobot. 9: 32. 1940.

Herbs, perennial, 10–20 cm tall, few and shortly branched apically, all parts puberulent. Lower and middle stem leaves shortly petiolate; leaf blade elliptic, ovate, or elliptic-obovate, 1–2.5 × 0.7–1.4 cm, 2-pinnatisect; segments 4(or 5) pairs; lobules 2–8 × 0.6–1 mm. Leaflike bracts lanceolate or linear-lanceolate, pinnatisect or entire. Synflorescence a racemelike panicle. Capitula peduncles 5–15(–20) mm. Involucre hemispheric or subglobose, 7–10 mm in diam.; phyllaries with scarious margin lacerate. Marginal female florets 8–12. Disk florets 30–40, bisexual; corolla limb puberulent. Achenes oblong or ovoid-oblong. Fl. and fr. Aug–Nov.

• Slopes; ca. 3900 m. Taiwan.

44. Artemisia adamsii Besser, Tent. Abrot. 27. 1832.

东北丝裂蒿 dong bei si lie hao

Herbs, perennial, or subshrubs, 15–40 cm, branched apically, arachnoid pubescent or glabrescent. Lower stem leaves ± sessile; leaf blade (2 or)3-pinnatisect. Middle stem leaves: leaf blade ovate, 1.5–2.5(–3) × 1.5–2.5(–3) cm, 1- or 2-pinnatisect; segments 3 or 4 pairs; lobules filiform, 2–3 × 0.5–1 mm, apically acute; leaflike bracts subpalmatisect. Synflorescence a narrow panicle. Involucre subglobose, 2–3 mm in diam. Marginal female florets 9–12. Disk florets 35–45, bisexual. Achenes ellipsoid-ovoid. Fl. and fr. Jul–Oct.

Saline steppes, meadows, riverbanks, hills; low elevations. W Heilongjiang, E Nei Mongol [E Mongolia, E Russia].

45. Artemisia dalai-lamae Krascheninnikov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 17. 1922.

米蒿 mi hao

Subshrubs, densely caespitose, 10–20(–35) cm tall, rarely branched above base, gray puberulent, strongly aromatic. Stems ± 4-angled, leaves clustered on short shoots. Stem leaves subsessile; leaf blade ovate or broadly ovate, 8–12 × 7–10 mm, 1- or 2-pinnatisect to ± palmatisect; segments 2 or 3 pairs; lobules filiform-clavate or linear-filiform, 2–4 × ca. 0.5 mm, apically obtuse. Uppermost leaves and leaflike bracts 3- or 5-lobed. Synflorescence terminal, ± spikelike, often unbranched. Capitula few, separated, subsessile. Involucre hemispheric or ovoid, 3–3.5(–4) mm in diam. Marginal female florets 1–3. Disk florets 8–20, bisexual; corolla yellow. Achenes obovoid. Fl. and fr. Jul–Sep.

• Rocky slopes, steppes, semidesert steppes, saline-alkaline soils, dry floodlands, gravelly areas, sometimes locally dominant; 1800–3200 m. W Gansu, SW Nei Mongol, Qinghai, Xizang.

46. Artemisia palustris Linnaeus, Sp. Pl. 2: 846. 1753.

黑蒿 hei hao

Herbs, annual, 10–40 cm tall, much branched. Lower and middle stem leaves thin, ovate or elliptic-ovate, 2–5 × 1.5–3 cm, (1 or)2-pinnatisect; segments (2 or)3 or 4 pairs; lobules narrowly linear, 15–35 × 0.5–1 mm. Synflorescence a narrow panicle. Capitula in groups of 2–10 along branches. Involucre subglobose, 2–3 mm in diam. Marginal female florets 10–13. Disk florets 20–26, bisexual. Achenes ellipsoid. Fl. and fr. Aug–Nov. $2n = 18$.

Steppes, forest steppes, riverbanks, floodlands; middle or low elevations. N Hebei, W Heilongjiang, W Jilin, W Liaoning, E and S Nei Mongol [Korea, Mongolia, E Russia].

47. Artemisia aurata Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 422. 1901.

黄金蒿 huang jin hao

Artemisia palustris Linnaeus var. *aurata* (Komarov) Pampanini.

Herbs, annual, 20–50(–80) cm tall, much branched. Leaves thin. Middle stem leaves: petiole 2–5 cm; leaf blade triangular-ovate or triangular-elliptic-ovate, 4–6(–11) × 2–3 cm, 2- or 3-pinnatisect; segments 4 or 5 pairs; lobules narrowly linear-lanceolate or filiform, 3–6 × 0.5–1 mm. Synflorescence a broad panicle; capitula usually in groups of 2–5. Involucre subglobose, 2–3 mm in diam. Marginal female florets 10–14. Disk florets 14–25, bisexual. Achenes ovoid-ellipsoid. Fl. and fr. Aug–Nov. $2n = 18$.

Rocky hills; middle or low elevations. Heilongjiang, Jilin, Liaoning [Japan, Korea, E Russia].

48. Artemisia caespitosa Ledebour, Fl. Altaic. 4: 80. 1833.

矮丛蒿 ai cong hao

Artemisia frigidoides H. C. Fu & S. Y. Zhu.

Herbs, perennial, caespitose, 5–15(–20) cm tall, shortly and capitately branched apically or stems not branched, yellowish sericeous-puberulent. Lower and middle stem leaves: petiole 6–10 mm. Lowermost leaf blades ± palmately 3–5-lobed. Middle stem leaves: leaf blade elliptic or ovate, 5–10 × 5–10 mm, ± 1- or 2-palmatisect; segments 1 or 2 pairs; lobes or lobules linear or narrowly linear-lanceolate, 3–6 × 1.5–2 mm. Uppermost leaves and leaflike bracts 3–5-lobed or entire; bracts linear or linear-lanceolate. Synflorescence a dense, short, ± spikelike panicle. Involucre hemispheric, subglobose, or ovoid-campanulate, 3–4 mm in diam. Marginal female florets 5–7. Disk florets 15–22, bisexual; corolla limb puberulent. Achenes obovoid or obovoid-ellipsoid. Fl. and fr. Aug–Oct.

Rocky hills, desert steppes; middle or low elevations. NW Nei Mongol, N Xinjiang [Mongolia, S Russia].

49. Artemisia austriaca Jacquemont in Murray, Syst. Veg., ed. 14, 744. 1784.

银蒿 yin hao

Artemisia austriaca var. *jacquiniana* Candolle; *A. austriaca* f. *microcephala* Pampanini; *A. austriaca* var. *orientalis* (Willdenow) Candolle; *A. nivea* Redowsky ex Willdenow; *A. orientalis* Willdenow; *A. repens* Pallas ex Willdenow.

Herbs, perennial, or subshrubs, 15–50 cm tall, caespitose, silvery gray or yellowish sericeous-pubescent. Leaves sessile, lowermost leaves 3-pinnatisect. Middle stem leaves: leaf blade elliptic-ovate or ovate, 1.5–4 × 1–2.5 cm, 2- or 3-pinnatisect; segments 2 or 3 pairs; lobules narrowly linear, 2–12 × 0.5–1 mm. Uppermost leaves and leaflike bracts pinnatisect or 3-sect or entire; bracts linear. Synflorescence a broad panicle. Involucre subglobose or ovoid-campanulate, 1–2 mm in diam. Marginal female florets 3–7. Disk florets 7 or 8, bisexual; corolla limb puberulent. Achenes ellipsoid. Fl. and fr. Aug–Oct. $2n = 16, 32, 36$.

Dry terraces, floodlands, saline-alkaline soils, open forests, semidesert steppes, wastelands; middle or low elevations. N and W Nei Mongol, N Xinjiang [Kazakhstan, Kyrgyzstan, Russia, Tajikistan; SW Asia (Iran), C, E, and SW Europe].

The essential oils from *Artemisia austriaca* are used as a perfume; the whole plant is used as herbage.

50. Artemisia brachyloba Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 51. 1883.

山蒿 shan hao

Artemisia licentii Pampanini.

Subshrubs or small shrubs, 30–60 cm tall, with strong woody rootstock, much branched, pubescent; stems glabrescent. Lower and middle stem leaves sessile; leaf blade broadly ovate or ovate, 2–4 × 1.5–2 cm, 2(or 3)-pinnatisect; segments 3 or 4 pairs; lobules narrowly linear or linear-lanceolate, 3–6(–8) × 0.3–1 mm. Uppermost leaves and leaflike bracts pinnatifid or 3-lobed or entire; bracts linear. Synflorescence a narrow panicle. Involucre ovoid or ovoid-campanulate; phyllaries densely white tomentose. Marginal female florets 10–15. Disk florets 20–25, bisexual. Achenes ovoid. Fl. and fr. Jul–Oct.

Sunny or rocky slopes or steppes, Gobi Desert, semidesert steppes; middle or low elevations. Gansu, N Hebei, Liaoning, Nei Mongol, Ningxia, N Shaanxi, N Shanxi [Mongolia].

Artemisia brachyloba is used in anti-inflammatory, antifebrile, diuretic, and anthelmintic medicines.

51. Artemisia succulenta Ledebour, Fl. Altaic. 4: 81. 1833.

苏联肉质叶蒿 su lian rou zhi ye hao

Herbs, annual or biennial, or subshrubs, 30–50 cm tall, much branched, tomentose or glabrescent. Leaves ± succulent; lower and middle stem leaves sessile; leaf blade elliptic or obovate, 10–30 × 5–10 mm, 1- or 2-pinnatisect or -partite; segments 1 or 2 pairs; lobes linear or linear-oblanceolate, 0.5–1.5 × 0.1–0.2 mm, 1–3-crenate or cleft or obtuse apically. Uppermost leaves and leaflike bracts 2- or 3-lobed or entire; bracts linear or linear-oblanceolate. Synflorescence a ± broad panicle. Involucre hemispheric, 4–5 mm in diam. Marginal female florets 15–20. Disk florets 60–80, bisexual. Achenes obovoid or ellipsoid-obovoid. Fl. and fr. Jul–Sep.

Marshlands, canyons, waste fields; 1000–1400 m. E Xinjiang [Kazakhstan, Russia].

52. Artemisia fukudo Makino, Bot. Mag. (Tokyo) 23: 146. 1909.

滨艾 bin ai

Herbs, biennial or short-lived perennial, 50–90 cm tall, much branched, gray arachnoid pubescent, glabrescent; stems purplish. Leaves thickly textured, basal ones rosulate, withering before anthesis; petiole 3–13 cm; leaf blade 11–18 × 8–16 cm, arachnoid when young, 2- or 3-pinnatisect, flagellate, or pal-

mately 2- or 3-partite; segments 3(or 4) pairs, linear, ca. 2 mm wide, apex rounded. Lower and middle stem leaves: leaf blade elliptic-ovate, 3–5 × 3–5 cm, pinnatisect; segments 2 or 3 pairs; lobes 8–12 × 1.5–2 mm. Uppermost stem leaves 3–5-sect; leaflike bracts narrowly linear-lanceolate, 10–30 × 1.5–2 mm. Synflorescence a moderately broad panicle, main branches ascending, relatively long. Capitula pedunculate, bracteolate, nodding. Involucre obconical, 4–5 mm in diam. Marginal female florets 10–15; corolla 1.5–2 mm. Disk florets 20–30, bisexual; corolla 1.5–2.5 mm. Achenes obovoid-ellipsoid, 1.2–2 mm, base cuneate, apex rounded, glabrous. Fl. and fr. Jul–Oct. 2*n* = 16.

Coastal beaches. N Taiwan, E Zhejiang [Japan, Korea].

53. Artemisia przewalskii Krascheninnikov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 2: 191. 1921.

甘青小蒿 gan qing xiao hao

Herbs, annual, 20–30 cm tall, pubescent or ± glabrescent. Lower and middle stem leaves ± sessile; leaf blade oblong or elliptic, 2–3 × 1–1.5 cm, pinnatisect; segments 2(or 3) pairs; lobes linear or filiform, 5–8 × 1–2 mm. Leaflike bracts like lowermost stem leaves; bracts filiform. Synflorescence a panicle. Involucre ovoid or hemispheric, 2.5–3 mm in diam. Marginal female florets 8–12. Disk florets 10–18, bisexual. Achenes ovoid or obovoid. Fl. and fr. Jul–Oct.

• Gobi Desert, gravelly soils; 2700–3300 m. N Gansu, NW Qinghai.

3. Artemisia sect. Artemisia

艾组 ai zu

Herbs, perennial, rarely subshrubs, usually arachnoid tomentose or pubescent, or glabrous, without glandular or viscid hairs (sessile glands often present). Leaves 1 or 2(or 3)-pinnatipartite to pinnatisect, or entire; lobes or lobules linear, linear-lanceolate, elliptic, or narrowly elliptic, more than (1.5–)2 mm wide, lacerate, or lobules broadly serrate, more than 5 × 5 mm. Capitula usually ellipsoid or ovoid, rarely campanulate, hemispheric, or subglobose; phyllary margins scarious, midvein green or sometimes brown. Receptacle glabrous. Marginal florets (1–)3–15(–20); corolla narrowly tubular or rarely narrowly conical, 2- or 3(or 4)-toothed or without teeth. Disk florets 4–45, bisexual, ovaries well developed; style ca. as long as or longer than corolla, branches divergent, recurved at apex.

About 100 species: more than 70 species in Asia and Europe, 27 species in North America, a few species in S Hemisphere; 56 species (28 endemic) in China.

Many species contain monoterpenoids and sesquiterpenoids.

1a. Leaves obviously white or brown gland-dotted, with concave reticulate venation or glands, glands deciduous.
2a. Middle stem leaves 1- or 2-pinnatisect, segments (3 or)4 or 5 pairs.
3a. Stem, branches, and phyllaries glabrous or sparsely puberulent, glabrescent; leaves brown gland-dotted, lobes acuminate ..... 79. *A. occidentalisinensis*
3b. Stem, branches, and phyllaries pubescent; leaves white gland-dotted, lobes obtuse.
4a. Stem, branches, and phyllaries rust-colored or brown tomentose or pubescent; leaves abaxially gray tomentose; capitula hemispheric or subovoid, 3–4(–5) mm in diam., in relatively long narrow panicles ..... 99. *A. imponens*
4b. Stem, branches, and phyllaries gray puberulent; leaves abaxially arachnoid pubescent; phyllaries puberulent initially, later glabrescent; capitula subglobose or ovoid, 1–2 mm in diam., in broad, much-branched panicles ..... 61. *A. zhongdianensis*
2b. Middle stem leaves entire, or 2- or 3-cleft, or pinnatifid, if pinnatisect then segments 1–3 pairs only.
5a. Middle stem leaves entire or 2- or 3-cleft or -partite, mixed sparsely serrate, attenuate basally, sessile; capitula 3–4 mm in diam.; phyllaries abaxially arachnoid tomentose with dark brown center ..... 54. *A. stolonifera*
5b. Middle stem leaves 1- or 2-pinnatipartite, or 1- or 2-pinnatisect and then segments 1–3 pairs only; capitula 1.5–3 mm in diam.; phyllaries pubescent or not, but without dark brown center.
6a. Middle stem leaves 1- or 2-pinnatisect.
7a. Branches (3–)5–10 cm; middle stem leaves 5–10 × 3–8 cm, lobules lanceolate or linear-lanceolate, more than 3 mm wide.
8a. Middle stem leaves (1 or)2-pinnatisect, adaxially arachnoid pubescent, later glabrescent; phyllaries arachnoid tomentose ..... 58. *A. lavandulifolia*
8b. Middle stem leaves 1(or 2)-pinnatisect, adaxially subglabrous; phyllaries sparsely arachnoid pubescent, later glabrescent ..... 59. *A. verlotorum*
7b. Branches 2–3(–5) cm; middle stem leaves less than 4 × 4 cm, lobules linear, less than 3 mm wide.
9a. Leaves adaxially sparsely pubescent, abaxially densely tomentose, apex obtuse; phyllaries densely arachnoid tomentose ..... 60. *A. kanashiroi*
9b. Leaves adaxially puberulent, later glabrescent, abaxially densely arachnoid tomentose, lobules acute; phyllaries puberulent initially, later glabrescent ..... 64. *A. lancea*
6b. Middle stem leaves 1- or 2-pinnatipartite to -pinnatifid.
10a. Middle stem leaf segments 2 or 3 pairs, lobes 2–3(–4) mm wide ..... 55. *A. argyi*

10b. Middle stem leaf segments 1 or 2 pairs, lobes usually (3–)5–30 mm wide.
11a. Middle stem leaves 3-lobed, middle lobe 6–10 × 1.5–3 cm, larger than laterals, abaxially densely gray or yellowish and arachnoid pubescent; leaf apex acuminate.
12a. Plants (30–)80–150 cm tall; phyllaries densely arachnoid pubescent; bisexual florets 7–13 ..... 56. *A. gilvescens*
12b. Plants 150–200 cm tall or more; phyllaries sparsely pubescent or glabrescent; bisexual florets 12–16 ..... 57. *A. austroyunnanensis*
11b. Middle stem leaves (3 or)5-lobed, middle lobe 2–6 × 0.3–0.6(–1) cm, subequal to or slightly larger than lateral lobes, abaxially yellow pubescent, veins sparsely puberulent; leaf apex acute.
13a. Middle lobe of leaf blade slightly larger than lateral lobes, adaxially sparsely puberulent; capitula in broad panicles, ovoid; phyllaries pubescent ..... 62. *A. calophylla*
13b. Middle lobe of leaf blade subequal to lateral lobes, adaxially sparsely barbate; capitula in narrow panicles, ellipsoid; phyllaries sparsely arachnoid pubescent ..... 63. *A. velutina*
1b. Leaves without concave reticulate venation, usually not gland-dotted.
14a. Middle stem leaves entire, margin serrate or not, or 3–5-partite.
15a. Middle stem leaves palmately or ternately 3- or 5-partite.
16a. Synflorescence a lax, broad panicle; capitula 4–5 mm in diam. ..... 88. *A. tafelii*
16b. Synflorescence a long, narrow panicle; capitula 2–2.5 mm in diam. ..... 105. *A. selengensis*
15b. Middle stem leaves entire.
17a. Leaves 8–13 cm, margin serrulate ..... 87. *A. viridissima*
17b. Leaves less than 8 cm, margin entire or occasionally 1–3-serrate or remotely toothed.
18a. Stem, branches, leaves, and phyllaries glabrous or puberulent initially, glabrescent; capitula subglobose, ovoid, or ovoid-campanulate.
19a. Middle stem leaves widest above middle; capitula 3–3.5 mm in diam. ..... 106. *A. keiskeana*
19b. Middle stem leaves widest at or below middle; capitula 1–2 mm in diam. ..... 82. *A. nilagirica*
18b. Stem, branches, leaves, and phyllaries arachnoid tomentose and pubescent; capitula ellipsoid or oblong.
20a. Middle stem leaves 0.3–0.6 cm wide, apex obtuse, usually entire, rarely 1- or 2-serrate ..... 84. *A. subulata*
20b. Middle stem leaves (0.7–)1.5–2.5(–3) cm wide, apex acuminate, 1–3-serrate or lacerate at apex.
21a. Capitula (2.5–)3–4 mm in diam.; bisexual florets 20–30 ..... 83. *A. integrifolia*
21b. Capitula 2–2.5 mm in diam.; bisexual florets 10–15 ..... 105. *A. selengensis*
14b. Middle stem leaves pinnately 1–3-divided.
22a. Middle stem leaves with 1 or 2 pairs of segments.
23a. Subshrubs, 10–20 cm tall; middle stem leaves 1–1.5 cm, lobe apices obtuse ..... 69. *A. nujianensis*
23b. Perennial herbs, 80–200 cm tall; middle stem leaves 6–12 cm, lobe apices acuminate ..... 86. *A. viridisquama*
22b. Middle stem leaves with 2–6(or 7) pairs of segments.
24a. Capitula 5–10 mm in diam., bisexual florets 30–60.
25a. Capitula 6–10 mm in diam., synflorescence a simple terminal raceme; phyllaries densely yellowish pubescent ..... 100. *A. smithii*
25b. Capitula 5–7 mm in diam., synflorescence a slender panicle with at least lower capitula on lateral branches; phyllaries rust-colored pubescent ..... 101. *A. speciosa*
24b. Capitula 1.5–5 mm in diam., bisexual florets 4–25 (30–35 in *A. moorcroftiana*).
26a. Capitula (3–)3.5–5 mm in diam.
27a. Leaf blade abaxially glabrous ..... 92. *A. tainingensis*
27b. Leaf blade abaxially puberulent to tomentose.
28a. Leaf blade abaxially pubescent or puberulent, sometimes arachnoid or silky.
29a. Plants 8–30 cm tall; middle stem leaves 1.5–4 × 0.5–2 cm.
30a. Phyllaries puberulent; leaf blade abaxially densely gray pubescent; plant 30–50 cm tall ..... 95. *A. youngii*
30b. Phyllaries densely brown-yellow tomentose; leaf blade abaxially yellowish pubescent; plant 8–30 cm tall ..... 97. *A. comaiensis*
29b. Plants 60–130(–200) cm tall; middle stem leaves 6–22 × 4–18 cm.
31a. Middle stem leaves with 2 or 3(or 4) pairs of segments ..... 70. *A. robusta*
31b. Middle stem leaves with (3 or)4–6 pairs of segments.
32a. Leaves 3.5–4 cm wide, lobules 5–8 mm ..... 104. *A. somae*
32b. Leaves 4–12 cm wide, lobules 10–15 mm.
33a. Capitula subglobose; phyllaries not brown, pubescent ..... 102. *A. sinensis*
33b. Capitula ovoid-campanulate or ovoid; phyllaries brown, glabrescent ..... 109. *A. taibaishanensis*
28b. Leaf blade abaxially tomentose, sometimes pubescent on veins.
34a. Middle stem leaves 13–19 cm ..... 89. *A. montana*

34b. Middle stem leaves 6–12 cm.
35a. Plants 8–30(–35) cm tall.
36a. Perennial herbs; phyllaries white tomentose; female florets 13–16 ..... 92. *A. tainingensis*
36b. Subshrubs; phyllaries densely pubescent; female florets 8–10.
37a. Leaf blade abaxially densely white tomentose, adaxially sparsely sericeous-tomentose ..... 103. *A. kawakamii*
37b. Leaf blade abaxially densely gray or yellowish tomentose, adaxially glabrescent ..... 94. *A. campbellii*
35b. Plants 30–150 cm tall.
38a. Middle stem leaves with 2 or 3 pairs of segments.
39a. Synflorescence a ± broad panicle; phyllaries gray arachnoid tomentose; leaf blades adaxially gray tomentose when young ..... 81. *A. igniaria*
39b. Synflorescence a narrow panicle; phyllaries arachnoid pubescent; leaf blades adaxially sparsely arachnoid pubescent.
40a. Leaf blade pinnatipartite, adaxially glandular punctuate ..... 68. *A. leucophylla*
40b. Leaf blade pinnatisect, adaxially not glandular punctuate ..... 85. *A. brachyphylla*
38b. Middle stem leaves with (3 or)4–6 pairs of segments.
41a. Largest leaf blade (1.5–)3–5.5 × (1.5–)2–3 cm; plants 30–70 cm tall; female florets 5–9; bisexual florets 8–15 ..... 98. *A. orientalihengduangensis*
41b. Largest leaf blade 6–14 × 3.5–4 cm; plants 70–130(–150) cm tall; female florets 10–20; bisexual florets 15–35.
42a. Perennial herbs 80–150 cm tall; synflorescence a lax, much-branched, broad panicle ..... 71. *A. qinlingensis*
42b. Subshrubs 50–70 cm tall; synflorescence a narrow panicle ..... 90. *A. moorcroftiana*
26b. Capitula 1.5–3(–3.5) in diam., ellipsoid, oblong, ovoid, or ovoid-oblong, usually in laxer synflorescences.
43a. Middle stem leaves with 4–6 pairs of segments.
44a. Plants 30–40 cm tall.
45a. Plants glabrescent; phyllaries ± glabrous; middle stem leaves 0.5–1.5 cm wide, ultimate lobules elliptic, 3–4 mm ..... 93. *A. orientalixizangensis*
45b. Plants tomentose; phyllaries sparsely yellowish tomentose; middle stem leaves 1.5–2.5 cm wide, ultimate lobules linear-lanceolate, 5–8 mm ..... 96. *A. jilongensis*
44b. Plants (45–)50–160 cm tall.
46a. Leaf blade abaxially sparsely gray pubescent or glabrescent ..... 107. *A. fulgens*
46b. Leaf blade abaxially densely arachnoid tomentose.
47a. Capitula 3–3.5 mm in diam., usually widely spaced along branches; female florets 10–15 ..... 71. *A. qinlingensis*
47b. Capitula 1.5–3(–3.5) mm in diam., if more than 3 mm then densely spaced; female florets 2–10.
48a. Middle stem leaves ± sessile; bisexual florets 8–20.
49a. Lobules of middle stem leaves linear or linear-lanceolate ..... 65. *A. vulgaris*
49b. Lobules of middle stem leaves elliptic, oblong, or serrate ..... 72. *A. phyllobotrys*
48b. Middle stem leaves petiolate; bisexual florets 4–8.
50a. Stem and branches glabrescent; middle stem leaves with petiole 1–1.5 cm, blade 4–5 cm ..... 76. *A. divaricata*
50b. Stem and branches densely intermixed gray and yellowish long pubescent and tomentose; middle stem leaves with petiole 0.3–0.5 cm, blade 6–8 cm ..... 91. *A. abaensis*
43b. Middle stem leaves with 1–3(or 4) pairs of segments, if 4 then phyllaries densely arachnoid pubescent.
51a. Subshrubs 10–20 cm tall; middle stem leaves 1–1.5 × 0.8–1 cm, 1-pinnatipartite with 1 or 2 pairs of segments ..... 69. *A. nujianensis*
51b. Perennial herbs, less often subshrubs, 30–150 cm tall; middle stem leaves 2–18(–20) × 2–10 cm, 1- or 2-pinnatipartite or pinnatisect with 2 or 3(or 4) pairs of segments.
52a. Phyllaries glabrous or glabrescent.
53a. Leaf blade pinnatisect, segments 1- or 2-paired, or leaf entire; capitula not subtended by leaflike bracts ..... 105. *A. selengensis*
53b. Leaf blade 1- or 2-pinnatipartite to subpinnatisect, segments 2–4-paired; capitula mostly subtended by leaflike bracts.
54a. Leaf blade (8–)10–18(–20) cm, abaxially pubescent, sparsely gray arachnoid tomentose or glabrescent.

55a. Capitula subglobose or ovoid, 1.5–2.5 mm in diam., in broad, much-branched panicles ... 108. *A. sylvatica*
55b. Capitula oblong or ellipsoid, (1.5–)2–3 mm in diam., in narrow or somewhat broad, rarely broad, panicles.
56a. Leaf blade ovate or elliptic-ovate, (7–)14–18(–20) cm; phyllaries not brown ..... 80. *A. incisa*
56b. Leaf blade suborbicular or broadly ovate, 10–14 cm; phyllaries brown ..... 109. *A. taibaishanensis*
54b. Leaf blade 5–10 cm, abaxially densely gray arachnoid tomentose.
57a. Middle stem leaves (1 or)2-pinnatisect, segments lanceolate, linear-lanceolate, or linear, 2–6(–10) mm wide; synflorescence branchlets densely spicate ..... 75. *A. rubripes*
57b. Middle stem leaves 1- or 2-pinnatisect or -partite or -cleft, segments not as above; synflorescence branchlets laxer, more racemelike.
58a. Middle stem leaves with 3(or 4) pairs of segments, distal lobe larger than lateral lobes, lateral lobes 1- or 2-partite; capitula erect or ± nodding ..... 77. *A. indica*
58b. Middle stem leaves with 2(or 3) pairs of segments, distal lobe larger than lateral lobes, basal lobes larger than lateral lobes, lobes entire or rarely 1- or 2-serrate; capitula nodding ..... 78. *A. princeps*
52b. Phyllaries persistently arachnoid tomentose or pubescent.
59a. Branches more than 20 cm; phyllaries with brown centers ..... 66. *A. yunnanensis*
59b. Branches less than 20 cm; phyllaries not with brown centers.
60a. Middle stem leaves elliptic or oblong, 1(or 2)-pinnatipartite, segments (2 or)3 or 4 pairs, elliptic, acuminate, 1- or 2-serrate, base attenuate; capitula in narrow panicles ..... 85. *A. brachyphylla*
60b. Middle stem leaves not as above; capitula in broad or somewhat broad or narrow panicles.
61a. Middle stem leaves (1 or)2-pinnatisect, lobules linear, linear-lanceolate, or lanceolate, acute apically.
62a. Middle stem leaves with (2 or)3(or 4) pairs of segments; capitula 2–3 mm in diam., in broad panicles ..... 67. *A. roxburghiana*
62b. Middle stem leaves with 2 or 3 pairs of segments; capitula 1.5–2 mm in diam., in narrow or somewhat broad panicles ..... 73. *A. mongolica*
61b. Middle stem leaves 1- or 2-pinnatipartite or 1-pinnatisect, lobules elliptic or elliptic-lanceolate, rarely linear-lanceolate and then obtuse apically.
63a. Branches more than 20 cm; middle stem leaves with 2 or 3 pairs of segments, lobes and lobules obtuse apically, petiole tomentose at base; capitula in broad panicles; phyllaries densely arachnoid pubescent, brown at center ..... 66. *A. yunnanensis*
63b. Branches less than 10 cm; middle stem leaves with 3(or 4) pairs of segments; petiole not tomentose at base; capitula in narrow or somewhat broad panicles; phyllaries puberulent, not brown at center.
64a. Leaves arachnoid tomentose, blades of lowermost stem leaves elliptic or ovate-elliptic, middle stem leaves 1-pinnatisect, with 2 or 3(or 4) pairs of segments; capitula in dense panicles ..... 68. *A. leucophylla*
64b. Leaves arachnoid pubescent, glabrescent, blades of lowermost stem leaves ovate, suborbicular, or broadly ovate, middle stem leaves 2-pinnatipartite or -sect, with 3(or 4) pairs of segments; capitula in lax panicles ..... 74. *A. verbenacea*

54. Artemisia stolonifera (Maximowicz) Komarov, Fl. Manshur. 3: 676. 1907.

宽叶山蒿 kuan ye shan hao

Artemisia vulgaris Linnaeus var. *stolonifera* Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 161. 1859; *A. integrifolia* Linnaeus var. *stolonifera* (Maximowicz) Pampanini; *A. koidzumii* Nakai var. *laciniata* (Nakai) Kitamura; *A. koidzumii* var. *manchurica* Pampanini, p.p.; *A. megalobotrys* Nakai; *A. migoana* Kitamura; *A. stolonifera* var. *laciniata* Nakai; *A. vulgaris* lusus *incana* Regel; *A. vulgaris* var. *kiusiana* Makino.

Herbs, perennial, 50–120 cm tall, sparsely gray arachnoid pubescent or glabrescent. Leaves ± sessile, gland-dotted adaxially. Basal and lowermost stem leaves entire, serrate. Middle stem leaves sessile; leaf blade obovate-elliptic, ovate-elliptic, or ovate, 6–12 × 4–7 cm, 2- or 3-cleft or -partite to coarsely toothed, base cuneate with 1- or 2-lobed pseudostipules, apex acute. Uppermost leaves and leaflike bracts ovate to linear-lanceolate, serrate or entire. Synflorescence a narrow panicle, to 40 cm, branches to 8 cm, ascending, slender and flexuous, lowermost subtended by leaflike bracts. Involucre ovoid or oblong, 3–4 mm in diam.; phyllaries arachnoid pubescent, or glabrescent. Marginal female florets 10–12. Disk florets 12–15, bisexual. Achenes oblong or ellipsoid. Fl. and fr. Jul–Nov. $2n = 36$.

Forest margins, roadsides, slopes, canyons, forest steppes; low elevations. Anhui, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shandong, Shanxi, Xinjiang, Zhejiang [Japan, Korea, Russia (Far East)].

55. Artemisia argyi H. Léveillé & Vaniot, Repert. Spec. Nov. Regni Veg. 8: 138. 1910.

艾 ai

Artemisia argyi var. *incana* (Maximowicz) Pampanini; *A. chiarugii* Pampanini; *A. handel-mazzetii* Pampanini; *A. nutans* Nakai; *A. nutantiflora* Nakai; *A. princeps* Pampanini var. *candicans* Pampanini, p.p.; *A. vulgaris* Linnaeus var. *incana* Maximowicz; *A. vulgaris* var. *incanescens* Franchet.

Herbs, perennial, or subshrubs, 80–150(–250) cm tall, with many lateral roots, shortly branched apically, gray arachnoid pubescent, strongly aromatic. Middle stem leaves: petiole 2–3 mm; leaf blade ovate, triangular-ovate, or subrhombic, 5–8 × 4–7 cm, abaxially densely gray arachnoid tomentose, adaxially incanous pubescent and white gland-dotted, 1(or 2)-pinnatipartite or -cleft; segments 2 or 3 pairs, usually serrate, base attenuate; veins abaxially prominent. Uppermost leaves and leaflike bracts pinnatipartite to 3-partite, or entire; bracts elliptic, elliptic-lanceolate, or lanceolate. Synflorescence a narrow panicle with branches to 10 cm, ascending, lower ones subtended by leaflike bracts. Capitula secund, not touching, subsessile. Involucre ellipsoid, 2.5–3(–3.5) mm in diam.; phyllaries arachnoid pubescent, or glabrescent. Marginal female florets 6–10. Disk florets 8–12, bisexual. Achenes ovoid-oblong or oblong. Fl. and fr. Jul–Oct. $2n = 36$.

Waste places, roadsides, slopes, hills, steppes, forest steppes; low elevations to 1500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Korea, Mongolia, Russia].

Artemisia argyi is used in making important anti-inflammatory, detoxifying, and hemostatic drugs. Leaf form is very variable: plants with slender, more deeply divided, pinnatipartite middle stem leaves have been placed in *A. argyi* var. *gracilis* Pampanini (朝鲜艾 chao xian ai), but, as such leaves are found throughout the range of the species, it does not seem worthwhile to formally separate them.

56. Artemisia gilvescens Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 175. 1866.

湘赣艾 xiang gan ai

Artemisia vulgaris Linnaeus var. *gilvescens* (Miquel) Nakai.

Herbs, perennial; stems erect, (30–)80–150 cm tall, densely lanate, shortly branched from upper nodes, branches sometimes nodding. Middle stem leaves ± sessile, papery; leaf blade 6–7 × 2.8–4.5(–6) cm, abaxially densely arachnoid tomentose, adaxially green, densely white punctuate, sparsely arachnoid tomentose or glabrescent, 3(–5)-lobed, base cuneate or attenuate into obscure petiole; terminal lobe oblong-acute, entire or with 1 or 2 distant serrations; lateral lobes smaller, oblong-lanceolate, acuminate. Upper leaves gradually smaller, sessile; leaf blade oblong, base cuneate, margin entire, slightly recurved, apex acute. Synflorescence a narrow panicle, also produced on lateral branches from upper leaf axils to form large panicles; lower branches to 2.5 cm, often much shorter than subtending bracts. Capitula shortly pedunculate. Involucre cylindric, ca. 4 × (2–)2.5–3 mm; phyllaries in 3 series, densely arachnoid pubescent, outer phyllaries ovate, obtuse, rather short, median and inner phyllaries oblong, apex rounded. Marginal female florets 5–8; corolla ca. 1.5 mm. Disk florets 7–13, bisexual; corolla ca. 2.2 mm, tube ca. 1 mm. Achenes ellipsoid or obovoid, ca. 0.8 mm. Fl. and fr. Jul–Oct.

Roadsides, shrublands, forest margins; low elevations. Anhui, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan [Japan].

Artemisia gilvescens is used medicinally.

57. Artemisia austroyunnanensis Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 4(2): 20. 1984.

滇南艾 dian nan ai

Artemisia burmanica Pampanini f. *latifolia* Pampanini; *A. dubia* Wallich ex Besser f. *tonkinensis* Pampanini.

Subshrubs, 150–200 cm tall or more, densely gray or yellowish pubescent, or glabrescent. Lowermost leaves: leaf blade ovate, 7–12 × 5–6 cm, pinnatipartite or -cleft; segments 2(or 3) pairs, oblong or oblong-elliptic, rarely with 1 or 2 serrations. Middle stem leaves: petiole 4–10 mm; leaf blade 6–10 × 1.5–3 cm, 3(–5)-lobed, apical lobe elliptic, lateral lobes 15–25 × 5–8 mm, apically acuminate and mucronulate. Uppermost leaves and leaflike bracts entire. Synflorescence a broad panicle. Capitula many, nodding. Involucre oblong or ovoid-oblong, 1.5–2.5(–3) mm; phyllaries sparsely pubescent, sometimes glabrescent. Marginal female florets 5–7. Disk florets 12–16, bisexual. Achenes oblong. Fl. and fr. Sep–Dec or Mar.

Grasslands, slopes, shrublands, forest margins, canyons; 800–2300 m. S and SW Yunnan [Bhutan, N India, N Myanmar, N Thailand, N Vietnam].

58. Artemisia lavandulifolia Candolle, Prodr. 6: 110. 1838 [*"lavandulaefolia"*].

野艾蒿 ye ai hao

Artemisia araneosa Kitamura; *A. argyi* H. Léveillé & Vaniot f. *eximia* Pampanini; *A. clemensiana* Pampanini; *A. codonocephala* Diels; *A. codonocephala* var. *maireana* Pampanini; *A. grisea* Pampanini; *A. lavandulifolia* var. *pekinensis* Pampanini; *A. selengensis* Turczaninow ex Besser lusus *umbrosa* (Turczaninow ex Besser) Regel; *A. selengensis* var. *umbrosa* (Turczaninow ex Besser) Ledebour; *A. tristis* Pampanini; *A. vulgaris* Linnaeus var. *umbrosa* Turczaninow ex Besser.

Herbs, perennial, or shrubs, 50–120(–200) cm tall; stems robust, erect, gray arachnoid pubescent, glabrous or nearly so below synflorescence. Basal and lowermost leaves withering before anthesis, long petiolate; leaf blade ovate or suborbicular, 8–13 × 7–8 cm, 2-pinnatisect. Middle stem leaves: petiole 1–2(–3) cm, base with 1- or 2-lobed pseudostipules; leaf blade ovate, ovate-elliptic, or suborbicular, 6–8 × 5–7 cm, abaxially densely tomentose, adaxially white gland-dotted and sparsely arachnoid pubescent, (1 or)2-pinnatisect; segments 2 or 3 pairs, 30–50(–70) × 5–7(–9) mm; lobules 2 or 3 pairs, lanceolate or linear-lanceolate, serrate. Uppermost leaves and leaflike bracts pinnatisect or 3-lobed or entire; lobes or entire bracts linear-lanceolate or lanceolate. Synflorescence a narrow, leafy, conical panicle. Capitula many, pedunculate or ± sessile. Involucre ellipsoid or oblong, 3.5–4.5 × 2–2.5(–3) mm in diam.; phyllaries densely arachnoid tomentose. Marginal female florets 4–9; corolla ca. 1.5 mm, glabrous. Disk florets 10–20, bisexual; corolla purple, 2–2.8 mm. Achenes oblong or obovoid, ca. 1 mm, glabrous. Fl. and fr. Jul–Oct.

Roadsides, forest margins, slopes, steppes, canyons, riverbanks or lakesides, brushlands; 400–3000 m. Anhui, Gansu, N Guangdong, N Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan [Japan, Korea, Mongolia, Russia].

Artemisia lavandulifolia is used medicinally.

59. Artemisia verlotorum Lamotte, Mém. Assoc. Franç. Congr. Clermont Ferrand 1876: 511. 1876.

南艾蒿 nan ai hao

Artemisia dubia Wallich ex Besser subf. *intermedia* Pampanini; *A. dubia* subf. *macrostachya* Pampanini; *A. dubia* var. *orientalis* Pampanini, p.p.; *A. dubia* subf. *pauciflora* Pampanini; *A. dubia* f. *pseudolavendulifolia* Pampanini; *A. dubia* subf. *puberula* Pampanini; *A. verlotorum* f. *glabrescens* Pampanini; *A. verlotorum* var. *lobata* Pampanini; *A. verlotorum* var. *rigida* Pampanini.

Herbs, perennial, 50–100 cm tall, pubescent, later glabrescent. Leaves white gland-dotted adaxially and abaxially densely gray tomentose. Basal and lowermost leaves shortly petiolate; leaf blade ovate, 1- or 2-pinnatisect. Middle stem leaves ± sessile; leaf blade ovate or broadly ovate, 5–10(–13) × 3–8 cm, 1(or 2)-pinnatisect; segments 3 or 4 pairs, lanceolate or linear-lanceolate, 30–50 × 3–5 mm. Uppermost leaves 3- or 5-lobed; leaflike bracts lanceolate or elliptic-lanceolate. Capitula in somewhat broad panicles, ellipsoid or oblong-ellipsoid, 2–2.5 mm in diam., sessile. Phyllaries glabrescent. Marginal female florets 3–6. Disk florets 8–18, bisexual. Achenes obovoid or oblong. Fl. and fr. Jul–Oct.

Hills, roadsides, waste areas; sea level to 2000 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, S Nei Mongol, S Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [E, S, and SE Asia, C, E, and W Europe, North and South America, Oceania].

Artemisia verlotorum is used medicinally.

60. Artemisia kanashiroi Kitamura, Acta Phytotax. Geobot. 12: 147. 1943.

狭裂白蒿 xia lie bai hao

Herbs, perennial, 25–60 cm tall, densely arachnoid tomentose, or glabrescent or sparsely tomentose later. Lower and middle stem leaves: petiole 5–40 mm; leaf blade suborbicular or broadly ovate, 3–4 × 3–4 cm, abaxially densely arachnoid tomentose, adaxially white gland-dotted and sparsely pubescent, 1(or 2)-pinnatisect; segments (1 or)2 or 3 pairs, linear or linear-lanceolate, 10–20(–40) × 1–2(–4) mm. Uppermost leaves 3–5-lobed; bracts leaflike 3-lobed or entire. Synflorescence a narrow panicle. Involucre cylindric or cylindric-ovoid, 2–2.5(–3) mm in diam.; phyllaries densely gray arachnoid tomentose. Marginal female florets 3–6. Disk florets 6–10, bisexual. Achenes oblong or oblong-ovoid. Fl. and fr. Jul–Oct.

• Roadsides, slopes, waste areas; low elevations to 2300 m. E Gansu, W Hebei, S Nei Mongol, Ningxia, NE Qinghai, N Shaanxi, Shanxi.

61. Artemisia zhongdianensis Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 1. 1988.

中甸艾 zhong dian ai

Herbs, perennial, 80–100 cm or more tall, pubescent. Leaves white gland-dotted and sparsely pubescent adaxially, densely gray arachnoid pubescent abaxially. Middle stem leaves: petiole 1.5–3 cm; leaf blade broadly ovate or ovate, 6–8 × 5–8 cm, 2(or 3)-pinnatisect; segments 4 or 5 pairs, subrhombic or ovate-elliptic, 3–4 × 1.5–2.5 cm, parted; lobules elliptic, linear-lanceolate, or lanceolate, 10–25 × 3–5 mm, obtuse apically; rachis winged. Upper leaves and leaflike bracts pinnatisect or 3–5-lobed. Capitula in broad panicles, many, subglobose or ovoid, 1–2 mm in diam., nodding. Phyllaries sparsely pubescent. Marginal female florets 5 or 6. Disk florets 6–8, bisexual. Achenes oblong or obovoid. Fl. and fr. Sep–Dec.

• Forest margins, slopes, scrub; ca. 2700 m. NW Yunnan.

62. Artemisia calophylla Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 457. 1930.

美叶蒿 mei ye hao

Subshrubs, 50–200 cm tall, yellowish pubescent. Basal and lowermost leaves shortly petiolate; leaf blade ovate or broadly ovate, 1- or 2-pinnatisect. Middle stem leaves: leaf blade broadly ovate, 6–11 × 3–9 cm, abaxially densely gray tomentose with sparsely pubescent veins, adaxially gland-dotted and sparsely puberulent, pinnatipartite; segments (1 or)2 pairs, lanceolate or linear-lanceolate, 30–60 × 3–6(–10) mm. Uppermost leaves and leaflike bracts lanceolate or linear-lanceolate. Synflorescence a broad panicle. Involucre ovoid, 2–2.5 mm; phyllaries sparsely pubescent. Marginal female florets 5 or 6. Disk florets 10–13, bisexual. Achenes obovoid. Fl. and fr. Jul–Oct.

• Forest margins, riversides, waste areas, slopes; 1600–3000 m. W Guangxi, Guizhou, S Qinghai, Sichuan, E Xizang, Yunnan.

63. Artemisia velutina Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 413. 1930.

黄毛蒿 huang mao hao

Artemisia velutina f. *foliosa* Pampanini.

Herbs, perennial, (25–)60–100 cm tall; stems often purplish; most parts pubescent. Lowermost leaves 1- or 2-pinnatipartite or -sect. Middle stem leaves: petiole 5–10(–15) mm; leaf blade ovate or elliptic-ovate, 4–6 × 2–3 cm, abaxially densely gray or yellowish tomentose, mixed pubescent on veins, adaxially dark green gland-dotted and sparsely pubescent, 1(or 2)-pinnatipartite or -cleft, rarely -sect; segments 2 or 3 pairs, various, lanceolate, oblong, or elliptic, 10–20 × 5–12 mm, serrate or entire. Uppermost leaves and leaflike bracts elliptic or lanceolate. Synflorescence a narrow panicle, ultimate branches short and dense, often less than 8 mm, with up to 7 capitula. Capitula closely spaced, ± nodding; peduncle to 1.5 mm. Involucre ellipsoid, 1.5–2 mm; phyllaries white with very faint greenish midrib, sparsely pubescent. Marginal female florets 8–10. Disk florets 10–15, bisexual. Achenes obovoid. Fl. and fr. Sep–Nov.

• Slopes, roadsides; low to middle elevations. Anhui, Fujian, Hebei, Henan, Hubei, Hunan, Jiangxi, S Shaanxi, Shandong, Shanxi, Sichuan, SE Xizang, Yunnan.

64. Artemisia lancea Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 500. 1903.

矮蒿 ai hao

Artemisia feddei H. Léveillé & Vaniot; *A. lavandulifolia* Candolle subf. *angusta* Pampanini; *A. lavandulifolia* subf. *effusa* Pampanini; *A. lavandulifolia* var. *feddei* (H. Léveillé & Vaniot) Pampanini; *A. lavandulifolia* var. *lancea* (Vaniot) Pampanini; *A. lavandulifolia* subf. *minutiflora* Pampanini; *A. lavandulifolia* f. *stenocephala* Pampanini; *A. minutiflora* Nakai; *A. vulgaris* Linnaeus var. *maximowiczii* Nakai, p.p.

Herbs, perennial, 80–150 cm tall, rhizomatous, sparsely arachnoid pubescent, sometimes glabrescent. Basal and lowermost leaves withering before anthesis, shortly petiolate; leaf blade ovate, 3–5(–7) × 2.5–4(–6.5) cm, 2-pinnatisect; segments 3 or 4 pairs; lobules linear-lanceolate or linear, 3–6 × 2–3 mm. Middle stem leaves ± sessile; leaf blade ovate-elliptic, ovate-orbicular, or suborbicular, 1.5–2.5 × 0.1–0.2 mm, abaxially densely gray or yellowish arachnoid pubescent, adaxially gland-dotted and sparsely arachnoid puberulent, or glabrescent, margin revolute, apex acute. Uppermost leaves and leaflike bracts 3–5-lobed or entire; lobes or entire bracts lanceolate or linear-lanceolate. Synflorescence a dense, broad to narrow panicle. Capitula many. Involucre ovoid or ellipsoid-ovoid, 1–1.5 mm in diam.; phyllaries sparsely arachnoid pubescent, glabrescent. Marginal female florets 1–3; corolla ca. 0.8 mm. Disk florets 2–5, bisexual; corolla purplish, ca. 1.5 mm. Achenes oblong. Fl. and fr. Aug–Oct.

Forest margins, roadsides, slopes, dry fields, waste areas; 300–1700 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, S Nei Mongol, S Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, E Russia].

Artemisia lancea is used medicinally.

65. Artemisia vulgaris Linnaeus, Sp. Pl. 2: 848. 1753.

北艾 bei ai

Herbs, perennial, (45–)60–160 cm tall, sparsely pubescent. Lowermost leaves shortly petiolate; leaf blade 2-pinnatisect. Middle stem leaves ± sessile; leaf blade elliptic, ovate-elliptic, suborbicular, or ovate-orbicular, 3–10(–15) × 1.5–6(–10) cm, abaxially densely gray arachnoid tomentose, adaxially sparsely arachnoid puberulent or glabrescent, 1- or 2-pinnatisect or pinnatipartite; segments (3 or)4 or 5, elliptic-lanceolate or linear-lanceolate, 3–5 × 1–1.5 cm, rachis narrowly winged, few serrate or not. Uppermost leaves pinnatipartite; leaflike bracts 3-lobed or entire; lobes or entire bracts lanceolate. Synflorescence an ill-defined panicle, lateral branches often shorter than subtending leaves. Involucre oblong, 2.5–3(–3.5) mm; phyllaries densely arachnoid pubescent. Marginal female florets 7–10. Disk florets 8–20, bisexual. Achenes obovoid or ovoid. Fl. and fr. Aug–Oct. $2n = 16, 16 + 1b, 18, 24, 36, 40, 45, 54$.

Roadsides, slopes, canyons, forest margins, forest steppes, subalpine steppes; 1500–3800 m. W Gansu, Qinghai, Shaanxi, W Sichuan, Xinjiang, E Xizang [Afghanistan, Japan, Mongolia, Myanmar, Pakistan, Russia, N Thailand, N Vietnam; Africa, SW Asia (Iran), Europe, North America].

1a. Plants 100–160 cm tall; middle stem leaves elliptic or ovate-elliptic; capitula in narrow dense panicles ..... 65a. var. *vulgaris*

1b. Plants (45–)60–80 cm tall; middle stem leaves suborbicular or ovate-orbicular; capitula in broad panicles ..... 65b. var. *xizangensis*

65a. Artemisia vulgaris var. **vulgaris**

北艾(原变种) bei ai (yuan bian zhong)

Artemisia samamisica Besser; *A. superba* Pampanini; *A. vulgaris* var. *coarctica* Forbes ex Besser, p.p.; *A. vulgaris* var. *latifolia* Fischer ex Besser; *A. vulgaris* var. *vulgatissima* Besser, p.p.

Plants usually 100–160 cm tall. Middle stem leaves elliptic or ovate-elliptic, 1- or 2-pinnatipartite or -sect. Synflorescence a dense, narrow panicle.

Roadsides, slopes, canyons, forest margins, forest steppes, subalpine steppes; 1500–2100 m. W Gansu, Qinghai, Shaanxi (Qinling), W Sichuan, Xinjiang [Afghanistan, Japan, Mongolia, Myanmar, Pakistan, Russia, N Thailand, N Vietnam; Africa, SW Asia (Iran), Europe, North America].

65b. Artemisia vulgaris var. **xizangensis** Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 505. 1980.

藏北艾 zang bei ai

Plants usually 60–80 cm tall. Middle stem leaves suborbicular or ovate-orbicular. Synflorescence a broad panicle.

• 3500–3800 m. E Xizang.

66. Artemisia yunnanensis Jeffrey ex Diels, Notes Roy. Bot. Gard. Edinburgh 5: 187. 1912.

云南蒿 yun nan hao

Artemisia igniaria Maximowicz var. *yunnanensis* (Jeffrey ex Diels) Pampanini; *A. jeffreyana* H. Léveillé, nom. illeg. superfl.

Subshrubs, 50–90 cm tall, gray sericeous-pubescent, later sparsely pubescent, much branched. Lower stem leaves: petiole 3–5 cm, base tomentose; lowermost leaves ovate, 2-pinnatisect or pinnatipartite; segments 2 or 3 pairs, oblong or ovate-elliptic, pinnatipartite; lobules 2-paired, oblong, apex obtuse. Middle stem leaves: petiole 1–4 cm; leaf blade ovate or obovate-attenuate, 5–7 × 3–6 cm, abaxially densely gray arachnoid tomentose, adaxially white gland-dotted and incanous pubescent, 1- or 2-pinnatisect or partite; segments 2 or 3 pairs, ovate-elliptic or oblong, 2–4 × 1.5–3.5 cm, apex obtuse and mucronulate. Uppermost leaves and leaflike bracts 3–5-partite or entire; lobes or entire bracts oblong or ovate-oblong. Synflorescence a broad panicle. Capitula solitary or in groups of 2 or 3. Involucre oblong or ovoid-ellipsoid, 2–2.5(–3) mm in diam.; phyllaries brown at center, arachnoid pubescent. Marginal female florets 7–13. Disk florets 8–15, bisexual. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

• Dry and hot canyons, shrublands and coniferous forest margins; low elevations to 3700 m. S Qinghai, W Sichuan, Xizang, NW Yunnan.

67. Artemisia roxburghiana Besser, Bull. Soc. Imp. Naturalistes Moscou 9: 57. 1836.

灰苞蒿 hui bao hao

Subshrubs, (20–)50–120 cm tall, arachnoid pubescent; rootstock horizontally creeping, ca. 1 cm thick. Leaves abaxially densely arachnoid tomentose, adaxially sparsely pubescent and gland-dotted, or glabrescent. Lowermost and middle stem leaves: petiole 1.5–2(–3) cm; leaf blade ovate or oblong-elliptic, 6–10(–18) × 4–6(–10) cm, 2-pinnatisect; segments (2 or)3 or 4 pairs, elliptic or oblong; lateral lobes with 1–3 pairs of lobules; lobules lanceolate or linear-lanceolate, 0.5–1.5 × 2–2.5 mm; rachis narrowly winged. Uppermost leaves and leaflike bracts pinnatisect or 3–5-lobed or entire; lobes or entire bracts linear-lanceolate or lanceolate. Synflorescence a narrow panicle to 25 × 3 cm, sometimes with extra panicles from upper nodes; branches simple, to 4 cm, erect, rather uniform in length; bracts linear, ca. as long as involucre. Capitula solitary or in dense glomerules of 2 or 3, subsessile, erect to ± patent. Involucre ovoid, subglobose or hemispheric, rarely oblong, 2–3 mm in diam.; outer phyllaries purplish tinged, purple or gray arachnoid pubescent, scarious margin broadly hyaline, apex obtuse. Florets 20–38, yellow or purple-brown tinged, all fertile. Marginal female florets 5–7; corolla filiform. Disk florets bisexual 10–20(–30); corolla limb yellow or purple. Achenes brown, obovoid or oblong, ca. 1.25 mm. Fl. and fr. Aug–Oct. $2n = 18, 36$.

Roadsides, slopes, dry canyons, grasslands, waste areas, terraces; 700–3900 m. S Gansu, Guizhou, W Hubei, Qinghai, S Shaanxi, W Sichuan, Xizang, Yunnan [Afghanistan, N India, Nepal, Pakistan, N Thailand].

1a. Phyllaries gray arachnoid pubescent ..... 67a. var. *roxburghiana*
1b. Phyllaries purple, sparsely arachnoid pubescent ..... 67b. var. *purpurascens*

67a. Artemisia roxburghiana var. **roxburghiana**

灰苞蒿(原变种) hui bao hao (yuan bian zhong)

Artemisia dubia Wallich ex Besser var. *jacquemontiana* Pampanini; *A. eriocephala* Pampanini; *A. hypoleuca* Edgeworth; *A. indica* Willdenow var. *exilis* Pampanini; *A. revoluta* Edgeworth; *A. roxburghiana* var. *acutiloba* Pampanini; *A. roxburghiana* var. *kansuensis* Pampanini.

Phyllaries gray arachnoid pubescent.

Roadsides, slopes, dry canyons, grasslands, waste areas, terraces; 700–3900 m. S Gansu, Guizhou, W Hubei, Qinghai, S Shaanxi, W Sichuan, Xizang, Yunnan [Afghanistan, N India, Nepal, N Thailand].

67b. Artemisia roxburghiana var. **purpurascens** (Jacquemont ex Besser) J. D. Hooker, Fl. Brit. India 3: 326. 1881.

紫苞蒿 zi bao hao

Artemisia purpurascens Jacquemont ex Besser, Bull. Soc. Imp. Naturalistes Moscou 9: 60. 1836; *A. strongylocephala* Pampanini.

Phyllaries purple, sparsely arachnoid pubescent.

Dry canyons, grasslands; 2000–3800 m. W Sichuan, Xizang [N India, Nepal, Pakistan].

68. Artemisia leucophylla C. B. Clarke, Compos. Ind. 162. 1876.

白叶蒿 bai ye hao

Artemisia vulgaris Linnaeus var. *leucophylla* Turczaninow ex Ledebour, Fl. Ross. 2: 586. 1845, nom. illeg. superfl.; *A. leucophylla* f. *luxurians* Pampanini; *A. leucophylla* f. *minuta* Pampanini; *A. leucophylla* var. *pusilla* Pampanini; *A. leucophylla* f. *simplicifolia* Pampanini; *A. leucophylla* f. *tenuisecta* (Regel) Pampanini; *A. mongolica* (Fischer ex Besser) Nakai var. *krascheninnikovii* Pampanini, p.p.; *A. mongolica* var. *leucophylla* (C. B. Clarke) W. Wang & H. T. Ho; *A. obscura* Pampanini var. *rigida* Pampanini; *A. vulgaris* var. *kamtschatica* Besser; *A. vulgaris* var. *minor* Ledebour; *A. vulgaris* var. *tenuisecta* Regel.

Herbs, perennial, 35–70 cm tall, arachnoid pubescent; rhizome creeping, with short branches from upper parts. Leaves abaxially densely gray arachnoid tomentose, adaxially sparsely arachnoid pubescent and gland-dotted. Lower and middle stem leaves: petiole 1–2 cm; lowermost leaf blades elliptic or ovate-elliptic in outline, 5–8 × 4–7 cm, 1- or 2-pinnatipartite or pinnatisect; segments 3(or 4) pairs, variously rhombic, elliptic, or oblong; lobules minute, 5–10 × 4–5 mm. Middle and upper stem leaves smaller, less divided, blade pinnatisect; segments 2 or 3(or 4) pairs; lobes linear-lanceolate, linear, elliptic-lanceolate, or lanceolate, 10–15 × 2–3 mm. Leaflike bracts 3–5-sect or entire. Synflorescence a ± dense narrowly conical panicle. Involucre oblong or ovoid, (2–)2.5–3.5(–4) mm in diam.; phyllaries greenish or violet, arachnoid pubescent. Marginal female florets 5–8. Disk florets 6–13, bisexual. Achenes obovoid. Fl. and fr. Jul–Oct. $2n = 18$.

Slopes, roadsides, forest margins, grasslands, riverbanks, lakeshores; low elevations to 4000 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Korea, Mongolia, Russia (W Siberia)].

69. Artemisia nujianensis (Y. Ling & Y. R. Ling) Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 26. 1988.

怒江蒿 nu jiang hao

Artemisia yunnanensis Jeffrey ex Diels var. *nujianensis* Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 505. 1980.

Subshrubs, 10–20 cm tall, gray pubescent. Leaves abaxially densely tomentose, adaxially incanous pubescent. Lower and middle stem leaves: petiole 0.7–1 cm; leaf blade ovate, oblong, or suborbicular, 1–1.5 × 0.8–1 cm, pinnatipartite; segments 1 or 2 pairs, elliptic or oblong, 3–4 × ca. 2 mm, 1- or 2-serrate, apex obtuse. Uppermost leaves and leaflike bracts 3-partite or -cleft, or entire; lobes or entire bracts oblong or elliptic. Synflorescence a lax, broad panicle; branches simple racemes to 10 cm, with sterile lower nodes, with leaflike bracts. Capitula up to 10, well spaced, long pedunculate. Involucre ovoid or subglobose, 2–2.5 mm in diam.; phyllaries densely arachnoid pubescent. Marginal female florets 7–9. Disk florets 10–14, bisexual. Achenes obovoid. Fl. and fr. Jul–Nov.

● River valleys, brushlands; 2200–2300 m. E Xizang, E Yunnan.

70. Artemisia robusta (Pampanini) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 26. 1988.

粗茎蒿 cu jing hao

Artemisia strongylocephala Pampanini f. *robusta* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 178. 1927.

Subshrubs, 100–130(–200) cm tall, yellowish pubescent. Lower and middle stem leaves: petiole 1–3.5 cm; leaf blade ovate or broadly ovate, 6–22 × 5.5–18 cm, abaxially densely arachnoid pubescent, adaxially sparsely pubescent or glabrescent, gland-dotted, 1(or 2)-pinnatipartite; segments 2 or 3 pairs, elliptic or narrowly elliptic, rarely elliptic-lanceolate, 4–13 × 2–4 cm, rachis winged, 1–5-serrate. Uppermost leaves pinnatipartite; leaflike bracts 3–5-lobed or entire; lobes or entire bracts lanceolate or linear-lanceolate. Synflorescence a broad panicle. Involucre ovoid or ovoid-campanulate, 3.5–5 mm in diam.; phyllaries arachnoid pubescent, glabrescent. Marginal female florets 8–13. Disk florets 13–26, bisexual. Achenes oblong or oblong-ovoid. Fl. and fr. Aug–Oct.

• Slopes, roadsides, shrublands, canyons; 1600–3500 m. W Sichuan, Xizang, NW Yunnan.

71. Artemisia qinlingensis Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 4(2): 18. 1984.

秦岭蒿 qin ling hao

Herbs, perennial, 80–150 cm tall, yellowish or gray arachnoid tomentose, later sparsely tomentose or glabrescent. Lower and middle stem leaves: petiole 0.5–1.5 cm; leaf blade elliptic, oblong, or ovate-elliptic, 6–8(–10) × 4–6 cm, abaxially densely arachnoid tomentose, adaxially sparsely arachnoid tomentose and gland-dotted, 2-pinnatisect; segments 4–6 pairs, 2.5–3.5 × 1.5–2.5 cm; lobules 3–5 pairs, rachis narrowly winged, deeply serrate, apex obtuse or rounded. Uppermost leaves ovate, 1- or 2-pinnatipartite, 3–5-partite, or entire; bracts minute, linear or linear-lanceolate. Synflorescence a lax, much-branched, broad panicle. Involucre oblong or subovoid, 3–3.5 mm in diam.; phyllaries arachnoid tomentose. Marginal female florets 10–15. Disk florets 15–25, bisexual. Achenes obovoid or ellipsoid-obovoid. Fl. and fr. Jul–Oct.

• Slopes, roadsides, forest margins; 1300–1500 m. E Gansu, SW Henan, S Shaanxi.

72. Artemisia phyllobotrys (Handel-Mazzetti) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 27. 1988.

叶苞蒿 ye bao hao

Artemisia strongylocephala Pampanini var. *phyllobotrys* Handel-Mazzetti, Acta Horti Gothob. 12: 278. 1938.

Herbs, perennial or nearly subshrubs, 50–100(–150) cm tall, with thick stock, arachnoid pubescent or glabrescent. Lowermost and middle stem leaves ± sessile, sparsely gray arachnoid pubescent adaxially and densely arachnoid tomentose abaxially. Middle leaves oblong-ovate, 2–5.5 × 1–3.5 cm, 2-pinnatisect; segments 2 or 3(?–5) pairs, 10–20 × 5–15 mm; lobules 1 or 2 pairs, elliptic or elliptic-lanceolate, 3–10 × 1.5–3 mm, obtuse apically; rachis narrowly winged. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect. Synflorescence a narrow or somewhat broad panicle, sometimes quite lax. Involucre oblong or obovoid-oblong, 2–2.5(–3) mm in diam., with obvious leaflike bracts at base; phyllaries gray arachnoid pubescent. Marginal female florets 4–8. Disk florets 10–14, bisexual; corolla purplish or yellow. Achenes obovoid. Fl. and fr. Jul–Oct.

• Alpine steppes, shrublands, waste slopes; 3000–3900 m. S Qinghai, W Sichuan.

73. Artemisia mongolica (Fischer ex Besser) Nakai, Bot. Mag. (Tokyo) 31: 112. 1917.

蒙古蒿 meng gu hao

Artemisia vulgaris Linnaeus var. *mongolica* Fischer ex Besser, Tent. Abrot. 53. 1832; *A. mongolica* f. *debilis* Pampanini; *A. mongolica* var. *krascheninnikovii* Pampanini, p.p.; *A. mongolica* subsp. *orientalis* Kitagawa; *A. obscura* Pampanini; *A. obscura* var. *congesta* Pampanini, p.p.; *A. obscura* var. *regina* Pampanini; *A. rubripes* Nakai f. *gracilis* Kitagawa; *A. vulgaris* var. *coarctica* Forbes ex Besser, p.p.; *A. vulgaris* var. *tenuifolia* Turczaninow ex Ledebour, nom. illeg. superfl.

Herbs, perennial, 40–120 cm tall, sparsely arachnoid pubescent. Middle stem leaves: petiole 5–20 mm; leaf blade ovate, suborbicular, or elliptic-ovate, sparsely gray arachnoid pubescent adaxially, densely arachnoid tomentose abaxially, 2-pinnatisect; segments 2 or 3 pairs; lobules lanceolate, linear, or linear-lanceolate, acute apically. Uppermost leaves and leaflike bracts ovate or elliptic-ovate, pinnatisect or 3- or 5-sect. Capitula in ± narrow panicles, ellipsoid, 1.5–2 mm in diam. Phyllaries gray arachnoid pubescent. Marginal female florets 5–10. Disk florets 8–15, bisexual. Achenes obovoid-oblong. Fl. and fr. Aug–Oct. $2n = 16, 18$.

Slopes, shrublands, riverbanks, lakeshores, roadsides, steppes, forest steppes, dry valleys; low elevations to 2000 m. Anhui, N Fujian, Gansu, N Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang [Kazakhstan, Korea, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan].

74. Artemisia verbenacea (Komarov) Kitagawa, Lin. Fl. Manshur. 434. 1939.

辽东蒿 liao dong hao

Artemisia vulgaris Linnaeus var. *verbenacea* Komarov, Fl. Manshur. 3: 673. 1907; *A. liaotungensis* Kitagawa; *A. mongolica* (Fischer ex Besser) Nakai var. *verbenacea* (Komarov) Pampanini; *A. obscura* Pampanini var. *congesta* Pampanini, p.p.; *A. princeps* Pampanini var. *candicans* Pampanini.

Herbs, perennial, 30–70 cm tall, with capitate branches, gray arachnoid tomentose, later loosely tomentose or glabrescent. Lowermost and middle stem leaves: petiole 1–2 cm; leaf blade ovate, suborbicular, or broadly ovate; lowermost blade (1.5–)2–4(–6) × 1.5–4 cm, 1- or 2-pinnapartite, rarely -sect; segments 2 or 3(or 4) pairs; middle blade 2–5 × 2–4 cm, 2-pinnatisect; segments 3(or 4) pairs; lobules elliptic or elliptic-lanceolate, rarely linear-lanceolate, (3–)5–10 × 1.5–2.5 mm, obtuse apically. Uppermost leaves pinnatisect; segments 2 pairs; leaflike bracts 3–5-sect. Capitula dense initially, lax later along

branches in ± narrow panicles, oblong or oblong-ovoid, 2–2.5(–3) mm in diam. Marginal female florets 5–8. Disk florets 8–20, bisexual; corolla limb purple. Achenes oblong or obovoid-ellipsoid. Fl. and fr. Aug–Oct.

• Slopes, roadsides, riverbanks, lakeshores; 2200–3500 m. Gansu, Heilongjiang, Jilin, Liaoning, S Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan.

Artemisia verbenacea is used medicinally.

75. Artemisia rubripes Nakai, Bot. Mag. (Tokyo) 31: 112. 1917.

红足蒿 hong zu hao

Artemisia mongolica (Fischer ex Besser) Nakai var. *parviflora* (Besser) Kitagawa; *A. mongolica* var. *pseudovulgaris* Pampanini; *A. nipponica* Pampanini var. *rubripes* (Nakai) Pampanini; *A. venusta* Pampanini; *A. vulgaris* Linnaeus var. *maximowiczii* Nakai, p.p.; *A. vulgaris* var. *parviflora* Besser.

Herbs, perennial, 75–180 cm tall, puberulent or glabrescent. Lowermost and middle stem leaves: petiole 5–10 mm or more; leaf blade abaxially densely gray arachnoid tomentose, adaxially ± glabrous. Lowermost leaves suborbicular, 2-pinnatisect. Middle stem leaves ovate, elliptic-ovate, or broadly ovate, 7–13 × 4–10 cm, (1 or)2-pinnatisect; segments 3 or 4 pairs, lanceolate, linear-lanceolate, or linear, 20–40 × 2–6(–10) cm; lobules 2 or 3 pairs, serrate. Uppermost leaves pinnatisect; leaflike bracts 3–5-sect. Capitula closely spaced along branches in ± broad panicles, ellipsoid-ovoid or oblong-ovoid, 1–1.5(–2) mm in diam. Phyllaries arachnoid puberulent or ± glabrescent. Marginal female florets 9–10. Disk florets 12–14, bisexual. Achenes narrowly ovoid. Fl. and fr. Aug–Oct.

Waste areas, grassy slopes, forest steppes, shrublands, roadsides, riverbanks, meadows, forests; low elevations to 1200 m. Anhui, N Fujian, Hebei, Heilongjiang, Jiangsu, N Jiangxi, Jilin, Liaoning, E Nei Mongol, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Mongolia, Russia].

76. Artemisia divaricata (Pampanini) Pampanini, Nuovo Giorn. Bot. Ital., n.s., 46: 560. 1939.

叉枝蒿 cha zhi hao

Artemisia roxburghiana Besser var. *divaricata* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 431. 1930.

Herbs, perennial, 80–120(–150) cm tall, gray pubescent or glabrescent. Leaves pubescent and glabrescent adaxially, densely yellowish pubescent and gray arachnoid tomentose, persistent. Lowermost leaves long petiolate; leaf blade 2-pinnatisect; segments 4 pairs. Middle stem leaves: petiole 1–1.5 cm; leaf blade ovate or elliptic-ovate, 4–5 × 3.5–5 cm, 2-pinnatisect; segments 4(or 5) pairs, ovate, 15–25 × 5–15 mm; lobules 3 or 4 pairs, elliptic-lanceolate or linear-lanceolate, 10–15(–2) × 1.5–2.5 mm. Uppermost leaves 1- or 2-pinnatisect; leaflike bracts pinnatisect. Capitula in broad, much-branched panicles, oblong or oblong-ovoid, 1.5–2 mm in diam. Marginal female florets 3–5. Disk florets 4–8, bisexual. Achenes oblong or ellipsoid. Fl. and fr. Aug–Oct.

• Hills, slopes, roadsides; 2000–3400 m. W Hubei, N and W Sichuan, W Yunnan.

77. Artemisia indica Willdenow, Sp. Pl. 3: 1846. 1803.

五月艾 wu yue ai

Herbs, perennial, or subshrubs, 80–150 cm tall, much branched, sparsely puberulent or glabrescent. Leaves shortly petiolate or ± sessile; leaf blade abaxially densely gray arachnoid tomentose, adaxially gray or yellowish tomentose or glabrescent. Lowermost leaves ovate or oblong-ovate, 6–12 × 3–8 cm, (1 or)2-pinnatipartite; distal lobes larger; segments 3 or 4 pairs, winged at midvein. Middle stem leaves ovate, oblong-ovate, or elliptic, 5–8 × 3–5 cm, (1 or)2-pinnatipartite; segments 3(or 4) pairs; distal lobe larger; lobes elliptic-lanceolate, linear-lanceolate, or linear, 10–20 × 3–5 mm; lobules deeply serrate, acute or acuminate apically. Uppermost leaves pinnatipartite; leaflike bracts 3-lobed or entire. Capitula sessile or inconspicuously pedunculate, ± erect, remote in broadly conical, almost leafless panicle with obliquely spreading, up to 18 cm long branches. Involucre ovoid, oblong-ovoid, or broadly ovoid, 3–4 × ca. 2 mm; phyllaries puberulent to glabrous. Florets 15–20, yellowish, all fertile. Marginal female florets 4–10; corolla tubular, ± glandular, 2-toothed. Disk florets 8–12, bisexual, basally glandular. Achenes brown, oblong or obovoid, ca. 1.25 mm. Fl. and fr. Aug–Oct.

Roadsides, forest margins, slopes, shrublands; low elevations to 2000 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, S Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, SE Nei Mongol, S Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [India, Indonesia, Japan, Korea, Myanmar, Philippines, N Thailand, Vietnam; North and Central America, Oceania].

1a. Branches 10–15(–20) cm; leaves densely arachnoid tomentose, lobules acute apically, midvein narrowly winged ..... 77a. var. *indica*

1b. Branches 15–25 cm; leaves sparsely arachnoid tomentose or glabrescent abaxially, lobules acuminate or mucronulate apically, midvein winged ..... 77b. var. *elegantissima*

77a. Artemisia indica var. **indica**

五月艾(原变种) wu yue ai (yuan bian zhong)

Absinthium moxa Besser; *Artemisia asiatica* Nakai ex Pampanini; *A. dubia* Wallich ex Besser f. *communis* Pampanini; *A. dubia* var. *compacta* Pampanini; *A. dubia* f. *congesta* Pampanini; *A. dubia* var. *gracilis* Pampanini; *A. dubia* var. *grata* (Wallich ex Besser) Pampanini; *A. dubia* f. *leptostachya* (Candolle) Pampanini; *A. dubia* var. *multiflora* (Wallich ex Besser) Pampanini; *A. dubia* var. *orientalis* Pampanini, p.p.; *A. dubia* var. *septentrionalis* Pampanini; *A. grata* Wallich ex Besser; *A. indica* var. *heyneana* Wallich ex Besser; *A. indica* var. *multiflora* Wallich ex Besser; *A. indica* var. *nepalensis* Besser; *A. leptophylla* D. Don; *A. leptostachya* Candolle; *A. longiflora* Pampanini; *A. nilagirica* (C. B. Clarke) Pampanini f. *lobata* Pampanini; *A. pleiocephala* Pampanini var. *grandis* Pampanini; *A. princeps* Pampanini var. *orientalis* (Pampanini) H. Hara; *A. vulgaris* Linnaeus var. *indica* (Willdenow) Maximowicz; *A. vulgaris* var. *vulgatissima* Besser, p.p.; *A. wallichiana* Besser.

Branches 10–15(–20) cm. Leaves abaxially densely arach-

noid tomentose; lobules acute apically, narrowly winged at midvein. Capitula in broad or somewhat broad panicles.

Roadsides, forest margins, slopes, shrublands; low to middle elevations. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, S Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, SE Nei Mongol, S Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [India, Indonesia, Japan, Korea, Myanmar, Philippines, N Thailand, Vietnam; North and Central America, Oceania].

Material from SE Asia formerly included within *Artemisia dubia* belongs to *A. indica* var. *indica*.

Artemisia indica var. *indica* is used medicinally; in particular, the root is used for a tonic for the kidneys.

77b. Artemisia indica var. **elegantissima** (Pampanini) Y. R. Ling & Humphries, Bull. Bot. Res., Harbin 8(3): 29. 1988.

雅致艾 ya zhi ai

Artemisia elegantissima Pampanini, Nuovo Giorn. Bot. Ital., n.s., 33: 454. 1926.

Branches 15–25 cm. Leaves abaxially sparsely tomentose or glabrescent; lobules acuminate apically, winged at midvein. Capitula in broad panicles.

Slopes; middle to high elevations. SE Xizang [N India].

78. Artemisia princeps Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 444. 1930.

魁蒿 kui hao

Artemisia montana (Nakai) Pampanini f. *occidentalis* Pampanini; *A. parvula* Pampanini; *A. vulgaris* Linnaeus var. *maximoviczii* Nakai, p.p.; *A. vulgaris* f. *nipponica* Nakai.

Herbs, perennial, 60–150 cm tall, sparsely arachnoid puberulent or glabrescent. Leaves densely arachnoid tomentose abaxially. Lowermost leaves long petiolate; leaf blade ovate or elliptic-ovate, 1- or 2-pinnatipartite; segments 2 pairs, oblong or oblong-elliptic. Middle stem leaves: petiole 1–2(–3) cm; leaf blade ovate or ovate-elliptic, 6–12 × 4–8 cm, pinnatipartite, rarely -sect; segments 2(or 3) pairs, elliptic-lanceolate or elliptic; distal lobe and lobules of lateral lobes larger, obtuse apically. Uppermost leaves pinnatipartite; leaflike bracts 3-lobed or entire. Capitula in somewhat broad panicles, oblong or oblong-ovoid, 1.5–2.5 mm in diam. Phyllaries sparsely arachnoid puberulent. Marginal female florets 5–7. Disk florets 4–9, bisexual. Fr. Jul–Nov. $2n = 34$.

Roadsides, slopes, shrublands, forest margins, valleys, riverbanks; below 100–1400 m. Anhui, S Gansu, Guangdong, Guangxi, Guizhou, S Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Liaoning, SE Nei Mongol, S Shaanxi, Shandong, S Shanxi, Sichuan, Taiwan, Yunnan [Japan, Korea].

Artemisia princeps is used medicinally.

79. Artemisia occidentalisinensis Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 2. 1988 [*"occidentali-sinensis"*].

华西蒿 hua xi hao

Herbs, perennial, 100–150 cm tall; rhizome short, thick; stem often solitary, branches many, 20–30 cm, subglabrous. Lower and middle stem leaves: petiole 2–10 mm; leaf blade elliptic-ovate, 4–9 × 2.5–4 cm, yellow or brown gland-dotted, 1–3-pinnatipartite or -sect; segments 4 or 5 pairs; lobes or lobules linear or linear-lanceolate or serrate, 5–25(–35) × 2.5–5 mm, base attenuate, margin revolute, acuminate apically; rachis narrowly winged. Uppermost leaves pinnatipartite or -sect; leaflike bracts pinnatipartite or entire. Synflorescence a broad panicle; ultimate branches with up to 8 capitula. Capitula solitary or in groups of 3 or 4, sessile. Involucre ellipsoid or oblong-campanulate, 2–3 mm in diam.; phyllaries initially puberulent, glabrescent. Marginal female florets 6–8. Disk florets 10–20, bisexual. Achenes obovoid. Fl. and fr. Aug–Oct.

• Slopes, roadsides; middle to high elevations. W Sichuan, Xizang.

1a. Middle stem leaves 1- or 2-pinnatipartite, lobules 8–25(–35) × 2.5–3.5 mm, margin entire ..... 79a. var. *occidentalisinensis*

1b. Middle stem leaves 2- or 3-pinnatipartite, lobules 5–10 × 4–5 mm, margin serrate ..... 79b. var. *denticulata*

79a. Artemisia occidentalisinensis var. **occidentalisinensis**

华西蒿(原变种) hua xi hao (yuan bian zhong)

Middle stem leaves 1- or 2-pinnatipartite; lobules linear or linear-lanceolate, 8–25(–35) × 2.5–3.5 mm, margin entire.

• Slopes, roadsides; middle to high elevations. Xizang.

79b. Artemisia occidentalisinensis var. **denticulata** Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 3. 1988.

齿裂华西蒿 chi lie hua xi hao

Middle stem leaves 2- or 3-pinnatipartite; lobules lanceolate, 5–10 × 4–5 mm, margin serrate.

• Middle to high elevations. W Sichuan, E Xizang.

80. Artemisia incisa Pampanini, Nuovo Giorn. Bot. Ital., n.s., 33: 456. 1926.

尖裂叶蒿 jian lie ye hao

Artemisia nuristanica Kitamura.

Herbs, perennial, 100–150 cm tall, pubescent, sometimes glabrescent. Lower and middle stem leaves: petiole 3–10 mm; leaf blade ovate or elliptic-ovate, (7–)14–18(–20) × (5–)6–10 cm, abaxially densely to sparsely grayish green arachnoid pubescent, adaxially green with sparse T-shaped hairs, (1 or)2-pinnatipartite to pinnatisect; segments 3–5 pairs, elliptic or oblong, 4–6 × 2–3.5 cm, sharply acute; lobules 3 or 4 pairs, base attenuate, 2- or 3-serrate at margin; rachis winged. Uppermost leaves and leaflike bracts pinnatipartite or -cleft. Synflorescence a narrow to broad panicle, 10–25 × 5–10 cm; branches obliquely patent to ascending, up to 25 cm. Capitula ± remote to approximate near branch apices, shortly pedunculate to sessile. Involucre ellipsoid or ellipsoid-ovoid, 2–3 mm in diam. Marginal

female florets 3 or 4[–8]. Disk florets 7–9(–12), bisexual. Achenes obovoid. Fl. and fr. Aug–Oct. $2n = 16$.

Middle to high elevations. S Xizang [Afghanistan, India, Kashmir, Nepal, N Pakistan].

81. Artemisia igniaria Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 161. 1859.

歧茎蒿 qi jing hao

Artemisia princeps Pampanini f. *dentata* Pampanini; *A. princeps* f. *dissecta* Pampanini; *A. princeps* subf. *purpurascens* Pampanini.

Subshrubs, 60–120(–150) cm tall, gray tomentose or later sparsely tomentose. Middle stem leaves: petiole 5–15 mm; leaf blade ovate or broadly ovate, 6–12 × 4–10 cm, abaxially densely tomentose, adaxially gray tomentose or glabrescent, 1- or 2-pinnatipartite; segments 2 or 3 pairs, elliptic or oblong, 3–5(–6) × 2–3 cm; lobules (2 or)3(or 4) pairs, apex mucronulate. Uppermost leaves 3-partite or entire; leaflike bracts elliptic, entire. Synflorescence a ± broad panicle. Involucre ellipsoid or ovoid, 2.5–3.5 mm in diam.; phyllaries gray arachnoid tomentose. Marginal female florets 5–8. Disk florets 7–14, bisexual. Achenes oblong. Fl. and fr. Aug–Nov.

• Slopes, forest margins, steppes, shrublands, roadsides; below 100 m. Hebei, Heilongjiang, Henan, Jilin, Liaoning, E and S Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi.

82. Artemisia nilagirica (C. B. Clarke) Pampanini, Nuovo Giorn. Bot. Ital., n.s., 33: 452. 1926.

南亚蒿 nan ya hao

Artemisia vulgaris Linnaeus var. *nilagirica* C. B. Clarke, Compos. Ind. 162. 1876.

Herbs, perennial, 20–60 cm tall, puberulent or glabrescent. Middle stem leaves ± sessile; leaf blade ovate or elliptic-ovate, 5–6 × 3–5 cm abaxially densely gray tomentose, pinnatifid; segments 1–3 pairs, ovate or oblong-ovate, usually 1- or 2-serrate, acuminate apically. Uppermost leaves and leaflike bracts oblong-ovate, few serrate. Synflorescence a broad panicle. Involucre ovoid or ovoid-campanulate, 1–2 mm in diam.; phyllaries puberulent. Marginal female florets 3 or 4. Disk florets 4–8, bisexual. Achenes obovoid. Fl. and fr. Aug–Oct. $2n = 18, 54$.

Slopes; middle elevations. SW Sichuan, SE Xizang [N India, N Myanmar].

83. Artemisia integrifolia Linnaeus, Sp. Pl. 2: 848. 1753.

柳叶蒿 liu ye hao

Artemisia integrifolia f. *bothnhofii* Pampanini; *A. integrifolia* f. *suzievii* Pampanini; *A. integrifolia* f. *transiens* Pampanini; *A. komarovii* Poljakov; *A. mongolica* (Fischer ex Besser) Nakai var. *interposita* Kitagawa; *A. quadriauriculata* F. H. Chen; *A. vulgaris* Linnaeus var. *integrifolia* (Linnaeus) Ledebour.

Herbs, perennial, 50–120 cm tall, arachnoid puberulent. Leaves abaxially densely tomentose, adaxially incanous puberulent or glabrescent, sessile. Lowermost leaves ovate or elliptic, rarely broadly ovate, margin few serrate. Middle stem leaves elliptic, elliptic-lanceolate, or linear-lanceolate, 4–7 × 1.5–2.5(–3) cm, base attenuate, margin 1–3-serrate, apex acuminate. Uppermost leaves elliptic or lanceolate, entire, rarely few serrate. Synflorescence a narrow panicle. Involucre elliptic or oblong, (2.5–)3–4 mm in diam.; phyllaries sparsely puberulent. Marginal female florets 10–15. Disk florets 20–30, bisexual. Achenes obovoid or oblong. Fl. and fr. Aug–Oct. $2n = 18, 36$.

Forest margins, roadsides, riverbanks, steppes, meadows, forest steppes, shrublands; low to middle elevations. Hebei, Heilongjiang, Jilin, Liaoning, E Nei Mongol [Korea, Mongolia, Russia].

84. Artemisia subulata Nakai, Bot. Mag. (Tokyo) 29: 8. 1915.

线叶蒿 xian ye hao

Artemisia integrifolia Linnaeus var. *subulata* (Nakai) Pampanini; *A. stenophylla* Kitamura, p.p.

Herbs, perennial, 45–80 cm tall, arachnoid pubescent or glabrescent, with capitate branches. Leaves sessile. Lowermost leaves oblanceolate or oblanceolate-linear, 8–13 × 0.5–0.8 cm, entire or 1- or 2-serrate. Middle stem leaves: blade linear, linear-lanceolate, or falcate, 5–10 × 0.3–0.6 mm, abaxially densely arachnoid tomentose, margin entire or occasionally 1- or 2-serrate, apex obtuse. Uppermost leaves and leaflike bracts linear. Synflorescence a narrow, racemelike panicle. Involucre oblong or ovoid-oblong, 2–3 mm in diam. Marginal female florets 10 or 11. Disk florets 10–15, bisexual. Achenes oblong-ovoid or ellipsoid. Fl. and fr. Aug–Oct.

Humid and semihumid slopes, forest margins, riverbanks, meadows; low elevations. N Hebei, Heilongjiang, Jilin, Liaoning, E and SE Nei Mongol, N Shanxi [Japan, Korea, E Russia].

85. Artemisia brachyphylla Kitamura, Acta Phytotax. Geobot. 5: 97. 1936.

高岭蒿 gao ling hao

Artemisia koidzumii Nakai var. *manchurica* Pampanini, p.p.; *A. pronutans* Kitagawa.

Herbs, perennial, 30–70 cm tall, densely gray arachnoid pubescent. Leaves ± sessile. Lowermost leaves ovate-elliptic or ovate-oblong in outline, 2-pinnatipartite. Middle stem leaves: leaf blade elliptic or oblong, 4.5–6.5 × 3.5–4.5 cm, abaxially densely gray tomentose, adaxially sparsely arachnoid pubescent, 1(or 2)-pinnatipartite; segments (2 or)3 or 4 pairs, elliptic, 1–1.5 × 0.3–0.5 cm, base attenuate; lobules narrow, 0.5–2(–3) mm wide, occasionally 1- or 2-serrate, apex acuminate. Uppermost leaves and leaflike bracts 3- or 5-partite or entire. Synflorescence a narrow panicle. Involucre subglobose or broadly globose, 2.5–4 mm in diam.; phyllaries arachnoid pubescent. Marginal female florets 4–6. Disk florets 6–10, bisexual. Achenes obovoid or oblong-obovoid. Fl. and fr. Aug–Oct.

Subalpine meadows, forest steppes, rocky slopes, forest margins, roadsides, shrublands; ca. 1100 m. E Jilin [Korea].

86. Artemisia viridisquama Kitamura, Acta Phytotax. Geobot. 12: 148. 1943.

绿苞蒿 lü bao hao

Herbs, perennial, 80–200 cm tall, pubescent. Middle stem and upper leaves ± sessile; leaf blade elliptic-ovate or ovate, 6–12 × 4–10 cm, abaxially white tomentose, 1(or 2)-pinnatipartite; segments 1 or 2 pairs, 3-parite or entire; lobules or lobes linear-lanceolate, 45–80 × 4–6 mm, acuminate apically. Leaflike bracts linear-lanceolate. Synflorescence a broad panicle. Capitula shortly pedunculate. Involucre ovoid-campanulate, 1.5–2 mm in diam.; phyllaries sparsely arachnoid tomentose. Marginal female florets 3–8. Disk florets 8–15, bisexual. Achenes ellipsoid. Fl. and fr. Aug–Oct.

• Slopes, roadsides; low elevations. S Gansu, Hebei, Shanxi, Sichuan.

87. Artemisia viridissima (Komarov) Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 484. 1930.

林艾蒿 lin ai hao

Artemisia vulgaris Linnaeus var. *viridissima* Komarov, Fl. Manshur. 3: 673. 1907; *A. viridissima* var. *japonica* Pampanini.

Herbs, perennial, 80–140 cm tall, with capitate branches. Leaves puberulent or glabrescent, ± sessile. Lowermost and middle stem leaves elliptic-lanceolate or lanceolate, 8–13 × 2–3 cm, base attenuate, margin serrulate, apex acuminate. Uppermost leaves and leaflike bracts elliptic or linear-lanceolate. Synflorescence a narrow panicle. Involucre ovoid or ovoid-campanulate, 2–3 mm in diam. Marginal female florets 3–5. Disk florets 8–12, bisexual. Achenes obovoid or ovoid. Fl. and fr. Jul–Oct.

Forest margins, roadsides; 1400–1700 m. Jilin, Liaoning [Korea].

88. Artemisia tafelii Mattfeld, Repert. Spec. Nov. Regni Veg. 22: 244. 1926.

波密蒿 bo mi hao

Artemisia lagocephala (Fischer ex Besser) Candolle var. *tafelii* (Mattfeld) Pampanini.

Herbs, perennial, 40–60 cm tall, sericeous-puberulent, later ± glabrescent. Leaves ± sessile. Lowermost leaves obovate, pinnatipartite. Middle stem leaves obovate or obovate-triangular, 7–9 × 4–5 cm, obliquely 3–5-partite from apex to center; segments oblong or elliptic, 20–40 × 5–10 mm, base attenuate, margin 1- or 2-serrate. Uppermost leaves obovate-elliptic, obliquely 3-partite or entire; leaflike bracts obovate-lanceolate or lanceolate. Synflorescence a lax, broad panicle. Involucre hemispheric or campanulate, 4–5 mm in diam. Marginal female florets 5–10. Disk florets 10–25, bisexual. Achenes obovoid or ovoid. Fl. and fr. Jul–Oct.

• Shrublands; ca. 3600 m. E Xizang.

89. Artemisia montana (Nakai) Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 461. 1930.

山地蒿 shan di hao

Artemisia vulgaris Linnaeus f. *montana* Nakai, Bot. Mag. (Tokyo) 26: 104. 1912; *A. gigantea* Kitamura; *A. montana* var. *latiloba* Pampanini.

Herbs, perennial, 150–200 cm tall, from creeping rhizomes, gray pubescent, glabrescent. Basal leaves withering before anthesis. Middle stem leaves: petiole 2.5–3 cm; leaf blade ovate, 13–19 × 4–12 cm, abaxially gray tomentose, adaxially thinly arachnoid, glabrescent; pinnatipartite, segments 2 or 3 pairs, oblong or oblong-lanceolate; distal lobes larger, base attenuate, entire or occasionally few serrate. Uppermost leaves and leaflike bracts lanceolate, 3-cleft or entire. Synflorescence a large, often rather narrow, panicle, main branches usually ascending; ultimate branches short, secund, without bracts. Involucre oblong, 2.5–3 mm in diam.; outer phyllaries arachnoid tomentose. Marginal female florets 4–6; corolla apex lacerate. Disk florets 8–14, bisexual. Achene obovoid, 1.5–2 mm. $2n$ = 51–54.

Roadsides, shrublands, forest margins, wet meadows, riverside forests; 300–2800 m. Anhui, Hunan, Jiangxi [Japan, E Russia].

"*Artemisia montana* Schlechtendal" (Ledebour, Fl. Ross. 2: 591. 1845) is merely a herbarium name cited as a synonym and was therefore not validly published (*Vienna Code*, Art. 34.1(c)).

90. Artemisia moorcroftiana Wallich ex Candolle, Prodr. 6: 117. 1838.

小球花蒿 xiao qiu hua hao

Artemisia moorcroftiana var. *campanulata* Pampanini; *A. moorcroftiana* f. *tenuifolia* Pampanini.

Subshrubs, 50–70 cm tall; rootstock horizontally creeping, ca. 1 cm thick, woody; stems several, with capitate branches, most parts sparsely ± arachnoid gray or yellowish pubescent or glabrescent. Lower and middle stem leaves: petiole 1–3 cm; leaf blade oblong, ovate, or elliptic, 5–10 × 2–3(–4.5) cm, abaxially densely gray or yellowish tomentose, adaxially sparsely tomentose, 2- or 3-pinnatisect or partite; segments (4 or)5 or 6 pairs, ovate or elliptic-ovate; lobules lanceolate or linear-lanceolate, margin few serrate, apex acuminate; rachis narrowly winged. Uppermost leaves pinnatipartite; leaflike bracts 3–5-partite or entire. Synflorescence a narrowly cylindric interrupted, racemelike panicle, 15–20 × 1.5–2.5 cm; branches 2–3 cm, erect to somewhat appressed spicate. Capitula sessile. Involucre globose or hemispheric, 4–6 mm in diam.; outer phyllaries purplish, sparsely pubescent, margin not hyaline scarious, apex acute. Receptacle ± convex, glabrous. Florets purplish. Marginal female florets 15–20; corolla linear-tubular, glandular, 2-toothed. Disk florets bisexual 30–35; corolla clavate-tubular, base glandular, apex very sparsely hairy. Achene brown, ± cylindric, ca. 1.75 mm. Fl. and fr. Jul–Oct. $2n$ = 18.

Slopes, terraces, valleys, rocky hills, subalpine steppes, subalpine meadows; 2000–5300 m. Gansu, Ningxia, Qinghai, W Sichuan, Xizang, NW Yunnan [Bhutan, India, N Pakistan].

91. Artemisia abaensis Y. R. Ling & S. Y. Zhao, Bull. Bot. Res., Harbin 5(2): 4. 1985.

阿坝蒿 a ba hao

Herbs, perennial, 100 cm tall or more, gray and yellowish villous and tomentose. Middle stem leaves: petiole 3–5 mm; leaf blade oblong-ovate or elliptic, 6–8 × 3.5–4.5 cm, sparsely arachnoid pubescent and gland-dotted adaxially, densely gray

arachnoid tomentose, 2-pinnatisect; segments (4 or)5 or 6 pairs, elliptic; lobules 2 or 3 pairs or deeply serrate; distal lobules longer, 5–12 × 2–4 mm; rachis narrowly winged. Uppermost leaves 1- or 2-pinnatipartite; leaflike bracts pinnatipartite, 3-partite, or entire. Capitula in broad, much-branched panicles, oblong or oblong-ovoid, 1.5–2 mm in diam. Phyllaries sparsely arachnoid pubescent. Marginal female florets 2–5. Disk florets 4–8, bisexual. Achene obovoid. Fl. and fr. Aug–Oct.

• Lakeshores, valleys, roadsides; middle to high elevations. SW Gansu, W Sichuan, E Qinghai.

92. Artemisia tainingensis Handel-Mazzetti, Acta Horti Gothob. 12: 277. 1938.

川藏蒿 chuan zang hao

Herbs, perennial, 15–30 cm tall, white tomentose or glabrous. Lowermost and middle stem leaves: petiole 1–2 cm; leaf blade elliptic, 1.5–3.5 × 1.2–1.8 cm, white tomentose or glabrous, 2-pinnatisect; segments 4 or 5(or 6) pairs, elliptic or elliptic-ovate, 10–15 × 5–10 mm; lobules elliptic or elliptic-lanceolate, (2–)5–8 × 0.5–1.3 mm; rachis narrowly winged. Uppermost leaves and leaflike bracts ovate, 1- or 2-pinnatisect or -partite. Capitula in narrow panicles, campanulate or ovoid-campanulate, 3–4(–4.5) mm in diam. Phyllaries brown, white tomentose. Marginal female florets 13–16. Disk florets 20, bisexual. Achene obovoid. Fl. and fr. Jul–Oct.

Rocky slopes, terraces; 3300–5300 m. Hubei, S Qinghai, W Sichuan, Xizang [N India].

1a. Stem, branches, leaves, and phyllaries white tomentose ..... 92a. var. *tainingensis*
1b. Stem, branches, and leaves glabrous, phyllaries sparsely tomentose ..... 92b. var. *nitida*

92a. Artemisia tainingensis var. **tainingensis**

川藏蒿(原变种) chuan zang hao (yuan bian zhong)

Artemisia campbellii J. D. Hooker & Thomson ex C. B. Clarke var. *limprichtii* Pampanini.

Stem, branches, leaves, and phyllaries white tomentose.

• Rocky slopes; 3300–4000 m. Hubei, S Qinghai, W Sichuan, E Xizang.

92b. Artemisia tainingensis var. **nitida** (Pampanini) Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 33. 1988.

无毛川藏蒿 wu mao chuan zang hao

Artemisia moorcroftiana Wallich ex Candolle f. *nitida* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 681. 1927; *A. moorcroftiana* var. *nitida* (Pampanini) Y. Ling & Y. R. Ling.

Stem, branches, and leaves glabrous. Phyllaries sparsely tomentose.

Terraces, rocky slopes; 4100–5300 m. C and W Xizang [N India].

93. Artemisia orientalixizangensis Y. R. Ling & Humphries, Bull. Bot. Res., Harbin 10(1): 19. 1990 [*"orientali-xizangensis"*].

昌都蒿 chang du hao

Herbs, perennial, 30–40 cm tall, gray puberulent, later glabrescent. Lowermost leaves suborbicular or oblong, 1.5–2 × 1–1.5 cm, 2- or 3-pinnatisect. Lower and middle stem leaves: petiole 0.4–0.7 cm; leaf blade suborbicular or oblong-ovate, 2–2.5 × 0.5–1.5 cm, 2(or 3)-pinnatisect; segments 4 or 5 pairs, oblong-ovate or elliptic, 5–8 × 4–6 mm; lobules elliptic, 3–4 × 1.5–2 mm; rachis narrowly winged. Uppermost leaves and leaflike bracts sessile, 1- or 2-pinnatisect. Synflorescence a dense, narrow, spikelike panicle. Involucre ovoid or subglobose, 1.5–2.5 mm in diam.; phyllaries ± glabrous. Marginal female florets 3–5. Disk florets 5–10, bisexual. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

• Slopes, roadsides; middle elevations. E and SE Xizang.

94. Artemisia campbellii J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 164. 1876.

绒毛蒿 rong mao hao

Subshrubs, 20–35 cm tall, densely yellowish or gray tomentose, foetid. Lower stem leaves: petiole 5–15 mm; leaf blade ovate, 2.5–4 × 1.5–2.5 cm, 2(or 3)-pinnatisect; segments 3–5 pairs, 5–15 × 3–5 mm; lobules lanceolate or linear-lanceolate, 3–5 × 0.5–1 mm. Middle stem and upper leaves sessile; leaf blade ovate, 2–3 × 1.5–2.5 cm, abaxially densely gray or yellowish tomentose, adaxially glabrescent, 1- or 2-pinnatisect; segments 3 or 4 pairs; lobules linear or linear-lanceolate. Leaflike bracts 3–5-sect or entire. Synflorescence a dense, narrow panicle. Involucre hemispheric, 3–4(–5) mm in diam.; phyllaries densely pubescent, margin brown. Marginal female florets 8–10. Disk florets 15–18, bisexual. Achenes oblong or obovoid. Fl. and fr. Jul–Nov.

Dry slopes, shrublands; 3800–5300 m. Qinghai, W Sichuan, E Xizang [Bhutan, India, N Pakistan].

95. Artemisia youngii Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 4. 1988.

高原蒿 gao yuan hao

Herbs, perennial, 30–50 cm tall, gray puberulent, capitately branched. Lower and middle stem leaves: petiole 0.5–1.5 cm; leaf blade elliptic or oblong-elliptic, 3–4 × 1.5–2 cm, abaxially densely gray pubescent, 2- or 3-pinnatisect; segments 5 or 6(or 7) pairs, elliptic; lobules 2 or 3 pairs, elliptic-lanceolate or linear-lanceolate, 3–5 × ca. 1.5 mm, rachis narrowly winged, occasionally few serrate. Uppermost leaves and leaflike bracts elliptic-ovate, 1- or 2-pinnatisect. Synflorescence a dense, narrow panicle. Involucre hemispheric or ovoid, 3–4 mm in diam.; phyllaries puberulent. Marginal female florets 8–14. Disk florets 10–20, bisexual. Achenes oblong-ovoid or obovoid. Fl. and fr. Aug–Oct.

• Slopes, roadsides; middle to high elevations. SE Qinghai, E Xizang.

96. Artemisia jilongensis Y. R. Ling & Humphries, Bull. Bot. Res., Harbin 10(1): 18. 1990.

吉隆蒿 ji long hao

Herbs, perennial, 30–40 cm tall, sparsely gray or yellowish tomentose. Lowermost and middle stem leaves: petiole 1.5–2

cm; leaf blade oblong, 2–3 × 1.5–2.5 cm, 2-pinnatisect; segments 4 or 5 pairs; lobules linear-lanceolate, 5–8 × 1.5–2 mm. Uppermost leaves and leaflike bracts (1 or)2-pinnatisect. Capitula in narrow panicles, ovoid, 2–3 mm in diam. Phyllaries sparsely yellowish tomentose. Marginal female florets 3–8. Disk florets 14–18, bisexual. Achene obovoid or oblong. Fl. and fr. Aug–Oct.

• Slopes; ca. 4200 m. S and SW Xizang.

97. Artemisia comaiensis Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 3. 1988.

高山矮蒿 gao shan ai hao

Herbs, perennial, dwarf, caespitose, 8–30 cm tall, gray or yellowish sericeous-pubescent. Lower and middle stem leaves: petiole 1–1.5 cm; leaf blade oblong, elliptic, or oblong-ovate, 1.5–3.5 × 0.5–2 cm, yellowish pubescent, 2- or 3-pinnatisect; segments 4 or 5(or 6) pairs, elliptic or oblong-ovate, 5–15 × 3–10 mm, pinnatipartite or 3-lobed; lobules elliptic or elliptic-lanceolate; rachis narrowly winged. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect. Synflorescence a narrow panicle. Capitula 2–4, sessile. Involucre hemispheric or subglobose, 3–4 mm in diam.; phyllaries densely brown-yellow tomentose. Marginal female florets 8–13. Disk florets 18–20, bisexual. Achenes obovoid. Fl. and fr. Aug–Oct.

• Alpine steppes, slopes, roadsides; 4000–5000 m. W Sichuan, E Xizang.

98. Artemisia orientalihengduangensis Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 34. 1988 [*"orientali-hengduangensis"*].

东方蒿 dong fang hao

Artemisia roxburghiana Besser var. *orientalis* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 430. 1930; *A. roxburghiana* f. *angustisecta* Pampanini.

Herbs, perennial, 30–70 cm tall, gray tomentose, later sparsely tomentose. Lowermost leaves: petiole 5–15(–20) mm; leaf blade oblong or ovate-elliptic, 2.5–5.5 × 2–3.5 cm, sparsely pubescent adaxially, densely yellowish tomentose and veins pubescent abaxially, 1- or 2-pinnatisect; segments 4 or 5 pairs, distal and upper lobes longer than basal lobes, upper lobes elliptic or oblong, 10–20 × 5–10 mm, lobulate or serrate; lobules 1 or 2 pairs, 3–5 × 1–3 mm. Middle stem leaves ± sessile; leaf blade oblong or obovate-oblong, 3–5.5 × 2–3 cm, pinnatipartite or -subsect; segments 4 or 5 pairs, elliptic or oblong, 5–15(–20) × 3–8 mm; rachis narrowly winged. Uppermost leaves and leaflike bracts 3–7-lobed; lobes lanceolate or linear-lanceolate. Capitula in narrow panicles, broadly ovoid or oblong, 3.5–4 mm in diam., sessile. Phyllaries gray or yellowish arachnoid tomentose. Marginal female florets 5–9. Disk florets 8–15, bisexual. Achene oblong or ovoid-oblong. Fl. and fr. Jul–Sep.

Slopes, roadsides, grasslands; 2300–3200 m. Sichuan, Yunnan [N Myanmar].

Artemisia orientalihengduangensis is used medicinally.

99. Artemisia imponens Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 424. 1930.

锈苞蒿 xiu bao hao

Herbs, perennial, 70–100 cm tall, sparsely yellowish or rust-colored pubescent or glabrescent. Lowermost leaves sessile; leaf blade ovate or broadly ovate, 2- or 3-pinnatisect. Middle stem leaves: leaf blade ovate or oblong, 5–7 × 4–6 cm, abaxially densely gray tomentose, adaxially sparsely sericeous-pubescent and white glandular punctuate, 2(or 3)-pinnatisect; segments 4 or 5 pairs; lobules lanceolate or linear-lanceolate, 10–15 × 1.5–3 mm, rachis narrowly winged, margin revolute, apex acute and mucronulate. Uppermost leaves 1(or 2)-pinnatisect; leaflike bracts pinnatisect, 5-lobed, or entire, latter lanceolate or linear-lanceolate. Synflorescence a somewhat long and broad panicle. Capitula sessile. Involucre hemispheric or subovoid, 3–4(–5) mm in diam.; phyllaries densely rust-colored tomentose. Marginal female florets 8–10. Disk florets 10–30, bisexual. Achenes oblong. Fl. and fr. Aug–Nov.

• Slopes, forest margins, grasslands; 3400–4700 m. W Hubei, Qinghai, W Sichuan, E Xizang, NW Yunnan.

100. Artemisia smithii Mattfeld, Repert. Spec. Nov. Regni Veg. 22: 246. 1926.

球花蒿 qiu hua hao

Herbs, perennial, 15–60 cm tall, rhizomatous, often not branched; most parts gray sericeous-pubescent. Basal leaves in dense rosette; petiole 6–7(–15) cm; leaf blade elliptic-ovate or oblong, 7–12 × 5–6 cm, 1- or 2-pinnatipartite; segments (3 or)4–6 pairs; distal and lateral lobes obovate, 2–4 × 1–3 cm, divided; lobules lanceolate or elliptic-lanceolate, rarely ovate-lanceolate, 10–15 × 3–5 mm; basal lobes entire; rachis with 3–4 mm wide wing. Lower and middle stem leaves: petiole 1–3 cm; leaves few, oblong or oblong-elliptic, 2.5–5(–6) × 1.5–3.5(–4) cm, pinnatisect; segments 3 or 4 pairs; lobes lanceolate, linear-lanceolate, or oblanceolate, 10–30(–35) × 2–3 mm. Uppermost leaves and leaflike bracts lanceolate or oblanceolate, 30–50 × 2–4 mm. Synflorescence a simple erect raceme, to 35 cm. Capitula nodding; peduncles 3–10 mm. Involucre hemispheric, 6–10 mm in diam.; phyllaries densely yellowish pubescent. Marginal female florets 10–16. Disk florets 50–60, bisexual; corolla limb purple. Achene obovoid or oblong. Fl. and fr. Jul–Oct.

• Alpine steppes, alpine meadows, slopes; 3200–4600 m. S Gansu, E Qinghai, NW Sichuan.

101. Artemisia speciosa (Pampanini) Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 505. 1980.

西南大头蒿 xi nan da tou hao

Artemisia smithii Mattfeld var. *speciosa* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 423. 1930; *A. smithii* f. *paniculata* Pampanini.

Herbs, perennial, 60–80 cm tall, puberulent. Lower and middle stem leaves ± sessile; leaf blade ovate or broadly ovate, 7–9 × 4–6 cm, abaxially densely gray arachnoid tomentose, adaxially sericeous-pubescent, 2-pinnatisect; segments 4 or 5 pairs; lobules linear-lanceolate or falcate-lanceolate, 20–40 × 1.5–2.5 mm; rachis narrowly winged. Uppermost leaves pinnatisect or 3–5-lobed; leaflike bracts linear-lanceolate. Synflorescence a narrow panicle. Involucre hemispheric, 5–7 mm in

diam.; phyllaries rust-colored pubescent. Marginal female florets 10–20. Disk florets 30–45, bisexual. Achenes obovoid. Fl. and fr. Sep–Oct.

• Rocky slopes, grasslands, shrublands, terraces, roadsides; 3000–3800 m. W Sichuan, E Xizang, NW Yunnan.

102. Artemisia sinensis (Pampanini) Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 505. 1980.

西南圆头蒿 xi nan yuan tou hao

Artemisia strongylocephala Pampanini var. *sinensis* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 177. 1927; *A. strongylocephala* f. *virgata* Pampanini.

Herbs, perennial, (40–)70–130(–150) cm tall, yellowish puberulent, sometimes glabrescent. Leaves ± sessile. Lowermost leaves oblong or ovate-oblong, 8–11 × 6–7 cm, 2-pinnatisect; segments 4 or 5 pairs, elliptic, 4–4.5 × 1.5–2.5 cm; lobules lanceolate or linear-lanceolate, (8–)10–15 × (3–)3.5–4 mm, abaxially densely arachnoid pubescent, adaxially sparsely pubescent, both surfaces glabrescent, rachis narrowly winged. Middle and upper stem leaves oblong, 6–11 × 4–8 cm, 1- or 2-pinnatipartite to subpinnatisect, segments 4 or 5 pairs. Leaflike bracts pinnatipartite or entire. Synflorescence a ± narrow panicle, to 18 cm; branches to 4 cm, ascending, capitula crowded toward tips. Capitula nodding. Involucre ovoid-campanulate, 3.5–4 mm in diam.; phyllaries yellowish puberulent. Marginal female florets 10–15. Disk florets 15–25(–30), bisexual. Achenes oblong or obovoid-oblong. Fl. and fr. Aug–Oct.

• Alpine or subalpine steppes, shrublands, forest margins, roadsides, often in dry stony situations; 2600–3900 m. SW Qinghai, W Sichuan, E Xizang, NW Yunnan.

103. Artemisia kawakamii Hayata, Icon. Pl. Formosan. 8: 65. 1919.

山艾 shan ai

Subshrubs, 8–25(–30) cm tall, sericeous-tomentose or glabrescent. Basal leaves forming rosettes, long petiolate. Lower and middle stem leaves: petiole 5–20 mm or more; leaf blade oblong or elliptic, 2–4 × 1–2 cm, abaxially densely white tomentose, adaxially sparsely sericeous-tomentose, (1 or)2-pinnatisect; segments 3(or 4) pairs, mostly 3-lobuled; lobules linear or linear-lanceolate, 5–20(–30) × 0.5–1(–2) mm. Uppermost leaves 3-lobed; leaflike bracts linear-lanceolate or linear. Synflorescence a lax racemelike panicle. Capitula few; peduncles 2–20 mm. Involucre hemispheric or broadly ovoid, 4–4.5 mm in diam.; phyllaries sparsely tomentose. Marginal female florets 8–12. Disk florets 18–25, bisexual. Achenes obovoid. Fl. and fr. Jul–Nov. $2n = 18$*.

• Waste areas, rocky slopes; 2700–3900 m. Taiwan.

104. Artemisia somae Hayata, Icon. Pl. Formosan. 8: 64. 1919 [*"somai"*].

台湾狭叶艾 tai wan xia ye ai

Herbs, perennial, 60–120 cm tall, densely grayish white sericeous-puberulent, later glabrescent. Lower and middle stem leaves: petiole 1.5–2.5 cm; leaf blade oblong-obovate or elliptic-obovoid, 10–12 × 3.5–4 cm, abaxially grayish white, persistently sericeous-puberulent, adaxially drying blackish, sparsely sericeous-puberulent, glabrescent, 2-pinnatisect; segments (3 or)4 or 5 pairs, distal lobes or terminals of lateral lobes (2 or)3(or 4)-lobulate; lobules lanceolate or linear-lanceolate, 5–8 × (2–)3–4 mm, acuminate apically. Uppermost leaves and leaflike bracts pinnatisect, 3-sect, or entire. Synflorescence a subterminal, ± narrowly conical panicle to 16 cm; branches few, ascending, to 4 cm; bracts minute. Capitula erect or spreading; peduncle to 5 mm, minutely bracteolate. Involucre broadly ovoid or hemispheric, 3.5–4 mm in diam.; phyllaries white pubescent. Marginal female florets 8–15. Disk florets 18–25, bisexual; corolla with lower part barbate or not. Achenes oblong-ovoid. Fl. and fr. Nov–Feb.

• Rocky slopes, mountain peaks, limestone crevices on dry ridges; 1500–2400 m. Taiwan.

1a. Lower part of corolla glabrous ..... 104a. var. *somae*
1b. Lower part of corolla barbate ..... 104b. var. *batakensis*

104a. Artemisia somae var. **somae**

台湾狭叶艾(原变种) tai wan xia ye ai (yuan bian zhong)

Lower part of corolla not barbate.

• Rocky slopes; 1500–2000 m. Taiwan.

104b. Artemisia somae var. **batakensis** (Hayata) Kitamura, Acta Phytotax. Geobot. 9: 32. 1940.

太鲁阁艾 tai lu ge ai

Artemisia batakensis Hayata, Icon. Pl. Formosan. 8: 64. 1919.

Lower part of corolla barbate.

• Mountain peaks in karst areas, limestone crevices on dry ridges; 1500–2300 m. Taiwan.

105. Artemisia selengensis Turczaninow ex Besser, Tent. Abrot. 50. 1832.

蒌蒿 lou hao

Herbs, perennial, 60–150 cm tall, strongly aromatic; rhizome elongated, 7–8 mm thick; stem often unbranched. Lower stem leaves usually withered, 8–12 cm overall; petiole 0.5–2(–5) cm; leaf blade broadly ovate or ovate, abaxially densely gray arachnoid tomentose, palmately or ternately 3–5-sect or -partite, or mixed 7-sect or entire; lobes linear or linear-lanceolate, 5–7(–8) × 0.3–0.5 cm, serrate or not. Middle stem leaves ± sessile; leaf blade palmately or ternately 3–5-lobed or entire; lobes elliptic, elliptic-lanceolate, or linear-lanceolate, 30–50 × 2–4 mm, base attenuate, margin entire or remotely narrowly toothed, apex acuminate. Uppermost leaves and leaflike bracts ternately 2- or 3-lobed or entire. Synflorescence a long, narrow panicle; branches short, erect or only narrowly spreading. Capitula sessile or subsessile. Involucre oblong or broadly ovoid, 2–2.5 mm in diam.; phyllaries sparsely gray arachnoid pubescent, glabrescent. Marginal female florets 8–12. Disk florets 10–15, bisexual. Achenes ovoid, ca. 1.2 mm, brown. Fl. and fr. Jul–Oct. $2n = 16, 36$.

Riverbanks, lakeshores, humid areas, meadows, slopes, roadsides; low elevations to 2500 m. Anhui, S Gansu, N Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, S Nei Mongol, S Shaanxi, Shandong, Shanxi, Sichuan, Yunnan [Korea, Mongolia, Russia (E Siberia)].

1a. Margins of leaves or lobes serrulate ..... 105a. var. *selengensis*

1b. Leaves or lobes not serrulate, rarely mixed few serrulate ..... 105b. var. *shansiensis*

105a. Artemisia selengensis var. **selengensis**

菱蒿(原变种) lou hao (yuan bian zhong)

Artemisia cannabifolia H. Léveillé; *A. cannabifolia* var. *nigrescens* H. Léveillé; *A. selengensis* f. *amurensis* Pampanini; *A. selengensis* var. *cannabifolia* (H. Léveillé) Pampanini; *A. selengensis* f. *dielsii* Pampanini; *A. selengensis* f. *integerrima* (Komarov) Pampanini; *A. selengensis* var. *pannosa* Pampanini; *A. selengensis* f. *serratifolia* (Regel) Pampanini; *A. selengensis* f. *simplicifolia* Nakai ex Pampanini; *A. selengensis* f. *subintegra* Pampanini; *A. vulgaris* Linnaeus var. *integerrima* Komarov; *A. vulgaris* lusus *selengensis* (Turczaninow ex Besser) Regel; *A. vulgaris* var. *selengensis* (Turczaninow ex Besser) Maximowicz; *A. vulgaris* f. *serratifolia* (Regel) Komarov; *A. vulgaris* lusus *serratifolia* Regel.

Leaf margin serrulate.

Riverbanks, lakeshores, humid areas, meadows, sometimes cultivated; low elevations. Anhui, S Gansu, N Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, S Nei Mongol, S Shaanxi, Shandong, Shanxi, Sichuan, Yunnan [Korea, Mongolia, Russia].

Artemisia selengensis var. *selengensis* is used for anti-inflammatory and anthelmintic medicines. The rhizome is edible.

105b. Artemisia selengensis var. **shansiensis** Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 5. 1988.

山西菱蒿 shan xi lou hao

Leaves or lobes not serrulate, rarely mixed few serrulate.

• Slopes, roadsides; low elevations. Hebei, Henan, Hubei, Hunan, Shanxi.

106. Artemisia keiskeana Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 176. 1866.

无齿菱蒿 wu chi lou hao

Artemisia keiskeana f. *hirtella* Nakai; *A. keiskeana* subf. *rotundifolia* Pampanini; *A. vulgaris* Linnaeus lusus *glabrescens* Regel.

Subshrubs, 30–100(–120) cm tall, strongly rhizomatous, most parts sparsely puberulent or glabrescent. Lower stem leaves: petiole 3–8 mm; leaf blade obovate or broadly cuneate, 3–8 × 1.5–4.5 cm, base attenuate, margin few acutely serrate from middle to apex, apex rounded. Middle stem leaves ± sessile; leaf blade obovate, ovate-elliptic, or obovate-cuneate, 4.5–6.5(–8) × 1.5–4 cm, base attenuate, margin serrate upward, apex obtuse. Upper leaves and leaflike bracts ovate or elliptic, few serrate or entire. Synflorescence a lax conical panicle; branches obliquely ascending, longer than subtending leaves. Capitula long pedunculate, pendent. Involucre subglobose, 3–3.5 mm in diam.; phyllaries glabrous. Marginal female florets 6–10; corolla 1.2–1.5 mm. Disk florets 13–18, bisexual; corolla ca. 2 mm. Achenes ovoid-ellipsoid, ca. 2 mm. Fl. and fr. Aug–Nov. $2n = 18, 27$.

Roadsides, dry slopes, shrublands, grasslands, forest margins; 100–900 m. Hebei, Heilongjiang, Jilin, Liaoning, Shandong [Japan, Korea, E Russia].

107. Artemisia fulgens Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 427. 1930.

亮蒿 liang hao

Herbs, perennial, 100–150 cm tall. Middle stem leaves ± sessile; leaf blade oblong, 4–9 × 2.5–4 cm, sparsely gray pubescent or glabrescent, 1- or 2-pinnatipartite to subpinnatisect; segments 4 or 5 pairs; lobes or lobules linear or linear-lanceolate, 8–25(–35) × 2.5–3.5 mm, rachis narrowly winged, acuminate apically. Uppermost leaves pinnatipartite or pinnatisect; leaflike bracts lobed or entire, latter linear or linear-lanceolate. Synflorescence a conical panicle, relatively small. Capitula crowded at branch tips, subsessile. Involucre ellipsoid or oblong-ovoid, 2–3 mm in diam.; phyllaries pale, sometimes with narrow dark midrib, arachnoid puberulent or glabrescent. Marginal female florets 6–8. Disk florets 10–20, bisexual. Achenes oblong. Fl. and fr. Aug–Nov.

• River floodlands, waste areas, slopes; 3400–3600 m. S Qinghai, W Sichuan, E Xizang.

This species looks rather similar to *Artemisia flaccida*.

108. Artemisia sylvatica Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 161. 1859.

阴地蒿 yin di hao

Herbs, perennial, 80–130 cm tall, puberulent or glabrescent. Lower and middle stem leaves: petiole 2–4(–5) cm; leaf blade ovate, broadly ovate, or oblong, 8–12(–15) × 7–11 cm, abaxially sparsely gray arachnoid tomentose or glabrescent, adaxially glabrescent, 1- or 2-pinnatipartite; segments 2 or 3 pairs, elliptic or oblong, 6–7(–9) × 1–1.5(–2) cm, 3–5-partite or -cleft, rarely entire; lobules elliptic, elliptic-lanceolate, or ovate-lanceolate, usually serrate. Uppermost leaves pinnatipartite; segments 1 or 2, lanceolate or elliptic-lanceolate, distal one longer, occasionally 1- or 2-serrate; leaflike bracts 3–5-partite or entire. Synflorescence a broad diffusely much-branched, conical panicle; ultimate branches slender and flexuous. Capitula shortly pedunculate, ± secund, most subtending bracts minute. Involucre subglobose or ovoid, 1.5–2.5 mm in diam.; phyllaries sparsely arachnoid puberulent, sometimes glabrescent, with distinct narrow midrib. Marginal female florets 4–7. Disk florets 8–14, bisexual. Achenes narrowly ovoid or narrowly obovoid. Fl. and fr. Aug–Oct. $2n = 16$.

Forest margins, shrublands, humid areas, slopes, roadsides; 100–1300 m. Anhui, SE Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, S Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Korea, Mongolia, E Russia].

1a. Leaves thinly papery; phyllaries gray arachnoid tomentose, later glabrescent; capitula widely separated along branches ..... 108a. var. *sylvatica*
1b. Leaves thickly papery; phyllaries tomentose; capitula closely spaced along branches ..... 108b. var. *meridionalis*

108a. Artemisia sylvatica var. **sylvatica**

阴地蒿(原变种) yin di hao (yuan bian zhong)

Leaves thinly papery. Capitula spreading on branches. Phyllaries gray arachnoid tomentose, later glabrescent.

Forest margins, shrublands, humid areas; low elevations. Anhui, SE Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Qinghai, S Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Korea, Mongolia, E Russia].

108b. Artemisia sylvatica var. **meridionalis** Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 444. 1930.

密序阴地蒿 mi xu yin di hao

Leaf blade thickly papery. Capitula closely spaced along branches. Phyllaries gray tomentose.

• Slopes, roadsides, shrublands. Henan, Jiangsu, Shanxi.

109. Artemisia taibaishanensis Y. R. Ling & Humphries, Bull. Bot. Res., Harbin 10(1): 17. 1990.

太白山蒿 tai bai shan hao

Subshrubs or perennial herbs, 80–100 cm tall, gray pubescent. Middle stem leaves: petiole 2–3 cm; leaf blade suborbicular or broadly ovate, 10–14 × 8–12 cm, 2-pinnatisect; segments 4 or 5 pairs, elliptic or oblong, 5–6 × 2–3 cm; lobules (2 or)3 pairs, rachis narrowly winged, 1- or 2-serrate. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect. Synflorescence a broad, much-branched panicle. Involucre ovoid-campanulate or broadly ovoid, 3–3.5(–4) mm in diam.; phyllaries puberulent, sometimes glabrescent. Marginal female florets 5–9. Disk florets 14–22, bisexual. Achenes obovoid. Fl. and fr. Aug–Nov.

• Slopes, forest margins, shrublands; middle to high elevations. S Shaanxi, NE Sichuan.

4. Artemisia sect. **Viscidipubes** Y. R. Ling, Acta Phytotax. Sin. 18: 506. 1980.

腺毛蒿组 xian mao hao zu

Herbs, perennial, rarely subshrubs; most parts usually finely arachnoid puberulent to tomentose, also with thick multicellular viscid hairs and/or gland-tipped hairs, and sessile glands. Leaves 1- or 2-pinnatipartite to pinnatisect; lobules 1–8 mm wide. Capitula ovoid or oblong-ovoid. Phyllary margins scarious, midvein green or sometimes brown. Receptacle glabrous. Marginal florets 2–15; corolla narrowly tubular or rarely narrowly conical, 2- or 3-toothed or without teeth. Disk florets 2–20(–50), bisexual; ovaries well developed; style ca. as long as or longer than corolla, branches divergent, recurved at apex.

Twenty-one species: mainly at middle and high elevations in NW and SW China, a few species in S and SE Asia; 20 species (16 endemic) in China.

Many species contain sesquiterpenoids and some monoterpenoids.

1a. Middle stem leaves with 2–4 pairs of main segments.
2a. Capitula 3–4 mm in diam., in groups of 3–6(–8) on branches of large broad panicles ..... 116. *A. erlangshanensis*
2b. Capitula 1.5–3(–4) mm in diam., uniformly distributed along branches in narrow or broad panicles.
3a. Stem and branches with many sessile blunt multicellular hairs and scattered gland-tipped hairs; middle stem leaves sessile, lobes 3–6(–8) mm wide, revolute, adaxially glandular pubescent and sparsely arachnoid pubescent, abaxial veins with hairs obviously differently colored from those elsewhere ..... 118. *A. chingii*
3b. Stem and branches sparsely pubescent and glandular pubescent or not; middle stem leaves shortly petiolate, lobes (3–)10 mm wide or more, flat, adaxially uniformly glandular pubescent or on veins only or mixed with non-glandular hairs, abaxial veins with hairs same or different colors as those elsewhere.
4a. Lobes of leaves linear or linear-lanceolate, (1–)1.5–2 × 0.3–1 cm; capitula in broad panicles.
5a. Lobes of leaves linear, 10–15(–30) × 3–6 mm ..... 119. *A. simulans*
5b. Lobes of leaves linear-lanceolate or elliptic-lanceolate, 15–20 × 5–10 mm ..... 125. *A. rosthornii*
4b. Lobes of leaves elliptic, oblong, or oblong-ovate, more than 2 × 1 cm; capitula in narrower panicles.
6a. Middle stem leaves 3- or ternately 5-partite, distal and lateral lobes subequal, not caudate, entire or few serrate at margin ..... 126. *A. sichuanensis*
6b. Middle stem leaves 1- or 2-pinnatisect, or -partite, segments 2–4(or 5) pairs, distal ones longer, or not and then with broadly winged rachis, usually serrate.
7a. Distal lobes not caudate, 2- or 3-cleft, rachis broadly winged.
8a. Leaves papery; capitula oblong or oblong-ovoid, 2.5–3(–4) mm in diam. ..... 124. *A. thellungiana*
8b. Leaves thickly papery; capitula ovoid, 1.5–2 mm in diam. ..... 122. *A. orientaliyunnanensis*

7b. Distal lobes caudate, longer than other lobes, serrate, rachis not winged.
9a. Leaves gland-dotted, segments 2 or 3 pairs, 1- or 2-cleft; capitula oblong or ovoid, 1.5–2(–2.5) mm in diam. ..... 117. *A. atrovirens*
9b. Leaves not gland-dotted, segments 3(or 4) pairs, 2- or 3-lobuled or serrate; capitula hemispheric or broadly ovoid, 2.5–3 mm in diam. ..... 127. *A. zayuensis*

1b. Middle stem leaves with 4–6 pairs of main segments.
10a. Capitula (3–)4–5 mm in diam., disk florets 30–40(–50); phyllaries tomentose.
11a. Phyllary margins not barbate; perennial herbs, 40–120 cm tall; stems glandular pubescent ..... 110. *A. viscida*
11b. Phyllary margins barbate; subshrubs, 25–50 cm tall; stems densely yellowish viscid tomentose ..... 111. *A. vexans*
10b. Capitula 1.5–3(–4) mm in diam., disk florets 2–20(–25), if capitula 3–4 mm in diam. then phyllaries glabrous or sparsely puberulent.
12a. Middle stem leaves (2 or)3-pinnatisect or -partite, deeply serrate.
13a. Uppermost flowering branches short, forming narrow panicle; phyllaries barbate at apex; capitula 3–4 mm in diam. ..... 113. *A. mattfeldii*
13b. Flowering branches long, forming broad, much-branched panicles; phyllaries not barbate; capitula 1–2.5 mm in diam.
14a. Stem, branches, leaves, and phyllaries with prominently gland-tipped hairs; capitula ellipsoid or oblong, 2–2.5 mm in diam. ..... 120. *A. gyitangensis*
14b. Stem, branches, and leaves viscid pubescent, phyllaries glandular pubescent and eglandular pubescent or not; capitula ovoid, 1–1.5 mm in diam. ..... 128. *A. gongshanensis*
12b. Middle stem leaves 1- or 2-pinnatisect or -partite.
15a. Capitula 3–4 mm in diam.
16a. Stem and branches sparsely glandular pubescent and densely tomentose, sparsely so later; capitula in narrow panicles ..... 112. *A. tangutica*
16b. Stem and branches densely glandular pubescent, not tomentose; capitula in somewhat broad panicles ..... 115. *A. viscidissima*
15b. Capitula 1.5–2.5(–3) mm in diam.
17a. Stem and branches densely viscid pubescent; leaves sparsely pubescent adaxially and densely arachnoid tomentose and white gland-dotted abaxially and sparsely glandular pubescent on abaxial veins; capitula in somewhat broad panicles; phyllaries densely tomentose and sparsely glandular pubescent ..... 129. *A. yadongensis*
17b. Stem and branches densely glandular pubescent and sparsely eglandular puberulent, adaxial surface of leaves and abaxial veins glandular pubescent or also tomentose adaxially; capitula in broad panicles; phyllaries arachnoid tomentose or glabrescent.
18a. Middle stem leaves 1-pinnatisect ..... 123. *A. shennongjiaensis*
18b. Middle stem leaves 2-pinnatipartite or -pinnatisect.
19a. Middle stem leaves 2-pinnatisect, distances between segments long, distal lobule longer than laterals, linear or linear-lanceolate, 15–25 × 1.5–2.5 mm ..... 114. *A. occidentalisichuanensis*
19b. Middle stem leaves 2-pinnatipartite or nearly -sect, distances between segments shorter, distal lobule subequal to laterals, elliptic-lanceolate or ovate-elliptic, 10–15 × 3–5 mm ..... 121. *A. myriantha*

110. Artemisia viscida (Mattfeld) Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 424. 1930.

腺毛蒿 xian mao hao

Artemisia moorcroftiana Wallich ex Candolle var. *viscida* Mattfeld, Repert. Spec. Nov. Regni Veg. 22: 247. 1926.

Herbs, perennial, 40–120 cm tall, densely glandular pubescent. Lower and middle stem leaves ± sessile; leaf blade elliptic or oblong, 3–4(–7) × 1–1.5(–2) cm, abaxially gray arachnoid tomentose except on veins, adaxially obviously glandular pubescent, 2-pinnatisect; segments 4 or 5 pairs, elliptic-ovate, 2- or 3-lobuled; lobules deeply serrate, 3–4 × 1–1.5(–2) mm, margin revolute, apex acute. Uppermost leaves 1- or 2-pinnatisect; leaflike bracts pinnatisect or 3–5-partite. Synflorescence a dense, narrow panicle. Capitula dense. Involucre broadly ovoid or campanulate, (3–)4–5 mm in diam.; phyllaries densely tomentose. Marginal female florets 8–10. Disk florets 30–40(–50), bisexual. Achenes oblong or obovoid-oblong. Fl. and fr. Aug–Oct.

• Roadsides, slopes; 3000–5000 m. S Gansu, E Qinghai, W Sichuan, E Xizang, NW Yunnan.

111. Artemisia vexans Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 427. 1930.

藏东蒿 zang dong hao

Subshrubs, 25–50 cm tall, strongly aromatic, densely gray or yellowish viscid tomentose, sparsely glandular pubescent, later laxly viscid tomentose. Lowermost and middle stem leaves

sessile; leaf blade elliptic or oblong, 3–4(–7) × 1–1.5(–2) cm, glandular pubescent on both surfaces, densely arachnoid tomentose abaxially, 2-pinnatisect; segments 4 or 5 pairs, elliptic-ovate; lobules 2 or 3 pairs, 3–4 × 1–1.5(–2) mm, margin revolute, acute apically. Uppermost leaves 1- or 2-pinnatisect; leaflike bracts pinnatisect or 3–5-partite. Capitula in narrow panicles, broadly ovoid or campanulate, (3–)4–5 mm in diam. Phyllaries densely yellowish tomentose, margin barbate. Marginal female florets 8–10. Disk florets 30–40(–50), bisexual. Achene oblong or obovoid-oblong. Fl. and fr. Aug–Oct.

Roadsides, slopes; 3000–5000 m. W Sichuan, E Xizang [Bhutan].

112. Artemisia tangutica Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 426. 1930.

甘青蒿 gan qing hao

Herbs, perennial, 50–90 cm tall, with capitate branches, densely arachnoid tomentose and sparsely glandular pubescent, later sparsely pubescent basally. Lower and middle stem leaves: petiole 5–20 mm; leaf blade elliptic-ovate or elliptic, 6–10 × 5–8 cm, abaxially glabrescent or densely tomentose, adaxially sparsely glandular pubescent, 2-pinnatisect; segments 4–6 pairs, oblong-ovate or oblong, 2.5–3.5 × 1–2 cm; lobules 2–4 pairs, ovate, elliptic-ovate, or elliptic, 5–10 × 2–4 mm, apex usually acute and mucronulate, sometimes ± rounded; rachis winged. Uppermost leaves pinnatipartite; leaflike bracts 3- or 5-partite or entire. Synflorescence a slender ± conical panicle, lower branches subtended by leaflike bracts; ultimate branches ± erect, slender, lowermost to 10 cm. Capitula mostly widely, rather irregularly, spaced, sometimes in small clusters toward base of branch and/or closely spaced apically, nodding; peduncle to 5 mm. Involucre oblong or broadly ovoid, 3–4 mm in diam.; phyllaries ± glabrous or sparsely puberulent. Marginal female florets 3–8. Disk florets 5–15, bisexual. Achene obovoid or oblong-ovoid. Fl. and fr. Jul–Oct.

• Slopes, dunes along riverbanks, grasslands, roadsides; 2700–3800 m. C and SW Gansu, W Hubei, Qinghai, W Sichuan, E Xizang, Yunnan.

1a. Leaves abaxially glabrescent; phyllaries ± glabrous ..... 112a. var. *tangutica*
1b. Leaves abaxially densely arachnoid tomentose; phyllaries sparsely puberulent ..... 112b. var. *tomentosa*

112a. Artemisia tangutica var. **tangutica**

甘青蒿(原变种) gan qing hao (yuan bian zhong)

Leaves abaxially glabrescent. Capitula ± widely spaced along branches. Phyllaries ± glabrous.

• Slopes, dunes along riverbanks; 3000–3800 m. C and SW Gansu, Qinghai, W Sichuan, E Xizang.

112b. Artemisia tangutica var. **tomentosa** Handel-Mazzetti, Acta Horti Gothob. 12: 277. 1938.

绒毛甘青蒿 rong mao gan qing hao

Leaves densely arachnoid tomentose abaxially. Capitula ± densely spaced along branches. Phyllaries sparsely puberulent.

• Grasslands, roadsides; ca. 3200 m. W Sichuan.

113. Artemisia mattfeldii Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 425. 1930.

粘毛蒿 nian mao hao

Herbs, perennial, 35–50 cm tall, capitately branched, densely glandular pubescent, strongly aromatic. Lowermost and middle stem leaves: petiole 2–3 cm or more; leaf blade oblong or oblong-ovate, 3.5–6 × 1.5–4 cm, abaxially gray or yellowish arachnoid tomentose or glabrous, adaxially and abaxially on veins glandular pubescent. Lowermost leaves (2 or)3-pinnatisect; middle leaves 2(or 3)-pinnatisect; segments 5 or 6 pairs, ovate or oblong-ovate, 1.5–2.5 × 1–1.5 cm; lobules lanceolate or deeply serrate, 3–7 × 1–1.5 mm, margin revolute, acute or obtuse apically; rachis winged. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect. Synflorescence a narrow panicle. Involucre oblong or broadly ovoid, 3–4 mm in diam.; phyllaries sparsely glandular pubescent. Marginal female florets 5–7. Disk florets 8–15, bisexual. Achene obovoid or oblong. Fl. and fr. Jul–Oct.

• Forest margins, grasslands, slopes, roadsides; 2600–4800 m. SW Gansu, NW Guizhou, W Hubei, S Qinghai, W Sichuan, E Xizang, W Yunnan.

1a. Leaves abaxially densely white tomentose ..... 113a. var. *mattfeldii*
1b. Leaves abaxially glabrous ..... 113b. var. *etomentosa*

113a. Artemisia mattfeldii var. **mattfeldii**

粘毛蒿(原变种) nian mao hao (yuan bian zhong)

Leaves abaxially densely white tomentose.

• Forest margins, grasslands, slopes, roadsides; 2600–4800 m. SW Gansu, S Qinghai, W Sichuan, E Xizang.

113b. Artemisia mattfeldii var. **etomentosa** Handel-Mazzetti, Acta Horti Gothob. 12: 276. 1938.

无绒粘毛蒿 wu rong nian mao hao

Leaves abaxially glabrous.

• Slopes; 3600–4200 m. SW Gansu, S Qinghai, W Sichuan, E Xizang.

114. Artemisia occidentalisichuanensis Y. R. Ling & S. Y. Zhao, Bull. Bot. Res., Harbin 5(2): 6. 1985 [*"occidentali-si-chuanensis"*].

川西腺毛蒿 chuan xi xian mao hao

Herbs, perennial, 150 cm tall or more, much branched, densely glandular pubescent. Lower and middle stem leaves: petiole 5–15 mm; leaf blade oblong or elliptic, 4–8(–9) × 3–4.5 cm, abaxially gray arachnoid pubescent, glandular pubescent on veins, adaxially glandular pubescent, 2-pinnatisect; segments 4 or 5 pairs; lobules 1 or 2 pairs, distal lobules longer, linear or linear-lanceolate, 15–25 × 1.5–2.5 mm; rachis winged. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect, 3-lobed, or entire. Synflorescence a broad, much-branched panicle. Involucre oblong-ovoid or oblong-campanulate, 1.5–2.5 mm in diam.; phyllaries sparsely puberulent or ± glabrous. Marginal

female florets 3–5. Disk florets 4–8, bisexual. Achenes oblong. Fl. and fr. Aug–Oct.

• Slopes, roadsides; middle to high elevations. W Sichuan.

115. Artemisia viscidissima Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 508. 1980.

密腺毛蒿 mi xian mao hao

Subshrubs, 70–80 cm tall, yellowish or gray glandular pubescent. Middle stem leaves ± sessile; leaf blade elliptic-ovate or ovate, 7–8 × 6–7 cm, both surfaces gray pubescent, adaxially and veins abaxially glandular pubescent, 2-pinnatisect; segments 4 or 5 pairs, distal lobes longer than others, elliptic or ovate-elliptic; lobules elliptic or elliptic-lanceolate, 8–12 × 4–6 mm, rachis narrowly winged, apex acuminate. Uppermost leaves and leaflike bracts pinnatipartite or 3-lobed. Synflorescence a moderately broad, simple panicle, branches racemelike, to ca. 5 cm. Capitula slightly irregularly spaced, sessile. Involucre broadly ovoid or ovoid-campanulate, often shorter than subtending bracteole, 3–3.5 mm; phyllaries brown pubescent. Marginal female florets 5–10. Disk florets 10–15, bisexual. Achenes oblong or ellipsoid. Fl. and fr. Aug–Oct.

• Forest margins. E Xizang.

116. Artemisia erlangshanensis Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 4(2): 23. 1984.

二郎山蒿 er lang shan hao

Subshrubs, 50–130(–150) cm tall, densely viscid tomentose and glandular pubescent. Lower and middle stem leaves: petiole 2–3 cm or more; leaf blade suborbicular, broadly ovate, or ovate, 6–12 × 4–10 cm, abaxially arachnoid tomentose, including veins, adaxially sparsely gland-dotted and puberulent, 1(or 2)-pinnatipartite; segments 2 or 3 pairs, elliptic or elliptic-lanceolate, 30–70 × 8–20 mm, margin usually 1- or 2-serrate. Uppermost leaves and leaflike bracts 3–5-lobed. Synflorescence a broad panicle. Capitula in clusters of 3–6(–8) along branchlets. Involucre hemispheric, subglobose, or broadly ovoid, 3–4 mm in diam.; phyllaries yellowish puberulent. Marginal female florets 8–15. Disk florets 15–25, bisexual. Achenes obovoid or oblong. Fl. and fr. Aug–Oct.

• Roadsides, slopes, ridges, canyons; 2300–3100 m. W Sichuan.

117. Artemisia atrovirens Handel-Mazzetti, Acta Horti Gothob. 12: 280. 1938.

暗绿蒿 an lü hao

Herbs, perennial, 60–100(–150) cm, apparently rhizomatous, glandular pubescent and deciduous puberulent. Lowermost leaves shortly petiolate; leaf blade ovate or broadly ovate, 5–10 × 4–10 cm, 1- or 2-pinnatpartite, segments 2 or 3 pairs, distal lobes longer than lateral lobes. Middle stem leaves: petiole 1–2 cm; leaf blade ovate or ovate-elliptic, (5–)5–8 × (3–)4–7 cm, abaxially densely grayish white tomentose, veins with sparser thick multicellular hairs, adaxially dark green, sericeous-puberulent, sometimes glabrescent, glandular punctuate, pinnatipartite; segments 2 or 3 pairs, elliptic or obovate-elliptic, 15–25 × (5–)10–15 mm, margin 1- or 2-toothed, apex acute and mucronulate. Uppermost leaves and leaflike bracts pinnatipartite, 3-lobed, or entire. Synflorescence a conical panicle; lower branches ± cylindric, ultimate branches secund; bracts linear, shorter than involucre. Capitula ± contiguous, subsessile, erect. Involucre oblong or ovoid, 1.5–2(–2.5) mm in diam.; phyllaries with green midrib, sparsely arachnoid pubescent. Marginal female florets 3–6. Disk florets 5–8, bisexual. Achenes obovoid. Fl. and fr. Aug–Oct.

Slopes, grasslands, roadsides; low elevations to 1200 m. Anhui, N Fujian, S Gansu, N Guangdong, N Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangxi, S Shaanxi, Sichuan, Yunnan, Zhejiang [N Thailand].

118. Artemisia chingii Pampanini, Nuovo Giorn. Bot. Ital., n.s., 39: 24. 1932.

南毛蒿 nan mao hao

Herbs, perennial, 80–100(–140) cm tall, stems sparsely glandular but densely viscid, pubescent. Lower stem leaves: petiole 5–15 mm; leaf blade ovate or broadly ovate, 5–6 × 4–5 cm, 1(or 2)-pinnatipartite to nearly -sect; segments 2 or 3, elliptic, lobes 3–6(–8) mm wide, margin revolute, occasionally with 2 or 3 serrations. Middle stem leaves ± sessile; leaf blade ovate, ovate-elliptic, or broadly ovate, 3.5–5 × 2–4 cm, abaxially densely arachnoid tomentose with underlayer of sessile glands and coarser blunt hairs on veins, adaxially papillate-pubescent, sometimes glabrescent, glandular pubescent, pinnatipartite; segments 2 or 3 pairs, elliptic or elliptic-lanceolate, 10–20 × 3–6(–8) mm. Uppermost leaves and leaflike bracts 3–5-partite or entire, lobes ± linear. Synflorescence a narrowly conical panicle. Involucre ovoid or oblong, 1.5–2 mm in diam.; phyllaries with green midrib, densely arachnoid pubescent to glabrescent. Marginal female florets 3–5. Disk florets 8–12, bisexual. Achenes obovoid or ovoid. Fl. and fr. Aug–Oct.

• Slopes, grasslands, roadsides; low to middle elevations. Anhui, S Gansu, Guangdong, Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangxi, S Shaanxi, S Shanxi, Sichuan, Taiwan, Yunnan, W Zhejiang.

119. Artemisia simulans Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 434. 1930.

中南蒿 zhong nan hao

Herbs, perennial, 80–120 cm tall, sparsely glandular pubescent and puberulent. Lower and middle stem leaves: petiole 3–5 mm; leaf blade ovate or ovate-elliptic, 4–8 × 3–7 cm, abaxially arachnoid tomentose, adaxially sparsely glandular pubescent, 1(or 2)-pinnatisect; segments 2–4, linear, 10–15(–30) × 3–6 mm. Uppermost leaves and leaflike bracts 3–5-lobed or entire. Synflorescence a broad, much-branched panicle. Involucre ellipsoid, 1.5–2 mm in diam.; phyllaries sparsely arachnoid tomentose. Marginal female florets 3–5. Disk florets 8–15, bisexual. Achenes obovoid. Fl. and fr. Aug–Nov.

• Slopes, waste areas; low elevations to 2900 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Yunnan, Zhejiang.

120. Artemisia gyitangensis Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 507. 1980.

吉塘蒿 ji tang hao

Herbs, perennial, ca. 120 cm tall, densely glandular pubes-

cent. Middle stem leaves ± sessile; leaf blade elliptic, 8–11 × 4–5 cm, abaxially gray tomentose, glandular pubescent on veins, adaxially densely glandular pubescent, (2 or)3-pinnatipartite or -sect; segments 5 pairs, ovate or ovate-elliptic, 15–25 × 5–15 mm; lobules 1–3 pairs, ovate or ovate-lanceolate, 5–7 × 2–4 mm, margins occasionally serrate, rachis narrowly winged. Uppermost leaves and leaflike bracts pinnatisect or 3-partite. Synflorescence a broad, much-branched panicle. Involucre ellipsoid or oblong, 2–2.5 mm in diam.; phyllaries sparsely glandular pubescent. Marginal female florets 5–10. Disk florets 8–20, bisexual. Achenes obovoid. Fl. and fr. Jul–Oct.

• Dry shrublands, slopes, forest margins; 3100–3800 m. W Sichuan, E Xizang.

121. Artemisia myriantha Wallich ex Besser, Tent. Abrot. 51. 1832.

多花蒿 duo hua hao

Herbs, perennial, 70–120(–150) cm tall, glandular and eglandular pubescent. Lower and middle stem leaves: petiole 5–20 mm; leaf blade ovate or elliptic, (5–)7–12(–19) × 6–10 cm, abaxially gray arachnoid tomentose, sometimes glabrescent, glandular pubescent on veins, adaxially densely glandular pubescent, 1- or 2-pinnatipartite or subpinnatisect; segments 4 or 5(or 6) pairs, elliptic or ovate-elliptic, 2.5–5(–6) × (1–)1.5–2.5(–3) cm; lobules 2 or 3 pairs, elliptic-lanceolate or ovate-elliptic, 10–15(–20) × 3–5 mm, occasionally with 1 or 2 serrations, apex mucronulate; rachis winged. Uppermost leaves pinnatipartite; segments 3 or 4 pairs; leaflike bracts 3–5-lobed or entire. Synflorescence a broad, much-branched panicle. Capitula many. Involucre oblong-ovoid or oblong, 1.5–2.5(–3) mm in diam.; phyllaries sparsely arachnoid puberulent or glabrescent. Marginal female florets 3–5. Disk florets 4–6, bisexual. Achenes obovoid or oblong. Fl. and fr. Aug–Nov.

Slopes, roadsides, shrublands, cultivated fields, thickets, forests, rocky riverbanks, ravines; 800–3500 m. S Gansu, Guangxi, Guizhou, Qinghai, S Shanxi, Sichuan, Xizang, Yunnan [Bhutan, N India, N Myanmar, Nepal, N Thailand].

1a. Leaf blades abaxially and phyllaries glabrescent ..... 121a. var. *myriantha*
1b. Leaf blades abaxially densely gray arachnoid tomentose, phyllaries sparsely arachnoid puberulent ..... 121b. var. *pleiocephala*

121a. Artemisia myriantha var. **myriantha**

多花蒿(原变种) duo hua hao (yuan bian zhong)

Artemisia burmanica Pampanini; *A. dolichocephala* Pampanini; *A. dolichocephala* f. *yunnanensis* Pampanini; *A. dubia* Wallich ex Besser var. *longeracemulosa* Pampanini; *A. dubia* var. *myriantha* (Wallich ex Besser) Pampanini; *A. pleiocephala* Pampanini f. *yunnanensis* (Pampanini) Pampanini; *A. vulgaris* Linnaeus var. *myriantha* (Wallich ex Besser) C. B. Clarke; *A. yunnanensis* H. Léveillé (Nov 1912), not Jeffrey ex Diels (Jun 1912).

Leaf blades abaxially and phyllaries glabrescent.

Slopes, roadsides, shrublands; low elevations to 2800 m. S Gansu, Guangxi, Guizhou, Qinghai, Sichuan, Yunnan [Bhutan, N India, N Myanmar, Nepal, N Thailand].

121b. Artemisia myriantha var. **pleiocephala** (Pampanini) Y. R. Ling, Kew Bull. 42: 446. 1987.

白毛多花蒿 bai mao duo hua hao

Artemisia pleiocephala Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 446. 1930; *A. dubia* f. *meridionalis* Pampanini.

Leaves densely gray arachnoid tomentose abaxially. Phyllaries sparsely arachnoid puberulent.

Slopes, roadsides, cultivated fields, thickets, forests, rocky riverbanks; 800–2800 m. Guizhou, Qinghai, Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal].

122. Artemisia orientaliyunnanensis Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 5. 1988 [*"orientali-yunnanensis"*].

滇东蒿 dian dong hao

Herbs, perennial, 50–100 cm tall, sparsely gray glandular and eglandular pubescent. Lower and middle stem leaves: petiole 2–3 cm; leaf blade ovate or ovate-oblong, 4–6 × 4–5 cm, abaxially gray arachnoid tomentose, densely glandular pubescent on veins, 1(or 2)-pinnatisect; segments 3 pairs, elliptic or ovate-elliptic, 15–30 × 8–15 mm, margins serrate; rachis winged. Uppermost leaves and leaflike bracts 3–5-partite or entire. Synflorescence a lax panicle. Involucre ovoid, 1.5–2 mm in diam.; phyllaries puberulent. Marginal female florets 2–4. Disk florets 2–5, bisexual. Achenes obovoid. Fl. and fr. Aug–Oct.

• Slopes, roadsides; 1500–2700 m. E Yunnan.

123. Artemisia shennongjiaensis Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 4(2): 24. 1984.

神农架蒿 shen nong jia hao

Herbs, perennial, 90 cm tall or more, yellowish pubescent and glandular pubescent. Lower and middle stem leaves ± sessile; leaf blade broadly ovate or suborbicular, 7–10 × 5–8 cm, abaxially gray arachnoid tomentose, glandular pubescent on veins, adaxially glandular pubescent, pinnatisect; segments (3 or)4 or 5 pairs, linear-lanceolate or linear, 35–55 × 4–6 mm, margin occasionally with 1 or 2 serrations, apex acuminate. Uppermost leaves and leaflike bracts 3–5-sect or entire. Synflorescence a broad, much-branched panicle. Involucre broadly ovoid or ovoid, 1.5–2 mm in diam.; phyllaries sparsely yellowish arachnoid pubescent. Marginal female florets 6–8. Disk florets 7–9, bisexual. Achenes oblong. Fl. and fr. Aug–Oct.

• Forest margins, roadsides; ca. 1600 m. W Hubei (Shennongjia).

124. Artemisia thellungiana Pampanini, Nuovo Giorn. Bot. Ital., n.s., 33: 457. 1926.

藏腺毛蒿 zang xian mao hao

Herbs, perennial, 50–80 cm tall, sparsely glandular pubescent. Lower and middle stem leaves ± sessile; leaf blade oblong-ovate, 8–11 × 6–10 cm, abaxially eglandular pubescent, adaxial surface and abaxial veins sparsely glandular pubescent, 1- or 2-pinnatipartite; segments 3 or 4 pairs, elliptic or oblong-

ovate, margin with 2 or 3 serrations, apex mucronulate; rachis winged. Upper leaves and leaflike bracts pinnatipartite or entire. Synflorescence a ± broad panicle. Involucre oblong or oblong-ovoid, 2.5–3(–4) mm in diam.; phyllaries glabrescent. Marginal female florets 10–15. Disk florets 16–20, bisexual. Achenes obovoid or ovoid-ellipsoid. Fl. and fr. Aug–Oct.

Slopes, roadsides; 1200–3000 m. SE Xizang, Yunnan [Bhutan, N India].

125. Artemisia rosthornii Pampanini, Nuovo Giorn. Bot. Ital., n.s., 36: 428. 1930.

川南蒿 chuan nan hao

Herbs, perennial, 50–80 cm tall, densely tomentose and sparsely glandular pubescent. Lower and middle stem leaves ± sessile; leaf blade ovate or elliptic-ovate, 5–6 × 3.5–4.5 cm, abaxially densely arachnoid tomentose and sparsely glandular pubescent, adaxial surface sparsely glandular pubescent and eglandular pubescent, pinnatisect; segments 3 or 4(or 5) pairs, linear-lanceolate or elliptic-lanceolate, 15–20 × 5–10 mm, apex acuminate and mucronulate. Uppermost leaves and leaflike bracts pinnatipartite, rarely 3-partite or entire. Synflorescence a broad and elongated panicle. Involucre ovoid-campanulate, 1.5–2 mm in diam.; phyllaries sparsely puberulent. Marginal female florets 3–5. Disk florets 4–7, bisexual. Achenes obovoid. Fl. and fr. Aug–Oct.

• Forest margins, roadsides; low to middle elevations. S Sichuan.

126. Artemisia sichuanensis Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 4(2): 21. 1984.

四川艾 si chuan ai

Herbs, perennial, 100–150 cm tall, sparsely glandular pubescent and eglandular pubescent. Lower and middle stem leaves: petiole 3–10 mm; leaf blade ovate or ovate-oblong, 5–6 × 3.5–4.5 cm, abaxially sparsely glandular pubescent and densely gray arachnoid tomentose, sometimes glabrescent, adaxially sparsely puberulent, densely glandular pubescent, pinnatisect; segments 3 or 4(–6) pairs, linear-lanceolate or elliptic-lanceolate, 15–20 × 5–10 mm, apex acuminate and mucronulate. Uppermost leaves and leaflike bracts pinnatipartite, 3-partite, or entire. Synflorescence a broad and elongated panicle. Capitula nodding. Involucre ovoid-campanulate, 1.5–2 mm in diam.; phyllaries sparsely puberulent. Marginal female florets 3–5. Disk florets 4–7, bisexual. Achenes obovoid. Fl. and fr. Aug–Oct.

• Slopes, grasslands, forest margins; 700–2500 m. C and W Sichuan.

1a. Leaves abaxially glabrescent ..... 126a. var. *sichuanensis*
1b. Leaves abaxially densely gray arachnoid tomentose ..... 126b. var. *tomentosa*

126a. Artemisia sichuanensis var. **sichuanensis**

四川艾(原变种) si chuan ai (yuan bian zhong)

Leaf blade abaxially glabrescent.

• Slopes, grasslands, forest margins; ca. 2500 m. C Sichuan.

126b. Artemisia sichuanensis var. **tomentosa** Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 4(2): 22. 1984.

密毛四川艾 mi mao si chuan ai

Leaf blade abaxially densely gray arachnoid tomentose.

• W Sichuan.

127. Artemisia zayuensis Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 507. 1980 [*"Zayüensis"*].

察隅蒿 cha yu hao

Herbs, perennial, 90–200 cm tall, glandular pubescent. Lower and middle stem leaves ± sessile; leaf blade ovate, oblong-ovate, or elliptic-ovate, 11–14 × 8–10 cm, gray pubescent or glabrescent, adaxially and veins abaxially sparsely glandular pubescent, 1- or 2-pinnatipartite or partly -sect; segments 3(or 4) pairs, elliptic or elliptic-lanceolate, 50–55 × 20–25 mm, distal lobe longer than lateral lobes, 5.5–6.5 mm, margin prominently 2 or 3 toothed, apex acuminate; rachis serrately winged. Uppermost leaves and leaflike bracts 3–5-partite, distal lobes longer. Synflorescence a lax, leafy, conical panicle; branches slender, ca. as long as subtending bract. Capitula sessile to shortly pedunculate, secund. Involucre hemispheric or broadly ovoid, 2.5–3 mm in diam.; phyllaries glabrescent. Marginal female florets 7 or 8. Disk florets 15–17, bisexual. Achenes oblong or ovoid. Fl. and fr. Jul–Oct.

• Forest margins, slopes, roadsides; 2600–3300 m. Xizang, W Yunnan.

1a. Leaves 1- or 2-pinnatipartite, lobes 2–2.5 cm wide, deeply serrate; corolla limb puberulent ..... 127a. var. *zayuensis*
1b. Leaves 2-pinnatipartite or leaves basally partly pinnatisect, lobes 1–1.5 cm wide, cleft, lobules few serrate; corolla limb glabrous ..... 127b. var. *pienmaensis*

127a. Artemisia zayuensis var. **zayuensis**

察隅蒿(原变种) cha yu hao (yuan bian zhong)

Leaf blade 1- or 2-pinnatipartite; lobes 2–2.5 cm wide, deeply serrate. Corolla limb puberulent.

• Forest margins; ca. 3100 m. Xizang (Zayü).

127b. Artemisia zayuensis var. **pienmaensis** Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 6. 1988.

片马蒿 pian ma hao

Leaf blade 2-pinnatipartite to 2-pinnatisect, basal part more deeply divided; lobes 1–1.5 cm wide, irregularly deeply serrate to pinnatifid; lobules few serrate. Corolla limb glabrous.

• Slopes, forest margins, roadsides; 2600–3300 m. W Yunnan.

128. Artemisia gongshanensis Y. R. Ling & Humphries, Bull. Bot. Res., Harbin 10(1): 20. 1990.

贡山蒿 gong shan hao

Herbs, perennial, 150–180 cm tall, sparsely pubescent and tomentose. Lower and middle stem leaves: petiole 3–4 cm; leaf

blade oblong or ovate, 14–17 × 8–11 cm, abaxially densely gray arachnoid tomentose, adaxially densely or sparsely glandular pubescent, 2(or 3)-pinnatisect; segments 5 or 6 pairs, elliptic or oblong, 4–7 × 3–6 cm; lobules 4–6 pairs, margin 5- or 6-toothed; rachis winged. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect, serrate. Synflorescence a broad panicle. Involucre ovoid, 1–1.5 mm in diam.; phyllaries glandular pubescent and sparsely eglandular deciduous puberulent. Marginal female florets 2 or 3. Disk florets 3–5, bisexual. Achenes obovoid. Fl. and fr. Aug–Nov.

• Rocky slopes, ridges; 3500–3600 m. W Yunnan (Gongshan).

129. Artemisia yadongensis Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 506. 1980.

亚东蒿 ya dong hao

Herbs, perennial or nearly subshrubs, 50–70 cm tall, gray or yellowish viscid tomentose. Middle stem leaves shortly petiolate to ± sessile; leaf blade oblong or oblong-ovate, 2–3.5 × 2–2.5 cm, abaxially and on adaxial veins densely arachnoid tomentose and glandular sometimes deciduous pubescent, adaxially sparsely gray pubescent and glandular punctuate, 2-pinnatisect; segments 4 or 5 pairs, elliptic or oblong, 2–3.5 × 2–2.5 cm; lobules 1 or 2 pairs, elliptic or narrowly elliptic, 5–10 × 3–8 mm, rachis winged, apex acute or obtuse. Uppermost leaves elliptic or ovate, 1(or 2)-pinnatipartite; segments 4 or 5 pairs; leaflike bracts pinnatipartite or entire. Synflorescence a moderately broad panicle. Involucre subglobose or broadly ovoid, 1.5–2.5 mm in diam.; phyllaries densely gray tomentose and sparsely glandular sometimes deciduous pubescent. Marginal female florets 3–8. Disk florets 5–10, bisexual; corolla limb puberulent. Achenes obovoid. Fl. and fr. Aug–Oct.

• Grasslands; ca. 2900 m. S Xizang (Yadong).

5. Artemisia sect. **Albibractea** Y. R. Ling, Acta Phytotax. Sin. 18: 506. 1980.

白苞蒿组 bai bao hao zu

Herbs, perennial, without glandular or viscid hairs (sessile glands often present). Leaves 1 or 2(or 3)-pinnatisect, rarely irregularly shallowly lobed or 3-cleft at apex. Capitula with bracts absent or minute and basal. Phyllaries ± uniformly membranous, white or yellowish, glabrous. Receptacle glabrous. Marginal florets 6–12. Disk florets 3–10(–23), bisexual; ovaries well developed; style ca. as long as or longer than corolla, branches divergent, recurved at apex.

Six species: E, S, and SE Asia; five species (four endemic) in China.

Many species contain sesquiterpenoids and some monoterpenoids.

1a. Leaf blade entire, rarely 2- or 3-cleft at apex, margin shallowly serrate ..... 134. *A. anomala*
1b. Leaf blade pinnately divided, margin more deeply serrate or lacerate.
2a. Middle stem leaves pinnatipartite or -cleft, segments 2(or 3) pairs, uppermost leaves 3-partite, margin serrate ..... 130. *A. deversa*
2b. Middle stem leaves 1–3-pinnatipartite or pinnatisect, segments 3–5 pairs, uppermost leaves not 3-partite, margin irregularly serrate.
3a. Middle stem leaves sessile, lobules lanceolate, elliptic-lanceolate, or linear-lanceolate, rarely falcate-lanceolate, entire or few serrate; involucre 2.5–3.5(–4) mm in diam., disk florets 10–23 ..... 133. *A. flaccida*
3b. Middle stem leaves petiolate, 1–3-pinnatipartite or -sect, segments irregularly serrate or lacerate; involucre 1–2.5(–3) mm in diam., disk florets 3–10.
4a. Middle stem leaves 1 or 2(or 3)-pinnatipartite or pinnatisect, segments 3 or 4(or 5) pairs, margin lacerate; involucre 1.5–2.5(–3) mm in diam.; marginal female florets 4–10 ..... 131. *A. lactiflora*
4b. Middle stem leaves 2- or 3-pinnatatisect, segments 4 or 5 pairs, margin regularly serrate; involucre 1–1.5 mm in diam.; marginal female florets 2–4 ..... 132. *A. emeiensis*

130. Artemisia deversa Diels, Bot. Jahrb. Syst. 29: 618. 1901.

侧蒿 ce hao

Herbs, perennial, 50–100 cm tall, branched apically; all parts glabrous. Middle stem leaves: petiole 2–4 cm; leaf blade ovate or broadly ovate, 8–14(–18) × 4–12 cm, pinnatipartite or -cleft; segments 2(or 3) pairs, ovate, ovate-elliptic, or ovate-lanceolate, 2.5–8 × 1–5 cm, margin lacerate and serrate, apex acuminate. Uppermost leaves dichotomously (2 or)3-partite, or entire; entire leaves elliptic or elliptic-lanceolate; distal lobes 4–8 × 2–5 cm, base attenuate, margin serrate; leaflike bracts entire or occasionally 1- or 2-partite or cleft. Synflorescence a moderately broad panicle, branches ± divaricate; ultimate branches slender, lax, sometimes several per node; bracts mostly absent. Capitula widely spaced, sessile. Involucre oblong or ellipsoid, 1.5–2.5 mm in diam. Marginal female florets 3–5. Disk florets 4–9, bisexual. Achenes oblong or obovoid-oblong. Fl. and fr. Aug–Oct.

• Forest margins, canyons, slopes, riverbanks; 1000–2300 m. SE Gansu, W Hubei, S Shaanxi, NE Sichuan.

131. Artemisia lactiflora Wallich ex Candolle, Prodr. 6: 115. 1838.

白苞蒿 bai bao hao

Herbs, perennial, 50–150(–200) cm tall, all parts glabrous. Lower and middle stem leaves: petiole 2–5 cm or more; leaf blade ovate or ovate-elliptic, 5.5–12.5(–31) × 4.5–8.5(–15) cm, 1 or 2(or 3)-pinnatisect, rarely partite; segments 3 or 4(or 5) pairs, very variable, ovate, ovate-elliptic, obovate, or elliptic; basal and lateral lobes larger than distal lobes, 2–8 × 1–3 cm, margin irregularly serrate, apex rounded to acuminate. Upper-

most leaves and leaflike bracts 1- or 2-pinnatipartite or -sect, margin serrate. Synflorescence a ± narrow conical panicle, often with extra panicles from upper nodes to form broad, conical, compound panicle; branches obliquely ascending; ultimate branches to 4 cm; bracts mostly absent. Capitula closely spaced, sessile. Involucre oblong, 1.5–2.5(–3) mm in diam. Marginal female florets 4–10. Disk florets 4–10, bisexual. Achenes obovoid or obovoid-oblong. Fl. and fr. Aug–Oct. $2n = 16, 18$.

Forest margins, shrublands, canyons, slopes, roadsides, riverbanks, thickets; low elevations to 3000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, S Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, N India, Indonesia, Laos, Singapore, N Thailand].

1a. Leaves ca. 31 × 15 cm, pinnatisect; leaflike bracts triangular ..... 131c. var. *taibaishanensis*

1b. Leaves 5.5–12.5(–14.5) × 4.5–8.5(–12) cm, 1- or 2(or 3)-pinnatisect or -partite; leaflike bracts pinnatipartite or pinnatisect.

2a. Middle stem leaves 1- or 2-pinnatisect or -partite, uppermost leaves pinnatipartite or pinnatisect ..... 131a. var. *lactiflora*

2b. Middle stem leaves 2(or 3)-pinnatisect, uppermost leaves 1- or 2-pinnatipartite or -pinnatisect ..... 131b. var. *incisa*

131a. Artemisia lactiflora var. **lactiflora**

白苞蒿(原变种) bai bao hao (yuan bian zhong)

Artemisia lactiflora f. *henryana* Pampanini; *A. lactiflora* f. *septemlobata* (H. Léveillé & Vaniot) Pampanini; *A. septemlobata* H. Léveillé & Vaniot.

Middle stem leaf blades 1- or 2-pinnatisect or -partite. Uppermost leaf blades pinnatipartite or -sect.

Forest margins, shrublands, canyons; low elevations to 3000 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangsu, Jiangxi, S Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, N India, Indonesia, Laos, Singapore, N Thailand].

Artemisia lactiflora var. *lactiflora* is used in anti-inflammatory medicines and is also cultivated as a culinary herb.

131b. Artemisia lactiflora var. **incisa** (Pampanini) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 42. 1988.

细裂叶白苞蒿 xi lie ye bai bao hao

Artemisia lactiflora f. *incisa* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 675. 1927.

Middle stem leaf blades 2(or 3)-pinnatisect or -partite. Uppermost leaf blades 1- or 2-pinnatipartite or -sect.

• Forest margins, canyons, grassy slopes, roadsides; below 1800 m. W Hubei, S Shaanxi, Sichuan.

131c. Artemisia lactiflora var. **taibaishanensis** X. D. Cui in K. T. Fu & Z. Ying Zhang, Fl. Tsinling. 1(5): 421. 1985.

太白山白苞蒿 tai bai shan bai bao hao

Leaves ca. 31 × 15 cm, blade pinnatisect. Leaflike bracts triangular.

• Slopes; 1200–1900 m. Gansu (Tianshui), Shaanxi (Meixian: Taibai Shan).

132. Artemisia emeiensis Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 42. 1988.

峨眉蒿 e mei hao

Artemisia anthriscifolia C. C. Chang, Sunyatsenia 6: 24. 1941, not Presl ex Steudel (1840), nom. subnud.

Herbs, perennial, 50–120 cm tall, glabrescent. Lowermost and middle stem leaves: petiole 2–4 cm; leaf blade ovate-oblong or ovate, 7–15 × 5–10 cm. Lower leaves 3-pinnatisect; middle leaves 2- or 3-pinnatisect; segments 4 or 5 pairs, ovate-oblong or oblong, 3–6 × 2–3 cm; lobules 2 or 3 pairs, lacerate; rachis narrowly winged. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect or -partite. Capitula in somewhat broad panicles. Involucre ovoid, 1–1.5 mm in diam. Marginal female florets 2–4. Disk florets 3–8, bisexual. Achene obovoid. Fl. and fr. Aug–Nov.

• Forest margins, forest shrublands; 2500–2800 m. C Sichuan.

133. Artemisia flaccida Handel-Mazzetti, Acta Horti Gothob. 12: 278. 1938.

垂叶蒿 chui ye hao

Herbs, perennial, 30–75 cm tall, puberulent or glabrescent. Lowermost and middle stem leaves shortly petiolate or ± sessile; leaf blade ovate, ovate-elliptic, or elliptic, 3–4(–10) × 3–6 cm, abaxially densely gray pubescent, adaxially puberulent or glabrescent, 2- or 3-pinnatisect; segments 3–5 pairs, ovate-elliptic or oblong; lobules elliptic-lanceolate, oblanceolate, or linear-oblanceolate, occasionally falcate-lanceolate, 2–15 × 1–4 mm, margin entire or serrate; rachis narrowly winged. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect, very reduced within racemes. Synflorescence a conical panicle, sometimes very lax; branches to 3 cm (to 6 cm in cultivation). Capitula rather few, somewhat clustered toward branch apex, mostly subsessile. Involucre broadly ovoid or nearly hemispheric, 2.5–3.5(–4) mm in diam. Marginal female florets 6–12. Disk florets 10–23, bisexual. Achenes oblong or ovoid-oblong. Fl. and fr. Aug–Nov.

• Grasslands, hills, roadsides, forest margins, forests; low elevations to 4100 m. W Guizhou, Sichuan, Yunnan.

1a. Middle stem leaf blades with 3 or 4(or 5) pairs of segments, lobules entire or 1- or 2-toothed, apices subacute ..... 133a. var. *flaccida*

1b. Middle stem leaf blades with (4 or)5 pairs of segments, lobules deeply serrate, apices acuminate ..... 133b. var. *meiguensis*

133a. Artemisia flaccida var. **flaccida**

垂叶蒿(原变种) chui ye hao (yuan bian zhong)

Segments of middle stem leaves 3 or 4(or 5) pairs; lobules

entire or 1- or 2-toothed, apices subacute. Synflorescence lax to very lax.

• Grasslands, hills, roadsides; 1000–4100 m. W Guizhou, Sichuan, Yunnan.

133b. Artemisia flaccida var. **meiguensis** Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 6. 1988.

齿裂垂叶蒿 chi lie chui ye hao

Segments of middle stem leaves (4 or)5 pairs, lobules deeply serrate, apices acuminate. Synflorescence relatively dense.

• Roadsides, forest margins, forests; low to middle elevations. C and E Sichuan.

134. Artemisia anomala S. Moore, J. Bot. 13: 227. 1875.

奇蒿 qi hao

Herbs, perennial, 80–150 cm tall, puberulent or glabrescent. Lower and middle stem leaves thickly papery; petiole 2–5 mm; leaf blade ovate, ovate-elliptic, ovate-lanceolate, elliptic-lanceolate, or lanceolate, 9–22 × 2.5–4(–5.5) cm, abaxially gray tomentose or glabrescent, adaxially drying dark, glabrescent, entire, rarely irregularly shallowly lobed or 3-cleft at apex. Uppermost leaves and leaflike bracts sessile, elliptic or elliptic-lanceolate. Synflorescence a ± narrow panicle, sometimes with extra panicles from upper nodes to form broad conical compound panicle; branches to 4 cm, usually less. Capitula usually very closely spaced, sessile. Involucre oblong or obovoid, 2–2.5 mm in diam.; phyllaries glabrous Marginal female florets 4–6. Disk florets 6–8, bisexual. Achenes obovoid or obovoid-oblong. Fl. and fr. Jun–Nov. $2n = 18$*.

• Forest margins, roadsides, canyons, riverbanks, shrublands, slopes; 200–1200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangsu, Jiangxi, E Sichuan, Taiwan, Zhejiang.

1a. Leaf blades abaxially glabrescent ..... 134a. var. *anomala*
1b. Leaf blades abaxially gray or yellowish tomentose ..... 134b. var. *tomentella*

134a. Artemisia anomala var. **anomala**

奇蒿(原变种) qi hao (yuan bian zhong)

Leaf blades ovate, ovate-elliptic, or ovate-lanceolate, 9–12(–15) cm, abaxially glabrescent.

• Forest margins, roadsides, canyons, riverbanks, shrublands, slopes; 200–1200 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, S Henan, Hubei, Hunan, Jiangsu, Jiangxi, E Sichuan, Taiwan.

Artemisia anomala var. *anomala* is used in anti-inflammatory medicines.

Artemisia anomala "var. *acuminatissima*" (Y. R. Ling, Guihaia 12: 104. 1992; 渐尖奇蒿 jian jian qi hao) was described from Jiangxi and Zhejiang, and also occurs in Anhui, growing on forest margins and roadsides at low elevations. It is said to differ from var. *anomala* in having leaf blades elliptic-lanceolate or lanceolate and 18-22 cm long. However, the name was not validly published because no type was indicated (*Vienna Code*, Art. 37).

134b. Artemisia anomala var. **tomentella** Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 633. 1937.

密毛奇蒿 mi mao qi hao

Leaf blades ovate, ovate-elliptic, or ovate-lanceolate, 9–12 cm, abaxially gray or yellowish tomentose.

• N Guangdong, Guangxi, Hubei, Hunan, Jiangxi, Zhejiang.

6. Artemisia sect. **Dracunculus** Besser, Bull. Soc. Imp. Naturalistes Moscou 8: 3, 8. 1835 [*"Dracunculi"*].

龙蒿组 long hao zu

Oligosporus Cassini, Bull. Sci. Soc. Philom. Paris 1817: 33. 1817.

Shrubs, subshrubs, or herbs, perennial, annual, or biennial, puberulent or pubescent, often glabrescent, rarely tomentose, without glandular or viscid hairs (sessile glands often present). Leaves 1- or 2-pinnatisect, less often subpalmately 5–7-partite or entire; lobules 0.3–1.5(–2.5) mm wide, or pectinate, less than 1.5 × 1.5 mm. Capitula globose to ovoid. Phyllary margins scarious. Receptacle glabrous. Marginal florets 2–20(–29); corolla tubular or narrowly conical, often slightly enlarged at base, 2- or 3-toothed. Disk florets 3–20(–35), male; ovaries minute, rarely absent; style shorter than corolla, 2-cleft, lobes usually not divergent, apex clavate or funnelform.

About 80 species: N Hemisphere, mainly in arid areas, a few species in N Africa, Central America, and N South America; 35 species (17 endemic) in China.

Many species contain aromatic compounds and some sesquiterpenoids and/or limited monoterpenoids.

1a. Leaves entire, linear, linear-lanceolate, elliptic-lanceolate, or lanceolate, occasionally some with 1(or 2) lateral lobes or apex 3-cleft ..... 135. *A. dracunculus*
1b. Leaves 1–3(or 4)-pinnatisect, lobules narrowly linear.
2a. Capitula (2.5–)3–6 mm in diam., or if 2.5–3 mm in diam. then plants shrubs or subshrubs, middle stem leaf lobules stiff, 1.5–3 mm wide.
3a. Plants more than 60 cm tall; involucres (3–)4–6 mm in diam., if less than 4 mm then involucres ovoid, lobules of middle stem leaves filiform or linear, 20–30 × 1.5–2.5 mm, or lobules falcate.
4a. Subshrubs, shortly capitate branched; lowermost and middle stem leaves less than 1 cm wide, pinnatisect, segments 1 or 2 pairs; capitula in spicate-racemose or narrow panicles; capitula 5–6 mm in diam. ..... 139. *A. kangmarensis*

4b. Shrubs, much branched; middle stem leaves (1 or)2-pinnatisect, segments 2 or 3 pairs, or 4 pairs and then leaves ovate or broadly ovate, more than 1 cm wide; capitula in broad or narrow panicles; capitula (2.5–)3–5 mm in diam.
5a. Capitula ovoid, erect, in broad and branched or somewhat broad panicles; stem purple; lower leaves with 3–5 pairs of segments, middle leaves with (2 or)3 or 4 pairs of segments ..... 138. *A. halodendron*
5b. Capitula globose or subglobose, nodding, in broad or narrow panicles; stem gray, brown or yellowish; lower leaves with 2–4 pairs of segments, middle leaves with 2 or 3(or 4) pairs.
6a. Middle stem leaves (5–)6–8 × 3–4 cm, segments 2 or 3(or 4) pairs, lobules narrowly linear, straight; capitula in narrow or somewhat broad panicles; stem gray ..... 137. *A. wudanica*
6b. Middle stem leaves 2–5(–8) × 1.5–3(–4) cm, segments (1 or)2 or 3 pairs, lobules linear or falcate; capitula in lax and broad panicles; stem yellowish ..... 136. *A. sphaerocephala*
3b. Plants to 20–50(–60) cm tall; capitula (2.5–)3(–4) mm in diam., or if more than 4 mm then capitula globose and lobules in middle stem leaves linear to filiform, 5–10 × 0.5–1 mm, or leaves palmately 5–7-partite.
7a. Stem unbranched or few and shortly capitate branched, pubescent; leaves palmately 5–7-partite, sericeous-pubescent on both surfaces; capitula in narrow panicles; phyllaries pubescent ..... 155. *A. kuschakewiczii*
7b. Stem branched, pubescent or glabrescent; leaves 1 or 2(or 3)-pinnatisect; capitula in broad or narrow panicles; phyllaries pubescent or glabrescent.
8a. Lowermost and middle stem leaves 2(or 3)-pinnatisect, lobules 0.5–0.8 mm wide; capitula hemispheric, pedunculate, in narrow racemelike panicles ..... 165. *A. oligocarpa*
8b. Lowermost and middle stem leaves 1- or 2-pinnatisect, lobules 1–2.5 mm wide; capitula not hemispheric, if pedunculate then leaf lobes falcate; capitula in broad or narrow panicles.
9a. Stem less than 30 cm tall; leaflike bracts 2–3 × capitula and longer than fertile branches; synflorescence a narrow panicle.
10a. Middle stem leaves 1–2 × 0.5–1.5 cm, pinnatisect, midvein flat ..... 150. *A. wellbyi*
10b. Middle stem leaves 3.5–4.5 × 2–3 cm, 2-pinnatisect, midvein abaxially prominent, white ..... 152. *A. gvangzeensis*
9b. Stem 30–60 cm tall; leaflike bracts longer than capitula but shorter than fertile branches; synflorescence a broad panicle.
11a. Lateral lobes of middle stem leaves linear, linear-lanceolate, or falcate-lanceolate, 1.5–2.5 mm wide ..... 151. *A. waltonii*
11b. Lateral lobes of middle stem leaves narrowly linear or filiform, straight, 1–1.5 mm wide ..... 142. *A. prattii*
2b. Capitula 1–2.5(–3) in diam.; middle stem leaf lobules narrowly linear or filiform, 0.5–1.5(–2) mm wide; or if capitula 2–2.5(–3) mm in diam. then plants herbaceous, lobules of leaves thin, 0.5–1 mm wide.
12a. Shrubs or caespitose subshrubs, with strong woody stock; lobules of middle stem leaves narrowly linear or filiform, 0.5–1.5(–2) mm wide; growing in arid areas.
13a. Lower branches more than 12 cm, upper branches more than 5 cm; capitula in broad panicles.
14a. Petiole in middle stem leaves 2–3(–4.5) cm; capitula subglobose ..... 143. *A. klementzae*
14b. Leaves sessile or petioles less than 1.5 cm in middle stem leaves; capitula ovoid or ovoid-ellipsoid.
15a. Middle stem leaves pinnatisect, lobes 0.5–1 mm, rarely mixed 1- or 2-lobuled at basal or middle lobes ..... 141. *A. ordosica*
15b. Middle stem leaves (1 or)2-pinnatisect, 3-lobuled at basal and middle lobes, lobes or lobules 1.5–2 mm.
16a. Branches many, nearly horizontal; lobule apex obtuse, mucronulate ..... 140. *A. songarica*
16b. Branches ascending; lobule apex acute.
17a. Bark usually deciduous; lobules 15–20 × 1.5–2 mm ..... 146. *A. oxycephala*
17b. Bark persistent; lobules 4–10 × (0.5–)1–1.5 mm ..... 147. *A. campestris*
13b. Lower branches 4–10 cm, upper branches 3–5 cm; capitula in narrow or somewhat broad panicles.
18a. Lower and middle stem leaves pinnatisect, segments of lowermost leaves 2 or 3 pairs, segments of middle leaves 1 or 2 pairs.
19a. Ultimate lobules of leaves 1.5–2.5 mm wide; involucre 2–2.5 mm in diam. ..... 145. *A. xanthochroa*
19b. Ultimate lobules of leaves 0.5–1.5 mm; involucre 2–2.5(–3) mm in diam.

20a. Involucre semi-globose or subglobose, 2.5(–3) mm in diam.; disk florets 5–10 ..... 154. *A. nortonii*
20b. Involucre ovoid-oblong or ellipsoid, 2–2.5 mm in diam.; disk florets 4–6 ..... 149. *A. saposhnikovii*
18b. Lowermost and middle stem leaves 2(or 3)-pinnatisect, segments of lowermost leaves 4 or 5 pairs.
21a. Middle stem leaf segments 3 or 4(or 5) pairs; synflorescence a broad, conical panicle ..... 148. *A. marschalliana*
21b. Middle stem leaf segments 2 or 3 pairs; synflorescence a narrow, cylindric panicle.
22a. Lowermost and middle stem leaves 1.5–2.5 × 1–1.5 cm, lowermost 1- or 2-pinnatisect, segments 2–5 pairs; capitula 1.5–2.5 mm in diam., in narrow panicles ..... 153. *A. xigazeensis*
22b. Lowermost and middle stem leaves less than 1 × 1 cm, 2-pinnatisect, segments 2 pairs; capitula 1–1.5 mm in diam., in somewhat broad or narrow panicles ..... 144. *A. globosoides*
12b. Perennial, annual, or biennial herbs, root solitary, or nearly subshrubs but not caespitose and lobules of leaves thin and soft, other lobules narrowly linear, filiform, or linear-lanceolate, less than 1 mm wide; not growing in arid areas.
23a. Annual, biennial, or perennial herbs, root solitary, narrowly fusiform; lobules of middle stem leaves soft and thin, narrowly linear-filiform or narrowly linear-lanceolate, 0.2–0.5(–1) mm wide.
24a. Segments of middle stem leaves 5–8 pairs; phyllaries gray puberulent ..... 169. *A. blepharolepis*
24b. Segments of middle stem leaves (1 or)2–4 pairs; phyllaries often glabrous or glabrescent.
25a. Middle stem leaves 2-pinnatisect, segments (3 or)4 pairs; capitula densely spicate on branches and in narrow or somewhat broad panicles ..... 167. *A. stricta*
25b. Middle stem leaves 1- or 2-pinnatisect, segments (1 or)2 or 3 pairs; capitula spreading on branches and in broad paniculate or spicate-panicles.
26a. Plants less than 20 cm tall, branched from base of stem, and usually procumbent; middle stem leaves pinnatisect; capitula in spicate panicles ..... 160. *A. demissa*
26b. Plants more than 20 cm tall, branched from middle or basally on stem; middle stem leaves 2-pinnatisect; capitula in broad panicles.
27a. Middle stem leaves gray or yellowish sericeous-pubescent, later glabrescent; capitula 1.5–2 mm in diam., sessile or shortly pedunculate, in broad panicles ..... 166. *A. scoparia*
27b. Middle stem leaves persistent pubescent; capitula 1–1.5 mm in diam., shortly pedunculate, in much-branched panicles ..... 168. *A. pewzowii*
23b. Perennial herbs, or nearly subshrubs, roots several, rarely solitary, but not narrowly fusiform; lobules in middle stem leaves narrowly linear, more than (0.5–)1 mm wide.
28a. Plants less and shorter branched; capitula in narrow panicles ..... 161. *A. macilenta*
28b. Plants more and long branched; capitula in broad or somewhat broad, rarely narrow, panicles.
29a. Capitula 1–1.5(–2) mm in diam., spreading apically on branches or branchlets and in broad and elongated panicles.
30a. Basal and lowermost leaves 7–8 × 5–7.5 cm, 2- or 3-pinnatisect or -partite, lobules 10–20 × 2–4 mm; phyllaries revolute at apex ..... 162. *A. chienshanica*
30b. Basal and lowermost leaves 2–4(–5) × 1.5–3.5 cm, 2(or 3)-pinnatisect, lobules 5–10 × 0.5–1.5(–2) mm; phyllaries erect at apex ..... 163. *A. capillaris*
29b. Capitula 1.5–2 mm in diam., spreading on whole branches or branchlets.
31a. Middle stem leaves 1(or 2)-pinnatisect, segments 1 or 2(or 3) pairs, lobules narrowly linear; capitula several, in narrow or somewhat broad panicles.
32a. Middle stem leaves 3–3.5 × 3–4 cm, lobes (10–)20–30 × 1–2 mm; capitula in narrow panicles ..... 164. *A. morrisonensis*
32b. Middle stem leaves 1.5–2.5 × 1.5–2.5 cm, lobes 3–5 × 0.5–1 mm; capitula in somewhat broad panicles ..... 159. *A. gansuensis*
31b. Middle stem leaves 1-pinnatisect, or 2-pinnatisect and then lobes or lobules linear-lanceolate or nearly subulate, segments in middle stem leaves (2 or)3 pairs; capitula in broad or somewhat broad, rarely narrow, panicles.

33a. Branches and leaves gray pubescent, later glabrescent; lobules of leaves narrowly linear or narrowly linear-lanceolate ..... 158. *A. pubescens*
33b. Branches and leaves persistent gray or yellowish pubescent; lobules of leaves linear-lanceolate or narrowly linear-subulate or subulate.
34a. Branches and leaves densely gray pubescent; lobules of leaves linear-lanceolate ..... 156. *A. forrestii*
34b. Branches and leaves densely yellowish pubescent; lobules of leaves narrowly linear-lanceolate or subulate ..... 157. *A. mairei*

135. Artemisia dracunculus Linnaeus, Sp. Pl. 2: 849. 1753.

龙蒿 long hao

Subshrubs, (20–)40–150(–200) cm tall, with branched, woody rhizome; all parts densely to sparsely puberulent or tomentose, sparser with age, sometimes glabrescent. Leaves sessile or subsessile; basal leaf blades entire or 2- or 3-lobed at tip. Middle stem leaves linear-lanceolate, elliptic-lanceolate, or linear, (1.5–)3–7(–10) × (0.1–)0.2–0.6(–1) cm, entire or with apex 3-partite or -cleft, or with 1(or 2) small lateral lobes. Uppermost leaves and leaflike bracts linear or lanceolate, 5–30 × 1–2 mm. Synflorescence a broad to racemelike leafy panicle; branches ascending to erect, sometimes appressed, to 10 cm. Capitula remote to approximate, nodding; peduncles curved, to 5 mm. Involucre subglobose, ovoid, or hemispheric, 2–5 mm in diam.; phyllaries glabrescent, scarious margin broad, outer phyllaries oblong or lanceolate, inner orbicular-oblong. Marginal female florets 6–10[–15]; corolla 0.5–1 mm, glandular, 2-fid. Disk florets 4–14, male; corolla campanulate, 2–2.5, 5-lobed. Achenes obovoid or obovoid-ellipsoid. Fl. and fr. Jul–Oct. 2*n* = 18, 36, 54, 72, 90.

Dry slopes, steppes, semidesert steppes, forest steppes, forest margins, waste areas, roadsides, terraces, subalpine meadows, meadow steppes, dry river valleys, rocky slopes, saline-alkaline soils; 500–3800 m. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, N Shaanxi, N Shanxi, Xinjiang, W Xizang [Afghanistan, N India, Kazakhstan, Mongolia, N and W Pakistan, Russia, Tajikistan; C and SW Asia, C, E, and W Europe, North America].

Artemisia dracunculus is cultivated as a culinary herb in Europe and used as a source of winter fodder for sheep in Xizang.

1a. Stem shortly capitate branched, stem, branches, leaves, and phyllaries densely tomentose, later sparsely tomentose; leaves entire ..... 135e. var. *pamirica*
1b. Stem much branched, stem, branches, leaves, and phyllaries glabrescent; leaves lobed or divided.
2a. Leaves elliptic-lanceolate or lanceolate, 3–6 mm wide, entire or some leaves 3-partite or -cleft at apex ..... 135b. var. *turkestanica*
2b. Leaves linear or lanceolate, 1–2(–3) mm wide, entire or some leaves with 1(or 2) small linear lateral lobes.
3a. Peduncles 2–5 mm; panicles lax and narrow ..... 135d. var. *qinghaiensis*
3b. Peduncles ± absent.
4a. Involucre 2–2.5(–3) mm in diam.; capitula in ± broad panicles ..... 135a. var. *dracunculus*
4b. Involucre 3–4 mm in diam.; synflorescence racemelike ..... 135c. var. *changaica*

135a. Artemisia dracunculus var. **dracunculus**

龙蒿(原变种) long hao (yuan bian zhong)

Artemisia desertorum Sprengel var. *macrocephala* Franchet; *A. dracunculus* var. *inodora* Besser, p.p.; *A. dracunculus* f. *minor* Komarov; *A. inodora* Willdenow (1809), not Miller (1768), nor M. Bieberstein (1808); *Oligosporus dracunculus* (Linnaeus) Poljakov.

Plants glabrescent. Leaf blade linear-lanceolate or linear, 1–2(–3) mm wide, entire or with 1(or 2) small lateral lobes. Synflorescence a ± broad panicle. Capitula sessile. Involucre globose or subglobose, 2–2.5(–3) mm in diam.

Dry slopes, steppes, semidesert steppes, forest steppes, forest margins, waste areas, roadsides, terraces, subalpine meadows, saline-alkaline soils; 500–3800 m. W Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, N Shaanxi, N Shanxi, Xinjiang [Afghanistan, N India, Mongolia, N Pakistan, Russia; C and SW Asia, C, E, and W Europe, North America].

135b. Artemisia dracunculus var. **turkestanica** Krascheninnikov, Mater. Istorii Fl. Rastitel'n. S.S.S.R. 2: 177. 1946.

宽裂龙蒿 kuan lie long hao

Leaf blade elliptic-lanceolate to lanceolate, 3–6 mm wide, apex usually 3-partite to 3-fid. Capitula ± sessile or shortly pedunculate. Involucre 3–4 mm in diam.

Dry river valleys, terraces, steppes, roadsides, waste areas; 800–2500 m. Xinjiang [Kazakhstan].

135c. Artemisia dracunculus var. **changaica** (Krascheninnikov) Y. R. Ling, Bull. Bot. Res., Harbin 2(2): 36. 1982.

杭爱龙蒿 hang ai long hao

Artemisia changaica Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 346. 1937; *Oligosporus changaicus* (Krascheninnikov) Poljakov.

Leaf blade linear-lanceolate or linear, entire or usually with 1(or 2) small linear lateral lobes. Synflorescence racemelike. Capitula ± sessile. Involucre 3–4 mm in diam.

Gansu, Ningxia, Qinghai, Xinjiang [Mongolia].

135d. Artemisia dracunculus var. **qinghaiensis** Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 44. 1988.

青海龙蒿 qing hai long hao

Leaf blade linear-lanceolate or linear. Synflorescence a lax panicle. Capitula with 2–5 mm peduncles, nodding. Involucre 2–5 mm in diam.

• Waste areas, roadsides; 2500–3500 m. E and N Qinghai.

135e. Artemisia dracunculus var. **pamirica** (C. Winkler) Y. R. Ling & Humphries, Bull. Bot. Res., Harbin 8(4): 45. 1988.

帕米尔蒿 pa mi er hao

Artemisia pamirica C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 329. 1890; *A. pamirica* var. *aschurbazewii* C. Winkler; *A. pamirica* f. *trifida* C. Winkler; *A. simplicifolia* Pampanini; *Oligosporus pamiricus* (C. Winkler) Poljakov.

Fertile shoots many, 20–30(–40) cm tall. Stem, branches, and leaves densely tomentose, later sparsely so. Leaves closely spaced; leaf blade lanceolate, entire. Synflorescence a dense, narrow panicle. Capitula closely spaced along short lateral branches.

Rocky slopes, meadow steppes; 3000–3400 m. Qinghai, W Xinjiang, W Xizang [Afghanistan, W Pakistan, Tajikistan].

136. Artemisia sphaerocephala Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 348. 1937.

圆头蒿 yuan tou hao

Artemisia salsoloides Willdenow var. *mongolica* Pampanini, p.p.; *Oligosporus sphaerocephalus* (Krascheninnikov) Poljakov.

Shrubs, 80–150 tall, with a strong woody stock, long and shortly branched, puberulent or glabrescent, incanous or yellowish, bark flaking off. Leaves ± succulent. Lower and middle stem leaves: petiole 0.3–0.8 cm; leaf blade broadly ovate or ovate, 2–5(–8) × 1.5–3(–4) cm, puberulent or glabrescent, 1- or 2-pinnatisect; segments (1 or)2 or 3 pairs, lateral middle lobes longer than other lobes, 3-sect; lobules linear or falcate, (5–)10–20(–30) × (1–)1.5–2 mm, apex mucronulate. Uppermost leaves pinnatisect or 3-lobed; leaflike bracts linear, entire. Synflorescence a broad, much-branched panicle. Capitula shortly pedunculate, nodding. Involucre globose or subglobose, 3–4 mm in diam.; phyllaries ± leathery. Marginal female florets 4–12. Disk florets 6–20, male. Achenes minute, obovoid. Fl. and fr. Jul–Oct.

Dunes of desert areas, desert steppes, dry slopes; 1000–2900 m. N and W Gansu, SW Nei Mongol, Ningxia, N Qinghai, N Shaanxi, N Shanxi, E Xinjiang [S Mongolia].

Artemisia sphaerocephala is used for windbreaks and sand stabilization, and it is used medicinally.

137. Artemisia wudanica Liou & W. Wang, Acta Phytotax. Sin. 17(4): 88. 1979.

乌丹蒿 wu dan hao

Shrubs, 100–200 cm tall or more, gray, with many long branches, branchlets, and short branches. Lower and middle stem leaves: petiole 5–6 cm; leaf blade broadly ovate, (5–)6–8 × 3–4 cm, 2-pinnatisect; segments 2 or 3(or 4) pairs, 2- or 3-lobuled; lobules linear, 20–40 × 1.5–2.5 mm, apex mucronulate. Uppermost leaves and leaflike bracts pinnatisect or 3-lobed; lobes linear. Synflorescence a narrow or moderately broad panicle. Capitula shortly pedunculate, nodding. Involucre globose or subglobose, 4–5 mm in diam. Marginal female florets 7–9. Disk florets 14–22, male. Achenes oblong-obovoid. Fl. and fr. Jul–Oct.

• Dunes of desert areas; low to middle elevations. N Hebei, S Nei Mongol.

Artemisia wudanica is used for windbreaks and sand stabilization.

138. Artemisia halodendron Turczaninow ex Besser, Bull. Soc. Imp. Naturalistes Moscou 8: 19. 1835.

盐蒿 yan hao

Artemisia intramongolica H. C. Fu; *A. intramongolica* var. *microphylla* H. C. Fu; *Oligosporus halodendron* (Turczaninow ex Besser) Poljakov.

Shrubs, 50–80 tall, with many long branches and branchlets, glabrescent, purple. Leaves puberulent or glabrescent. Lower and middle stem leaves: petiole 1–4 cm; leaf blade broadly ovate or suborbicular, 1- or 2-pinnatisect; segments (2 or)3 or 4 pairs, basal lobes longer than others; lobules 1 or 2 pairs, linear, 10–15(–20) × 0.5–1 mm, apex mucronulate. Uppermost leaves and leaflike bracts 3–5-sect or entire. Synflorescence a broad, much-branched panicle. Capitula many, shortly pedunculate or ± sessile, erect. Involucre ovoid, (2.5–)3–4 mm in diam. Marginal female florets 4–8. Disk florets 8–15, male. Achenes ovoid-oblong or obovoid-ellipsoid. Fl. and fr. Jul–Oct.

Dunes of desert areas, desert steppes, steppes, forest steppes, rocky slopes. N Gansu, N Hebei, W Heilongjiang, W Jilin, W Liaoning, Nei Mongol, Ningxia, N Shaanxi, N Shanxi, E Xinjiang [Mongolia, Russia].

Artemisia halodendron is used for windbreaks and sand stabilization.

139. Artemisia kangmarensis Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 510. 1980.

康马蒿 kang ma hao

Subshrubs, 30–40 cm tall, with short capitate branches, puberulent or glabrescent. Lower and middle stem leaves ± sessile; leaf blade oblong or elliptic, 1–2.5 × 0.5–1 cm, abaxially puberulent or glabrescent, pinnatisect; segments 1 or 2 pairs; lobes linear, linear-lanceolate, or falcate, 3–6 × ca. 1 mm. Upper leaves and leaflike bracts 3-lobed or entire. Synflorescence a narrow, spikelike panicle. Capitula sessile or shortly pedunculate. Involucre globose or hemispheric, 5–6 mm in diam. Marginal female florets 8–15. Disk florets 20–35, male; corolla limb puberulent. Achenes obovoid or ovoid. Fl. and fr. Aug–Oct.

• Roadsides, slopes; 4300–4500 m. E Xizang.

140. Artemisia songarica Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 49. 1841.

准噶尔沙蒿 zhun ga er sha hao

Oligosporus songaricus (Schrenk ex Fischer & C. A. Meyer) Poljakov.

Shrubs, 30–80 cm tall, with a thick rootstock, branches many, nearly horizontal, puberulent or glabrescent. Lower and middle stem leaves sessile; leaf blade ovate-oblong, 2–4 × ca. 2 cm, 1- or 2-pinnatisect; segments 2 or 3 pairs, lateral and basal lobes usually 3-sect; lobules linear, 5–10(–12) × 1.5–2 mm, apex mucronulate. Uppermost leaves and leaflike bracts linear. Synflorescence a lax, broad panicle. Capitula sessile or shortly pedunculate, nodding. Involucre ovoid, 1.5–2 mm in diam. Marginal female florets 4 or 5. Disk florets 6–10, male. Achenes ovoid. Fl. and fr. Jun–Oct. $2n = 18$.

Dunes of desert areas, rocky slopes; low to middle elevations. N Xinjiang [Kazakhstan].

141. Artemisia ordosica Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 173. 1946.

黑沙蒿 hei sha hao

Artemisia ordosica var. *furva* H. C. Fu; *A. ordosica* var. *montana* H. C. Fu; *A. salsoloides* Willdenow var. *mongolica* Pampanini, p.p.

Shrubs, 50–100 cm tall, with a strong woody stock, much branched, purple or later brown. Lowermost leaf blades 3–5(–7) × 2–4 cm, 1- or 2-pinnatisect, basal lobes 2- or 3-lobuled. Middle stem leaves ± sessile; leaf blade pinnatisect; segments 3 or 4 pairs, linear, 15–30 × 0.5–1 mm, straight or falcate. Uppermost leaves and leaflike bracts 3- or 5-sect or entire. Synflorescence a broad panicle, nodding or oblique. Involucre ovoid, 1.5–2.5 mm in diam. Marginal female florets 10–14. Disk florets 5–7, male. Achenes obovoid. Fl. and fr. Jul–Oct. $2n = 36$*.

• Dunes, desert areas, dry slopes, desert steppes; low elevations to 1500 m. N Hebei, Nei Mongol, N Shanxi; cultivated in C and W Gansu, Ningxia, N Shaanxi, and Xinjiang.

Artemisia ordosica is used for windbreaks and sand stabilization. It is also used for making anti-inflammatory drugs.

142. Artemisia prattii (Pampanini) Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 511. 1980.

藏岩蒿 zang yan hao

Artemisia salsoloides Willdenow var. *prattii* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 698. 1927; *A. salsoloides* f. *halodendron* Pampanini; *A. salsoloides* f. *paniculata* (J. D. Hooker) Pampanini; *A. salsoloides* var. *paniculata* J. D. Hooker.

Subshrubs, 30–60 cm tall, branching from below middle, branches ascending, most parts adpressed pubescent, hairs medifixed, ± rapidly glabrescent. Lowermost leaves shortly petiolate. Middle stem leaves sessile; leaf blade oblong or suborbicular, 2–3 × 2–2.5 cm, pinnatisect [to palmatisect]; segments 2 or 3 pairs, linear, occasionally forked, 8–12 × 1–1.5 mm. Uppermost leaves 3- or 5-lobed; leaflike bracts linear. Synflorescence a lax conical panicle, to 40 cm; branches elongated. Capitula solitary or in groups of 2 or 3, nodding, secund, sometimes peduncle longer than involucre, bracteolate. Involucre globose, ovoid, or broadly ovoid, 2.5–3 mm in diam.; phyllaries glabrous. Marginal female florets 5–8. Disk florets 6–15, male. Achenes obovoid or ovoid-ellipsoid. Fl. and fr. Jul–Sep.

• Dry hills, subalpine semidesert steppes; 2500–3600 m. SE Qinghai, W Sichuan, E Xizang.

143. Artemisia klementzae Krascheninnikov, Mater. Istorii Fl. Rastitel'n. S.S.S.R. 2: 163. 1946.

蒙古沙地蒿 meng gu sha di hao

Artemisia xylorhiza Krascheninnikov ex Filatova.

Shrubs, 30–60 cm tall, with a thick rootstock, much branched. Lower and middle stem leaves: petiole 2–3(–4.5) cm; leaf blade broadly ovate or suborbicular, 2–3 × 2–3 cm, 1- or 2-pinnatisect; segments 2(or 3) pairs, lateral middle lobes 3-lobed; lobes or lobules linear, 10–15 × 0.5–1 mm. Uppermost leaves and leaflike bracts 3- or 5-lobed or entire. Synflorescence a broad panicle. Capitula nodding. Involucre subglobose, 2–2.5 mm in diam. Marginal female florets 3–5. Disk florets 5–10, male. Achenes obovoid. Fl. and fr. Jul–Oct.

Dunes of desert and semidesert areas, steppes; below 1500 m. E and SE Nei Mongol [Mongolia].

144. Artemisia globosoides Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 5(2): 7. 1985.

假球蒿 jia qiu hao

Subshrubs, 30–35 cm tall, with a thick rootstock. Lower and middle stem leaves: petiole 1–1.5 cm; leaf blade suborbicular, oblong, or ovate, 0.5–0.8 × 0.5–0.8 cm, pubescent or glabrescent, 2-pinnatisect; segments 2 pairs, 2- or 3-sect; lobules linear or narrowly lanceolate, 2–3 × ca. 1 mm, apex mucronulate. Upper leaves and leaflike bracts 3- or 5-sect. Synflorescence a ± narrow panicle. Capitula nodding. Involucre ovoid, 1–1.5 mm in diam. Marginal female florets 2–4. Disk florets 3–5, male. Achenes obovoid. Fl. and fr. Aug–Oct.

• Sand dunes, dune margins, waste areas. Nei Mongol, Ningxia.

145. Artemisia xanthochroa Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 174. 1946.

黄绿蒿 huang lü hao

Oligosporus xanthochrous (Krascheninnikov) Poljakov.

Subshrubs, 20–60 cm tall, pubescent or glabrescent. Lower and middle stem leaves: petiole 5–15 mm; leaf blade ovate, 1.5–2 × 1.5–2 cm, pinnatisect; segments of lower leaves 2 or 3 pairs, segments of middle leaves 1 or 2 pairs, linear or linear-lanceolate, 5–10 × 1.5–2.5 mm. Capitula in narrow or somewhat broad panicles. Involucre ovoid, 2–2.5 mm in diam. Marginal female florets 3–6. Disk florets 3–7, bisexual. Achene ovoid. Fl. and fr. Aug–Oct.

Dry slopes, steppes, Gobi Desert. N Nei Mongol [Mongolia].

146. Artemisia oxycephala Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 4: 93. 1936.

光沙蒿 guang sha hao

Artemisia pubescens Ledebour var. *oxycephala* (Kitagawa) Kitagawa.

Subshrubs, 50–80 cm tall, with a thick rootstock. Lowermost leaves long petiolate; middle stem leaves ± sessile; leaf blade broadly ovate or suborbicular, 2–5 × 2–3 cm, puberulent or glabrescent, 2-pinnatisect; segments 2 or 3 pairs; lateral lobes 3-sect; lobules linear, 15–20 × 1.5–2 mm. Uppermost leaves and leaflike bracts 3–5-sect or entire. Synflorescence a lax, ± broad panicle. Involucre oblong, 1.5–2.5(–3.5) mm in diam. Marginal female florets 8–14. Disk florets 3–10, male. Achenes oblong. Fl. and fr. Aug–Oct.

• Steppes, dry hills, dunes, saline-alkaline soils, lakeshores, forest steppes; low elevations. N Hebei, W Heilongjiang, W Jilin, W Liaoning, Nei Mongol, N Shanxi.

147. Artemisia campestris Linnaeus, Sp. Pl. 2: 846. 1753.

荒野蒿 huang ye hao

Oligosporus campestris (Linnaeus) Cassini.

Shrubs, 30–60[–150] cm tall, with a strong woody stock, much branched, faintly aromatic, pubescent or glabrescent. Lowermost leaves: petiole 3–5 cm; leaf blade broadly ovate or ovate, (3–)4–5(–8) × 2.5–5 cm, 2(or 3)-pinnatisect; segments 4 or 5 pairs, 3–5-sect; lobules narrowly linear or narrowly linear-lanceolate, 4–10 × (0.5–)1–1.5[–2] mm, apex mucronulate. Middle stem leaves sessile, 1- or 2-pinnatisect; segments 3 or 4 pairs. Uppermost leaves and leaflike bracts 3–5-sect or entire. Synflorescence a lax, broad panicle. Involucre ovoid, 1.5–2.5 mm in diam. Marginal female florets 3–6[–20]. Disk florets 6–10[–30], bisexual. Achene obovoid. Fl. and fr. Jul–Oct. $2n = 18$, 36.

Steppes, waste areas, rocky slopes, dune margins; 300–3100 m. N Gansu, Taiwan, Xinjiang [Japan, Russia; C Asia, Europe, North America].

We have not seen material of *Artemisia campestris* var. *glomerata* Pampanini (Nuovo Giorn. Bot. Ital., n.s., 34: 642. 1927), described as an annual with ± filiform leaf segments.

148. Artemisia marschalliana Sprengel, Syst. Veg. 3: 496. 1826.

中亚旱蒿 zhong ya han hao

Subshrubs or small shrubs, 30–70(–80) cm tall, with a thick rootstock, gray pubescent or sericeous-pubescent, persistent or glabrescent. Lower stem leaves: petiole 3–6 cm; leaf blade oblong-ovate or ovate, (3–)4–8(–10) × 2–5(–6) cm, 2(or 3)-pinnatisect; segments 4–6 pairs, 3–5-lobuled. Middle and upper stem leaves petiolate; leaf blade 1- or 2-pinnatisect; segments 3 or 4(or 5) pairs; lobules linear or linear-lanceolate, 6–15 × (0.5–)1–1.5 mm, apex mucronulate. Leaflike bracts 3–5-sect or entire. Synflorescence a broad to slender, erect or ascending, conical panicle, sometimes with lateral branches to form compound panicle; branches short, mostly less than 1 cm. Capitula contiguous along ultimate branches, ± sessile, erect. Involucre ovoid or broadly ovoid, 1.5–2.5(–3) mm in diam. Marginal female florets 3–8. Disk florets 5–15, male. Achenes ovoid. Fl. and fr. Jul–Oct.

Steppes, forest steppes, wastelands, rocky slopes, hills; 500–2200 m. N Xinjiang [Kazakhstan, Russia; Europe].

1a. Stem, branches, leaves, and phyllaries gray pubescent, later glabrescent; synflorescence an ascending, slender conical panicle ..... 148a. var. *marschalliana*

1b. Stem, branches, leaves, and phyllaries persistently sericeous-pubescent; synflorescence a broad, compound panicle ..... 148b. var. *sericophylla*

148a. Artemisia marschalliana var. **marschalliana**

中亚旱蒿(原变种) zhong ya han hao (yuan bian zhong)

Artemisia inodora M. Bieberstein, Fl. Taur.-Caucas. 2: 295. 1808, not Miller (1768), nor Willdenow (1809); *A. campestris* Linnaeus var. *gmeliniana* Besser; *A. campestris* var. *marschalliana* (Sprengel) Poljakov; *A. campestris* var. *steveniana* Besser; *A. tomentella* Trautvetter var. *subglabra* Kraschenninikov; *Oligosporus marschallianus* (Sprengel) Lessing.

Stems with few branches above base; vegetative parts and phyllaries gray pubescent, later glabrescent. Synflorescence a slender, ascending conical panicle.

Steppes, forest steppes, wastelands, rocky slopes, hills; 500–2200 m. N Xinjiang [Kazakhstan, Russia; Europe].

148b. Artemisia marschalliana var. **sericophylla** (Ruprecht) Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 48. 1988.

绢毛旱蒿 juan mao han hao

Artemisia sericophylla Ruprecht, Beitr. Pflanzenk. Russ. Reiches 2: 41. 1845; *A. campestris* var. *sericophylla* (Ruprecht) Poljakov.

Stem, branches, leaves, and phyllaries persistently sericeous-pubescent. Stems branching to form a broad compound panicle.

Steppes, forest steppes, wastelands, rocky slopes, hills; 500–2200 m. N Xinjiang [Kazakhstan, Russia; Europe].

149. Artemisia saposhnikovii Krascheninnikov ex Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 412. 1955.

昆仑沙蒿 kun lun sha hao

Subshrubs, 30–40 cm tall, with a thick rootstock and capitate branches. Lower and middle stem leaves: petiole 3–15 mm; leaf blade ovate, 1–3 × 0.5–2.5 cm, yellowish pubescent or glabrescent, 1(or 2)-pinnatisect; segments 2 pairs, linear, straight or falcate, 3–8(–15) × 0.5–1 mm, margin deeply serrate, apex obtuse and mucronulate. Uppermost leaves and leaflike bracts pinnatisect, 3-sect, or entire. Synflorescence a narrow panicle. Capitula contiguous along ultimate branches, nodding. Involucre oblong-ovoid or ellipsoid, 2–2.5 mm in diam. Marginal female florets 4 or 5. Disk florets 4–6, male. Achenes oblong or oblong-obovoid. Fl. and fr. Aug–Oct. $2n = 36$.

Rocky terraces, canyons, dry valleys, roadsides; 1300–2500 m. SW Xinjiang [Kyrgyzstan].

150. Artemisia wellbyi Hemsley & H. Pearson, J. Linn. Soc., Bot. 35: 183. 1902.

藏沙蒿 zang sha hao

Artemisia salsoloides Willdenow var. *wellbyi* (Hemsley & H. Pearson) Ostenfeld & Paulsen; *Oligosporus wellbyi* (Hemsley & H. Pearson) Poljakov.

Subshrubs, 15–28 cm tall, with a thick stock, densely gray or yellowish and sericeous-pubescent. Lower and middle stem leaves: petiole 5–20 mm. Lower leaves ovate or elliptic-ovate, 1.5–2.5 × 0.8–1.8 cm, 2-pinnatisect; segments 3 or 4 pairs; lobules linear or linear-lanceolate, 4–5 × 0.5–2 mm. Middle stem leaves elliptic-ovate, 10–20 × 5–15 mm, 1(or 2)-pinnatisect; segments 3(or 4) pairs; lobules 4–10(–18) × 1–1.5 mm. Uppermost leaves and leaflike bracts 3- or 5-sect or entire. Synflorescence a lax, narrow panicle. Capitula initially dense, later lax. Involucre ovoid or subglobose, 2.5–3.5(–4) mm in diam.; phyllaries puberulent or glabrescent. Marginal female florets 5–15. Disk florets 8–16, bisexual. Achene obovoid. Fl. and fr. Jul–Nov.

Riverbanks, lakeshores, hills, rocky slopes, alpine steppes, alpine meadows; 3600–5300 m. Xizang [N India].

151. Artemisia waltonii J. R. Drummond ex Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 707. 1927.

藏龙蒿 zang long hao

Shrubs, 30–60 cm tall, much branched, puberulent or glabrescent. Lower stem leaves: petiole 0.2–0.5 cm; leaf blade ovate-oblong or oblong, 2–2.5 × 1.5–1.8 cm, grayish puberulent, 2-pinnatisect or -partite; segments 3 pairs. Middle stem leaves sessile; leaf blade 1(or 2)-pinnatisect or -partite; lobules linear, linear-lanceolate, or falcate-lanceolate, 3–15 × 1.5–2.5 mm, margin nearly revolute, apex obtuse or acuminate, mucronulate; midrib convex abaxially, concave adaxially. Uppermost leaves 3–5-partite; leaflike bracts lanceolate or falcate. Synflorescence a broad panicle. Capitula ± sessile or shortly pedunculate, nodding. Involucre globose to broadly ovoid, 2.5–3(–3.5) mm in diam. Marginal female florets 18–29. Disk florets 20–30, male; corolla limb puberulent. Achenes oblong or obovoid. Fl. and fr. May–Sep.

• Roadsides, riverbanks, shrublands, slopes, steppes, dry valleys, waste areas; 3000–4300 m. S Qinghai, W Sichuan, Xizang, W Yunnan.

1a. Lobes of leaves linear or linear-lanceolate, 3–8 mm, obtuse; capitula sessile ..... 151a. var. *waltonii*

1b. Lobes of leaves falcate-lanceolate, 8–15 mm, acuminate; capitula shortly pedunculate ..... 151b. var. *yushuensis*

151a. Artemisia waltonii var. **waltonii**

藏龙蒿(原变种) zang long hao (yuan bian zhong)

Lobes of middle stem leaves linear or linear-lanceolate, 3–8 mm, apex obtuse. Capitula sessile.

• Roadsides, riverbanks, shrublands, slopes, steppes, dry valleys; 3000–4300 m. S Qinghai, W Sichuan, Xizang, W Yunnan.

151b. Artemisia waltonii var. **yushuensis** Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 49. 1988.

玉树龙蒿 yu shu long hao

Lobes of middle stem leaves falcate-lanceolate, 8–15 mm, apex acuminate. Capitula shortly pedunculate.

• Slopes, waste areas; middle to high elevations. S Qinghai, N Xizang.

152. Artemisia gyangzeensis Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 510. 1980.

江孜蒿 jiang zi hao

Subshrubs, 20–30 cm tall; branches capitate, 4–5 cm, puberulent, glabrescent. Lower and middle stem leaves: petiole 1–2 cm; leaf blade ovate or oblong, 3.5–4.5 × 2–3 cm, 2-pinnatisect; segments 3 pairs, 8–12 × ca. 5 mm; lobules 1 or 2 pairs, linear-lanceolate or linear, 5–10 × 1.5–2 mm, base attenuate, margin revolute, midvein white, prominent abaxially. Uppermost leaves pinnatisect; leaflike bracts 3-sect or entire. Synflorescence a narrow panicle. Involucre globose or ovoid-globose, 2.5–3.5 mm in diam. Marginal female florets 3–8. Disk florets 10–20, male. Achenes obovoid or ovoid-elliptic. Fl. and fr. Jul–Sep.

• Slopes; ca. 3900 m. S Gansu, Qinghai, E Xizang.

153. Artemisia xigazeensis Y. R. Ling & M. G. Gilbert, **sp. nov.**

日喀则蒿 ri ka ze hao

Type: China. Xizang: N of Phari, 1882, *Dr. King's Collector 54* (holotype, K).

Paratypes: China. Xizang: near Phari, 14,500 ft., Sep 1838, *B. J. Gould 1621* (K); Dochen Lake Camp, ca. 15,000 ft., 24 Jun 1939, *B. J. Gould 2194* (K); Valley ca. 10 km NNE of Lhasa, 4,150 m, 2 Aug 1989, *B. Dickoré 3628* (K). Qinghai: E shore of Kokonor (Qinghai Hu), 10,700 ft., Sep 1925, *J. F. Rock 13385* (K).

Plantae suffruticosae; caules multi erecti vel ascendentes, ramis ascendentibus brevibus angustis; indumentum ex trichomatibus medifixis adpressis constans. Folia 1(ad 2)-pinnatisecta, segmentis 3- ad 5-jugatis asymmetrice 3(ad 5)-lobatis, lobulis ultimis oblanceolatis usque anguste oblongis interdum falcatis 4–7(–10) × 0.9–1.5 mm. Synflorescentia paniculata anguste cylindrica, ramis erectis brevibus. Involucrum ovoideum usque ovoideo-campanulatum 2.5–4 × 1.5–2.5 mm, phyllariis glabris, exterioribus costa crassiuscula. Flosculi marginales 5 ad 8, ei disci 5 ad 12 ovario vestigiali.

Plant subshrubby, 7–22 cm tall; rootstock a deep woody taproot to ca. 1 cm thick; stems becoming very many with age, erect or ascending, basally medifixed appressed pubescent, upper parts glabrescent; branches ascending, short, narrow. Basal and lower stem leaves usually withered by anthesis; pseudostipules absent; petiole 1–2.5 cm; leaf blade ± oblong to oblanceolate in outline, 1–2.5 × 0.6–1.5 cm, 1(–2)-pinnatisect, abaxially adpressed pubescent, adaxially glabrous or glabrescent; segments 3–5-paired, asymmetrically 3(–5)-lobed; ultimate lobules oblanceolate to narrowly oblong, sometimes falcate, 4–

7(–10) × 0.9–1.5 mm, apex acute to slightly cuspidate. Middle and upper stem leaves similar but smaller and often pseudostipulate, these with 2 or 3 pairs of lobes. Synflorescence an erect or ascending narrowly cylindric panicle; branches erect, closely appressed to main axis, short, to 3.5 cm, lower bracts sessile, pinnatisect to subpalmatisect, uppermost bracts linear. Capitula separated, mostly erect; peduncle 1–6 mm, sparsely pubescent, usually bracteolate. Involucre ovoid to ovoid-campanulate, 2.5–4 × 1.5–2.5 mm; phyllaries ca. 3-seriate, glabrous, inner zone sometimes tinged purplish, scarious margin broad, hyaline; outer phyllaries broadly ovate, short, with slightly thickened midrib, apex rounded to subacute; inner phyllaries oblong-ovoid, apex acute, sometimes slightly recurved. Marginal florets 5–8; style long exserted. Disk florets 5–12; corolla ca. 2 mm, glabrous; ovary vestigial. Achenes dark brown, cylindric-ellipsoid, obscurely pale ribbed.

• Rocky slopes, steppes, roadsides; 2700–4600 m. ?Gansu, Qinghai, E Xizang.

Y. Ling & Y. R. Ling (Acta Phytotax. Sin. 18: 511. 1980) published *Artemisia xigazeensis* as a "nom. nov." for *A. salsoloides* sensu J. D. Hooker (Fl. Brit. India 3: 321. 1881), not Willdenow (Sp. Pl. 3: 1832. 1803), explicitly including in synonymy both *A. salsoloides* var. *salsoloides* (as misapplied by Hooker, loc. cit.), *A. salsoloides* var. *paniculata* J. D. Hooker (loc. cit.), and *A. salsoloides* f. *halodendron* Pampanini (Nuovo Giorn. Bot. Ital., n.s., 34: 697. 1927). This multiplicity of elements means that the replaced synonym was not clearly indicated, as is required by Art. 33.4 of the *Vienna Code* for valid publication of a replacement name. *Artemisia xigazeensis* was not instead validly published as the name of a new taxon because no type was indicated (Art. 37.1).

The name *Artemisia xigazeensis* has been consistently applied to a distinctive small caespitose plant branching mostly very near ground level and with erect racemelike panicles. The present treatment excludes the syntypes of *A. salsoloides* var. *paniculata*, all of which have 1 to few stems branching mostly well above ground level and have relatively broad panicles, matching *A. prattii* rather well. In these circumstances, *A. xigazeensis* is here described as a new species.

154. Artemisia nortonii Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 683. 1927.

藏旱蒿 zang han hao

Herbs, perennial, 15–25 cm tall, branched apically, gray pubescent. Lower and middle stem leaves ± sessile; leaf blade oblong or oblong-ovate, 1.5–2(–2.5) × 0.5–1.5 cm, pinnatisect; segments 2 or 3 pairs in lowermost leaves and 1 or 2 pairs in middle leaves, linear or linear-lanceolate, 3–5(–8) × 0.5–1.5 mm. Uppermost leaves and leaflike bracts 3-sect or entire. Synflorescence a narrow panicle. Involucre semi-globose or subglobose, 2.5(–3) mm in diam. Marginal female florets 3–7. Disk florets 5–10, male. Achenes obovoid. Fl. and fr. Jun–Oct.

• Slopes; ca. 4200 m. E and S Xizang.

155. Artemisia kuschakewiczii C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 330. 1890 [*"kuschakewiczi"*].

掌裂蒿 zhang lie hao

Oligosporus kuschakewiczii (C. Winkler) Poljakov.

Herbs, perennial, 5–12(–15) cm tall, with a thick rootstock, white sericeous-pubescent or glabrescent. Lower and middle stem leaves: leaf blade suborbicular or ovate, 5–25 × 5–25 mm, subpalmately 5–7-partite; lobes not or rarely (2 or)3–5-lobuled; lobes or lobules linear-lanceolate, 2–5 × 1–2 mm. Uppermost leaves 3–5-partite; leaflike bracts linear. Synflorescence a spikelike or racemelike panicle. Involucre ovoid, 2.5–3 mm in diam.; phyllaries white or yellowish sericeous-puberulent. Marginal female florets 5 or 6. Disk florets 9–12, male. Achenes obovoid. Fl. and fr. Aug–Oct.

Lakeshores, riverbanks, slopes; 3500–4000 m. Xinjiang, W Xizang [Tajikistan].

156. Artemisia forrestii W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 195. 1920.

亮苞蒿 liang bao hao

Subshrubs, 50–75 cm tall, rhizomatous, densely gray pubescent. Lower and middle stem leaves ± sessile; leaf blade ovate, 2–4 × 1.5–3 cm, pinnatisect; segments 2 pairs, linear-lanceolate, 15–20 × 1–1.5(–2) mm. Uppermost leaves 3–5-sect; leaflike bracts 3-sect or entire. Synflorescence a narrow panicle, branches very short, to 5 mm, sometimes branching from lower nodes to form large panicle. Involucre subglobose, 2–2.5 mm in diam. Marginal female florets 2 or 3. Disk florets 4–8, male. Achenes minute. Fl. and fr. Sep–Nov.

• Slopes, waste areas; 2200–3800 m. Yunnan.

157. Artemisia mairei H. Léveillé, Repert. Spec. Nov. Regni Veg. 11: 303. 1912.

小亮苞蒿 xiao liang bao hao

Artemisia mairei f. *latifolia* Pampanini.

Herbs, perennial, 40–60 cm tall, erect, yellowish pubescent. Lower and middle stem leaves sessile; leaf blade ovate, 1.5–3 × 1–2 cm, pinnatisect; segments 2 pairs, subulate or linear-subulate, 10–15 × ca. 1 mm. Uppermost leaves and leaflike bracts 3-sect or entire. Synflorescence a narrow to broad panicle, branches ascending, sometimes reduced to simple racemes, sometimes producing secondary panicles and broad synflorescence. Capitula spreading, subsessile. Involucre subglobose, (1.5–)2 mm in diam.; phyllaries glabrous. Marginal female florets 2 or 3(?–7). Disk florets 3–7, male. Achenes minute. Fl. and fr. Aug–Nov.

• Slopes, roadsides; 2100–3600 m. Yunnan.

158. Artemisia pubescens Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 568. 1815.

柔毛蒿 rou mao hao

Herbs, perennial, or subshrub 25–60(–70) cm tall, with a thick rootstock, lower parts yellow-brown tomentose, upper parts gray pubescent, glabrescent. Basal and lower stem leaves long petiolate; leaf blade 4–8(–12) × 1.5–2 cm, 2-pinnatisect. Middle stem leaves: petiole (0–)2–5 cm; leaf blade ovate, rather densely pubescent to glabrous, (1 or)2(or 3)-pinnatisect; segments (2 or)3 or 4 pairs, basal and middle lobes lobulate; lobules linear or linear-lanceolate, 10–30 × 0.5–1.5(–2) mm. Uppermost leaves pinnatisect; leaflike bracts 3-sect or entire. Syn-

florescence a narrow or broad panicle. Capitula many, erect, oblique, or nodding. Involucre subglobose or ovoid, 1.5–3 mm in diam. Marginal female florets 8–15. Disk florets 10–15, male. Achenes oblong or oblong-ovoid. Fl. and fr. Aug–Oct.

Steppes, forest steppes, meadows, forest margins, hills, waste areas, rocky slopes, roadsides, stable dunes of desert margins; low to middle elevations. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, N Shaanxi, N Shanxi, NW Sichuan, Xinjiang [Mongolia, Russia].

Three varieties are recognized in China; Russian authors recognize three further varieties from outside of China.

1a. Involucre broadly ovoid, 2.5–3 mm in diam.; capitula erect or oblique, in narrow panicles ..... 158b. var. *gebleriana*
1b. Involucre subglobose or ovoid, 1.5–2 mm in diam.; capitula in broad or somewhat broad panicles.
2a. Herbs; leaf blades abaxially persistently puberulent ..... 158a. var. *pubescens*
2b. Subshrubs; leaf blades abaxially glabrescent ..... 158c. var. *coracina*

158a. Artemisia pubescens var. **pubescens**

柔毛蒿(原变种) rou mao hao (yuan bian zhong)

Artemisia campestris Linnaeus var. *pubescens* (Ledebour) Trautvetter; *A. capillaris* Thunberg var. *simplex* Maximowicz; *A. commutata* Besser; *A. commutata* var. *helmiana* Besser; *A. commutata* var. *pallasiana* Besser; *A. commutata* var. *pubescens* (Ledebour) Poljakov; *A. desertorum* Sprengel f. *helmiana* (Besser) Pampanini; *A. desertorum* var. *pallasiana* (Besser) Pampanini; *Oligosporus adfinis* Lessing; *O. commutatus* (Besser) Poljakov.

Herbs, perennial. Leaves persistently pubescent. Synflorescence a moderately broad panicle. Capitula oblique or nodding. Involucre subglobose or ovoid, 1.5–2 mm in diam.

• Steppes, forest steppes, meadows, forest margins, hills, waste areas, rocky slopes, roadsides; low to middle elevations. Gansu, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, N Shaanxi, N Shanxi, NW Sichuan, Xinjiang.

158b. Artemisia pubescens var. **gebleriana** (Besser) Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 51. 1988.

大头柔毛蒿 da tou rou mao hao

Artemisia commutata var. *gebleriana* Besser, Bull. Soc. Imp. Naturalistes Moscou 8: 72. 1835; *A. desertorum* f. *gebleriana* (Besser) Pampanini.

Herbs, perennial. Leaves glabrescent. Synflorescence a narrow panicle. Capitula erect or oblique. Involucre broadly ovoid, 2.5–3 mm in diam.

Heilongjiang, Jilin, Liaoning, Nei Mongol [Mongolia, Russia].

158c. Artemisia pubescens var. **coracina** (W. Wang) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 51. 1988.

黑柔毛蒿 hei rou mao hao

Artemisia coracina W. Wang, Acta Phytotax. Sin. 17(4): 89. 1979.

Subshrubs. Leaves glabrescent. Synflorescence a broad panicle. Capitula oblique or nodding Involucre subglobose or ovoid, 1.5–2 mm in diam.

• Stable dunes of desert margins. W Jilin.

159. Artemisia gansuensis Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 5(2): 9. 1985.

甘肃蒿 gan su hao

Subshrubs, 18–30(–40) cm tall, with a thick rootstock, gray puberulent or glabrescent. Lowermost leaves shortly petiolate; leaf blade broadly ovate or suborbicular, 2–3(–3.5) × 2–3 cm, 2-pinnatisect; segments (2 or)3(or 4) pairs, 3-sect. Middle stem leaves ± sessile; leaf blade 1.5–2.5 × 1.5–2.5 cm; lobules linear, 5–8 × 0.5–1 mm, apex mucronulate. Uppermost leaves and leaf-like bracts 3- or 5-lobed. Synflorescence a conical panicle, lower branches to 4 cm, very slender, often also on well-developed spreading lateral branches forming large, lax panicle. Capitula peduncle 0–5 mm. Involucre ovoid-campanulate or narrowly ovoid, 1–2 mm wide. Marginal female florets 3–6. Disk florets 4–8, male. Achenes obovoid. Fl. and fr. Aug–Oct.

• Dry slopes, roadsides, Gobi Desert margins. Gansu, N Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, N Shanxi.

1a. Involucre 1.5–2 mm in diam.; peduncles 0–2 mm ..... 159a. var. *gansuensis*
1b. Involucre ca. 1(–1.5) mm in diam.; peduncles 3–5 mm ..... 159b. var. *oligantha*

159a. Artemisia gansuensis var. **gansuensis**

甘肃蒿(原变种) gan su hao (yuan bian zhong)

Capitula: peduncle 0–2 mm. Involucre 1.5–2 mm in diam.

• Dry slopes, roadsides. Gansu, N Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, N Shanxi.

159b. Artemisia gansuensis var. **oligantha** Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 5(2): 10. 1985.

小甘肃蒿 xiao gan su hao

Capitula: peduncle 3–5 mm. Involucre 1(–1.5) mm in diam.

• Gobi Desert margins. S Nei Mongol.

160. Artemisia demissa Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 348. 1937.

纤杆蒿 xian gan hao

Oligosporus demissus (Krascheninnikov) Poljakov.

Herbs, annual or biennial, 5–20 cm, much branched; lower branches procumbent, yellowish pubescent or glabrescent. Lower stem leaves: petiole 0.5–1 cm; leaf blade oblong or ovate, 1–1.5 × 0.8–1.3 cm, 2-pinnatisect; segments 2 or 3; lobules narrowly linear-lanceolate or elliptic-lanceolate, 3–5 × ca. 1 mm, apex mucronulate. Middle and upper stem leaves

pinnatisect. Leaflike bracts linear, entire. Synflorescence a narrow, spikelike panicle. Involucre ovoid, 1.5–2 mm in diam.; phyllaries puberulent, sometimes glabrescent. Marginal female florets 10–19. Disk florets 3–8, male. Achenes obovoid. Fl. and fr. Jul–Sep. $2n = 18$.

Valleys, slopes, roadsides, grasslands, rocky hills; 2600–4800 m. Gansu, Nei Mongol, Qinghai, W Sichuan, Xinjiang, Xizang [Afghanistan, India, Tajikistan].

161. Artemisia macilenta (Maximowicz) Krascheninnikov, Mater. Istorii Fl. Rastitel'n. S.S.S.R. 2: 156. 1946.

细杆沙蒿 xi gan sha hao

Artemisia campestris Linnaeus var. *macilenta* Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 158. 1859; *A. desertorum* Sprengel var. *macilenta* (Maximowicz) Pampanini; *Oligosporus macilentus* (Maximowicz) Poljakov.

Herbs, perennial, or nearly subshrubs, 40–70 cm tall, puberulent, often glabrescent. Lower stem leaves: petiole 1–3 cm; leaf blade ovate or broadly ovate, 2–4 × 2–4 cm, 2-pinnatisect; segments 2 or 3 pairs. Middle and upper stem leaves ± sessile; leaf blade pinnatisect; segments 2 pairs; lobules 7–12(–15) × 0.3–0.5(–1) mm. Leaflike bracts linear, entire. Synflorescence a narrow panicle. Involucre ovoid or subglobose, 1–1.5(–2) mm in diam. Marginal female florets 3–6. Disk florets 4–8, male. Achenes obovoid. Fl. and fr. Aug–Oct.

Dry slopes, valleys, roadsides, forest margins, steppes, forest steppes; low to middle elevations. N Hebei, Nei Mongol, N Shanxi [E Russia].

162. Artemisia chienshanica Y. Ling & W. Wang, Acta Phytotax. Sin. 17(4): 89. 1979.

千山蒿 qian shan hao

Subshrubs, 25 cm tall or more, brown or yellowish tomentose or glabrescent. Lowermost leaves: petiole 1–3 cm; leaf blade ovate or obovate, 7–8 × 5–7.5 cm, 2- or 3-pinnatisect or -partite; segments 4(or 5) pairs; lobules (1 or)2 pairs, lanceolate, linear, or linear-lanceolate. Middle stem leaves: petiole 0.5–1 cm; leaf blade ovate or broadly ovate, 2-pinnatisect; segments 2 or 3(or 4) pairs; lobules narrowly linear or linear-lanceolate, 5–15 × 1–1.5 mm. Uppermost leaves and leaflike bracts pinnatisect or 3-sect. Synflorescence a broad, much-branched panicle. Involucre oblong, 1–1.5 mm in diam.; phyllaries revolute apically. Marginal female florets 5–7. Disk florets 5 or 6, male. Achenes oblong. Fl. and fr. Aug–Oct.

• Hills, slopes. Liaoning (Anshan, Qian Shan).

163. Artemisia capillaris Thunberg, Nova Acta Regiae Soc. Sci. Upsal. 3: 209. 1780.

茵陈蒿 yin chen hao

Artemisia capillaris var. *acaulis* Pampanini, p.p.; *A. capillaris* var. *arbuscula* Miquel; *A. capillaris* f. *glabra* Pampanini; *A. capillaris* var. *sacchalinensis* (Tilesius ex Besser) Pampanini; *A. capillaris* f. *sericea* (Nakai) Pampanini; *A. capillaris* var. *sericea* Nakai; *A. hallaisanensis* Nakai var. *formosana* Pampanini; *A. hallaisanensis* f. *parvula* Pampanini; *A. hallaisanensis* var. *philippinensis* Pampanini; *A. hallaisanensis* f. *swatowiana* Pampanini; *A. sacchalinensis* Tilesius ex Besser; *Oligosporus capillaris* (Thunberg) Poljakov.

Herbs, biennial or perennial, 30–80(–100) cm tall; rootstock vertical, woody; stems usually 1 to few, slender, erect, pale purplish or reddish brown, glabrous. Basal leaves silky hairy, shortly petiolate. Middle stem leaves almost sessile; leaf blade oblong-ovate, 2–4 × 1–2.5 cm, 1- or 2-pinnatisect; segments filiform, 8–12 × 0.3–0.5 mm, ± acute. Uppermost leaves and leaflike bracts simple, filiform with 1 or 2 basal auricles. Synflorescence a narrow to wide panicle, 10–30 × 5–15 cm; primary branches 8–20 cm, ascending, bearing 3–8 cm, ± patent secondary branches. Capitula many, shortly pedunculate to sessile, secund, approximate, nodding. Involucre ovoid, ca. 1.75–2.25 × 1–1.5 mm; phyllaries 3- or 4-seriate, laxly imbricate, glabrous; outermost ovate, ca. 0.75 mm, green with narrow membranous margin, ± acute; inner ones elliptic, ca. 1.25 mm, with broad membranous margin, obtuse. Receptacle conical, glabrous. Florets 8–12, yellow. Marginal female florets 3–5; corolla narrowly tubular, ca. 0.75 mm, 2-toothed. Disk florets 5–7, male; corolla narrowly conical, ca. 1.25 mm, 5-toothed, glandular. Achenes brown, oblong-ovate, ca. 0.8 mm.

Humid slopes, hills, terraces, roadsides, riverbanks; 100–2700 m. Anhui, Fujian, Guangdong, Guangxi, Hebei, E Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, E and S Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, Indonesia, Japan, Korea, Malaysia, Nepal, Philippines, E Russia, Vietnam].

Artemisia capillaris is well known as a source of diuretic and detoxifying medicines.

164. Artemisia morrisonensis Hayata, Icon. Pl. Formosan. 8: 63. 1919.

细叶山艾 xi ye shan ai

Subshrubs, 50–60 cm tall, puberulent, glabrescent. Lower stem leaf blades suborbicular or ovate-triangular, 3–4 × ca. 4 cm, 2(or 3)-pinnatisect. Middle stem leaves: petiole 1–2 cm; leaf blade 3–3.5 × 3–4 cm, 1(or 2)-pinnatisect; segments 2(or 3) pairs, 3-lobuled; lobules (10–)20–30 × 1–2 mm. Uppermost leaves and leaflike bracts 3–5-lobed. Synflorescence a narrow, racemelike panicle. Capitula shortly pedunculate or ± sessile. Involucre subglobose, 1.5–2 mm. Marginal female florets 11–15. Disk florets 4–16, male. Achenes ellipsoid. Fl. and fr. Jun–Nov. $2n = 34$*.

• Forest margins, roadsides, slopes; 300–2500 m. Taiwan.

165. Artemisia oligocarpa Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 137. 1908.

高山艾 gao shan ai

Artemisia borealis Pallas var. *oligocarpa* (Hayata) Kitamura.

Subshrubs, 15–35 cm tall, sericeous-pubescent or glabrescent. Leaves sericeous-pubescent or glabrescent. Lower and middle stem leaves: petiole 0.5–1 cm; leaf blade broadly ovate, 2.5–4.5 × 2.5–4.5 cm, 2(or 3)-pinnatisect; segments 2 or 3(or 4) pairs; lobules 3 or 5, linear or filiform, 4–10 × 0.5–1 mm. Up-

permost leaves and leaflike bracts 3- or 5-lobed. Synflorescence a racemelike panicle. Involucre hemispheric, 3(–4) mm in diam. Marginal female florets 10–15. Disk florets 11–18, male; corolla limb purple. Achenes obovoid. Fl. and fr. Jul–Nov. $2n = 18$*.

• Grasslands, high mountaintops; 2500–3800 m. Taiwan.

166. Artemisia scoparia Waldstein & Kitaibel, Descr. Icon. Pl. Hung. 1: 66. 1802.

猪毛蒿 zhu mao hao

Artemisia capillaris Thunberg subf. *angustisecta* Pampanini; *A. capillaris* f. *elegans* (Roxburgh) Pampanini; *A. capillaris* f. *kohatica* (Klatt) Pampanini; *A. capillaris* f. *myriocephala* Pampanini; *A. capillaris* var. *scoparia* (Waldstein & Kitaibel) Pampanini; *A. capillaris* subf. *tenuifolia* Pampanini; *A. capillaris* f. *villosa* Pampanini; *A. capillaris* f. *williamsonii* Pampanini; *A. elegans* Roxburgh; *A. kohatica* Klatt; *A. scoparia* var. *heteromorpha* Kitagawa; *A. scoparia* f. *sericea* Komarov; *A. scopariiformis* Popov; *Oligosporus scoparius* (Waldstein & Kitaibel) Poljakov.

Herbs, perennial, biennial, or annual, 40–90(–130) cm tall, much branched from lower on stem; branches and leaves gray or yellowish sericeous-pubescent, later glabrescent, strongly aromatic. Lower stem leaves: petiole 2–4 cm; leaf blade ovate-oblong or elliptic, 1.5–3.5 × 1–3 cm, 2- or 3-pinnatisect; segments 3 or 4 pairs; lobules 1 or 2 pairs, 3–5 × 0.2–1 mm. Middle stem leaves sessile; leaf blade oblong or ovate-oblong, 1–2 × 0.5–1.5 cm, 1- or 2-pinnatisect; segments 2 or 3 pairs; lobules filiform, usually curved, 4–8 × 0.2–0.3(–0.5) mm. Uppermost leaves and leaflike bracts 3–5-sect. Synflorescence a broad panicle. Capitula many, shortly pedunculate or sessile. Involucre subglobose, rarely ovoid, 1–1.5(–2) mm in diam. Marginal female florets 5–7. Disk florets 4–10, male. Achenes obovoid or oblong. Fl. and fr. Jul–Oct. $2n = 16, 18, 36$.

Slopes, forest margins, roadsides, steppes, terraces, desert margins, dry riverbeds; low elevations to 3200 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan, Zhejiang [Afghanistan, India, Japan, Korea, Pakistan, Russia, Thailand; C and SW Asia, Europe].

Artemisia scoparia is well known as an ingredient of diuretic and detoxifying medicines.

167. Artemisia stricta Edgeworth, Trans. Linn. Soc. London 20: 73. 1846.

直茎蒿 zhi jing hao

Herbs, annual or biennial, 10–40(–90) cm tall; branches ascending or diffuse, gray pubescent or glabrescent. Lowermost leaves: petiole 2–2.8 cm; leaf blade ovate or ovate-oblong, (1–)1.5–2.5(–3) × 1–2(–2.5) cm, 2- or 3-pinnatisect; middle stem leaves: petiole 0.5–1(–2) cm; leaf blade 1–2 × 0.5–0.8 cm, 2-pinnatisect; segments (3 or)4 pairs, 10–15 × 4–8 mm, 3-lobuled; lobules narrowly linear or narrowly linear-lanceolate, 2–3(–5) × (0.5–)1–1.5 mm. Uppermost leaves and leaflike bracts 1- or 2-pinnatisect, sessile. Synflorescence a very narrowly conical panicle, usually erect but sometimes with more spreading lateral panicles from lower nodes; branches up to 4 cm, erect or ascending, little branched; capitula remote or congested toward apices, mostly shorter than subtending bract. Capitula erect, subsessile or shortly pedunculate. Involucre subglobose or ovoid, 1.5–2.5 mm in diam.; outermost phyllaries glabrescent, margin narrowly hyaline-scarious, apex acute. Florets 20–25, yellow. Marginal female florets 10–20, with narrowly urceolate-tubular, 2-toothed corolla. Disk florets 3–5, functionally male. Achene brown, oblong to obovoid, 0.6–0.8 mm. Fl. and fr. Jul–Sep.

Dry slopes, roadsides, forest margins, valleys, waste areas, shrublands; 2200–4700 m. C Gansu, Qinghai, Sichuan, S Xinjiang, Xizang, Yunnan [Bhutan, N India, Nepal].

1a. Stem 20–40(–90) cm tall, erect; branches not diffuse ..... 167a. var. *stricta*
1b. Stem 10–20 cm tall, spreading; lower branches diffuse ..... 167b. var. *diffusa*

167a. Artemisia stricta var. **stricta**

直茎蒿(原变种) zhi jing hao (yuan bian zhong)

Artemisia edgeworthii Balakrishnan, nom. illeg. superfl.

Stem 20–40(–90) cm tall, erect; branches not diffuse.

Dry slopes, roadsides, forest margins, valleys, waste areas, shrublands; 2200–4700 m. C Gansu, Qinghai, Sichuan, S Xinjiang, Xizang, Yunnan [Bhutan, N India, Nepal].

"*Artemisia stricta* B. Heyne" (Candolle, Prodr. 5: 374. 1836) was merely cited as a synonym of *Cyathocline stricta* Candolle and was therefore not validly published (*Vienna Code*, Art. 34.1(c)).

167b. Artemisia stricta var. **diffusa** (Pampanini) Y. R. Ling & M. G. Gilbert, **comb. in stat. nov.**

披散直茎蒿 pi san zhi jing hao

Basionym: *Artemisia stricta* f. *diffusa* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 705. 1927; *A. edgeworthii* var. *diffusa* (Pampanini) Y. Ling & Y. R. Ling.

Stem 10–20 cm tall; lower branches diffuse and prostrate.

W Sichuan, E Xizang, W Yunnan [N India, Nepal].

168. Artemisia pewzowii C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 3. 1893.

纤梗蒿 xian geng hao

Herbs, annual, biennial, or perennial, (15–)40–50 cm tall, branching from most nodes, branches ascending, gray pubescent or glabrescent. Lower stem leaves: petiole 1.5–3.5 cm; leaf blade ovate, 2–3 × 1–1.5 cm, pubescent, 2-pinnatisect; segments 2 or 3 pairs, 3-lobuled; lobules linear-lanceolate to elliptic-lanceolate, 3–5 × 0.5–1 mm. Middle stem leaves sessile; leaf blade 1- or 2-pinnatisect; segments (1 or)2 or 3 pairs, 3–5-lobuled; lobules filiform, 5–10 × 0.3–0.5 mm. Uppermost leaves and leaflike bracts 3–5-sect. Synflorescence a narrow panicle; branches from all but lowest node, ascending; ultimate branches to ca. 1 cm, erect. Capitula almost contiguous; peduncle to 3 mm. Involucre ovoid, 1–1.5 mm in diam.; phyllaries glabrous. Marginal female florets ca. 15. Disk florets 3–8, male. Achenes small. Fl. and fr. Aug–Nov.

• Desert steppes, rocky and grassy slopes; 1000–3900 m. Qinghai, Xinjiang, Xizang.

169. Artemisia blepharolepis Bunge, Beitr. Fl. Russl. 164. 1852.

白莎蒿 bai suo hao

Herbs, annual, 20–60 cm tall, many branched, gray pubescent, fetid. Lower and middle stem leaves: petiole 0.5–3 cm; leaf blade ovate-oblong or oblong, 1.5–4 × 0.3–0.8 cm, densely gray pubescent, (1 or)2-pinnatisect; segments 5–8 pairs, ovate-oblong or subobovate, 3–5 × 2–3 mm, serrate to pinnatipartite; teeth 5–8 pairs, 0.3–0.8(–1.5) × 0.3–0.8 mm. Uppermost leaves and leaflike bracts pinnatipartite or entire, latter elliptic-lanceolate or lanceolate, few serrate. Synflorescence a broad, diffuse panicle. Capitula shortly pedunculate. Involucre ellipsoid or oblong-ellipsoid, 1.5–2 mm in diam.; phyllaries gray puberulent. Female florets 2 or 3. Disk florets 3–6, male. Achenes ellipsoid. Fl. and fr. Jul–Oct.

Dry slopes, grasslands, steppes, waste areas, roadsides, dunes near riverbanks; low elevations. Nei Mongol, Ningxia, N Shaanxi [Mongolia].

7. Artemisia sect. **Latilobus** Y. R. Ling, Acta Phytotax. Sin. 18: 512. 1980.

牡蒿组 mu hao zu

Herbs, perennial, or subshrubs, puberulent or pubescent, often glabrescent, without glandular or viscid hairs (sessile glands often present). Leaves 1- or 2-pinnatisect to -pinnatipartite or 3–7-subpalmatisect or -partite; lobules linear, lanceolate, elliptic, linear-lanceolate, or serrate, 1.5–4(–12) mm wide. Capitula globose to ovoid. Phyllary margins scarious. Receptacle glabrous. Marginal florets 2–15(–21); corolla tubular or narrowly conical, often slightly enlarged at base, 2- or 3-toothed. Disk florets 2–20(–30), male; ovaries usually absent, rarely minute; style shorter than corolla, 2-cleft, lobes usually not divergent, with apex clavate or funnelform.

Twenty-three species: Asia, Europe; 17 species (seven endemic) in China.

Many species contain aromatic compounds and sesquiterpenoids and/or limited monoterpenoids.

1a. Involucre 3–4 mm in diam.; marginal florets 10–15, disk florets 10–30.
2a. Lower stem leaf petioles 5–7 cm; blades 10–15 cm; disk florets 25–30 ..... 171. *A. bargusinensis*
2b. Lower stem leaf petioles to 3 cm; blades 2–5 cm; disk florets 10–20.
3a. Middle stem leaves spatulate or obovate-spatulate ..... 181. *A. nanschanica*
3b. Middle stem leaves ovate, ovate-oblong, or elliptic.
4a. Leaf blade pinnatisect; lower and middle leaves with petiole 1–3 cm; florets 21–30 ..... 170. *A. depauperata*
4b. Leaf blade ternately 3-partite (or -cleft); lower and middle leaves ± sessile; florets 33–40 ..... 184. *A. tridactyla*
1b. Involucre 1–2.5(–3.5) mm in diam.; marginal florets 2–9, disk florets 2–15.
5a. Lower and middle stem leaf blades widest above middle, spatulate or subspatulate, often with attenuate base, serrate at apex, entire or 3–5-cleft with much broader middle lobe.
6a. Middle stem leaves 2–6 cm wide.
7a. Middle stem leaves 5.5–8 × 4–6 cm; involucre 2–3 mm in diam. ..... 176. *A. littoricola*
7b. Middle stem leaves 2.5–4 × 2–4 cm; involucre 1.5–2(–3) mm in diam.
8a. Synflorescence a narrow, ± cylindric panicle ..... 177. *A. manshurica*
8b. Synflorescence a broad, ± conical panicle ..... 174. *A. eriopoda*
6b. Middle stem leaves 0.5–1.2(–2) cm wide.
9a. Basal leaves entire ..... 178. *A. japonica*
9b. Basal leaves 1- or 2-pinnatipartite or -pinnatisect.
10a. Middle stem leaves 2–3 cm, lobes 1–2 mm wide ..... 179. *A. parviflora*
10b. Middle stem leaves 1–1.5, lobes 3–4 mm wide ..... 180. *A. hancei*
5b. Lower and middle stem leaves widest at or below middle.
11a. Middle stem leaves 3–5(–7)-partite.
12a. Branches 15–35 cm or more, usually flexuous and horizontal; middle stem leaves 3–7 cm wide ..... 183. *A. dubia*
12b. Branches 8–14 cm, ascending; middle stem leaves 0.8–1.5 cm wide.
13a. Middle stem leaves with lobes 10–20 mm; leaflike bracts 3-partite; corolla limb glabrous ..... 185. *A. giraldii*
13b. Middle stem leaves with lobes 5–8(–10) mm; leaflike bracts linear or linear-lanceolate; corolla limb puberulent ..... 186. *A. conaensis*
11b. Middle stem leaves 1- or 2-pinnatisect or pinnatipartite.
14a. Rhizomes not shortly terete; middle stem leaves spatulate or attenuate, entire or obliquely 3–5-cleft, -partite, or -sect from apex to base, or leaves heteromorphic, spatulate or attenuate in sterile branches and 1(or 2)-pinnatisect or -partite ..... 175. *A. angustissima*
14b. Rhizomes shortly terete; sterile and middle stem leaves not spatulate or attenuate, middle leaves 1- or 2-pinnatisect.
15a. Stem, branches, leaves, and phyllaries densely gray and yellowish sericeous-pubescent, later sparsely pubescent; middle stem leaves with 2 or 3 pairs of lobes ..... 173. *A. duthreuil-de-rhinsi*

15b. Stem, branches, and leaves pubescent or glabrescent; middle stem leaves with 2 or 3 pairs of lobes.
16a. Middle stem leaves shortly petiolate, 1-pinnatipartite, or 2-pinnatipartite and then lobulate from mid-lateral lobes; capitula sparse ..... 172. *A. desertorum*
16b. Middle stem leaves sessile, 1- or 2-pinnatisect, segments 2 or 3 pairs, basal lobes lobulate or not; capitula many, dense ..... 182. *A. pengchuoensis*

170. Artemisia depauperata Krascheninnikov, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1949 (1–2): 3. 1949.

中亚草原蒿 zhong ya cao yuan hao

Artemisia pycnorrhiza Ledebour var. *depauperata* (Krascheninnikov) Poljakov.

Herbs, perennial, 8–18 cm tall, with a short, strong rhizome; upper parts sericeous-pubescent. Lower stem leaves: petiole 1–3 cm; leaf blade ovate or elliptic-ovate, 2–3(–4) × 1–2 cm, incanous pubescent, glabrescent, 1- or 2-pinnatisect; segments 3 or 4 pairs, elliptic or oblong-ovate, pinnately or 3-lobuled; lobules linear-lanceolate, lanceolate, or falcate, 3–6 × (0.5–)1–1.5 mm. Middle and upper stem leaves ± sessile; leaf blade ovate or ovate-oblong, pinnatisect; segments 2 or 3 pairs; lobes lanceolate. Leaflike bracts 3–5-sect or entire. Synflorescence a racemelike panicle. Capitula 2 or 3 per branch, shortly pedunculate. Involucre broadly ovoid, 3–4 mm in diam.; phyllaries glabrescent. Marginal female florets 11–15. Disk florets 10–15, male; corolla limb puberulent. Achenes ovoid. Fl. and fr. Jul–Oct. $2n = 36$.

Slopes, steppes; 2300–2600 m. N Xinjiang [Kazakhstan, Mongolia, Russia].

171. Artemisia bargusinensis Sprengel, Syst. Veg. 3: 493. 1826.

巴尔古津蒿 ba er gu jin hao

Artemisia borealis Pallas var. *willdenovii* Besser; *Oligosporus bargusinensis* (Sprengel) Poljakov.

Herbs, perennial, 20–50 cm tall, with thick rhizomes. Lower leaves ovate-oblong or oblong, 10–15 × 2–3 cm, 2-pinnatisect; segments 3 or 4 pairs; lobules linear-lanceolate, linear, or falcate, 10–15 × 1–2 mm. Middle stem leaves: petiole 5–7 cm; leaf blade oblong-ovate, 1- or 2-pinnatisect; segments 3(or 4) pairs. Uppermost leaves and leaflike bracts pinnatisect, 3-sect, or entire. Synflorescence a long, narrow panicle. Capitula sessile to shortly pedunculate toward base. Involucre broadly ovoid, 3–4 mm in diam. Marginal female florets 10–15. Disk florets 25–30, male. Achenes obovoid. Fl. and fr. Aug–Oct. $2n = 36$.

Slopes, grasslands, forest margins; middle elevations. Heilongjiang [Russia; Europe].

172. Artemisia desertorum Sprengel, Syst. Veg. 3: 490. 1826.

沙蒿 sha hao

Herbs, perennial, 10–70(–90) cm tall, with thick, woody, ± oblique rhizome, branched above, puberulent or glabrous. Basal and lower leaves: petiole 1–3 cm; leaf blade ovate, elliptic, oblong, or oblong-ovate, 2–5(–10) × 1.5–4.5 cm, 2(or 3)-pinnatisect or -partite; segments 2 or 3 pairs, elliptic or oblong, 10–15(–20) × 3–6 mm; lobules 3–5 pairs, linear, linear-lanceolate, or elliptic, 5–15(–20) × 1–1.5(–2) mm, apex acute. Middle stem leaves: petiole 1–3 cm, basally auriculate; leaf blade oblong or ovate, 1- or 2-pinnatipartite. Uppermost leaves 3–5-pinnatipartite; leaflike bracts 3-lobed or entire. Synflorescence a racemelike panicle, 15–20 × 5–6 cm; primary branches 6–10 cm, ± erect, secondary branches 1–1.5 cm, ascending. Capitula many, nodding. Involucre ovoid or subglobose, 1.5–3 mm in diam., shortly pedunculate or not; phyllaries glabrous, outer ovate, margin narrowly hyaline membranous. Receptacle convex, glabrous. Florets 12–16(–20). Marginal female florets 4–8. Disk florets 5–10(–12). Achene dark brown, obovoid or oblong, ca. 1 mm, finely striate. Fl. and fr. Aug and Oct. $2n = 36$.

Steppes, meadows, forest steppes, alpine and subalpine steppes, waste areas, rocky slopes, dry valleys, riverbanks, forest margins, roadsides, grasslands, in shrubs; low elevations to 4600 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [N India, Japan, Korea, Mongolia, Nepal, N Pakistan, E Russia].

1a. Plants 50–70(–90) cm tall; lobules elliptic or ovate-elliptic ..... 172a. var. *desertorum*
1b. Plants 10–20 cm tall; lobules linear or linear-lanceolate.
2a. Involucre 1.5–2 mm in diam. ... 172b. var. *tongolensis*
2b. Involucre (2–)2.5–3 mm in diam. ... 172c. var. *foetida*

172a. Artemisia desertorum var. **desertorum**

沙蒿(原变种) sha hao (yuan bian zhong)

Artemisia desertorum f. *latifolia* Pampanini, p.p.; *A. desertorum* var. *sprengeliana* Besser; *A. desertorum* var. *willdenowiana* Mattfeld; *A. japonica* Thunberg var. *desertorum* (Sprengel) Maximowicz; *Oligosporus desertorum* (Sprengel) Poljakov.

Plants 50–70(–90) cm tall. Basal leaves ovate, 2–3 cm, 2-pinnatipartite; lobules elliptic or ovate-elliptic. Involucre 2.5–3 mm in diam.

Steppes, meadows, forest steppes, alpine steppes, waste areas, rocky slopes, dry valleys, riverbanks, forest margins, roadsides; low elevations to 4000 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [N India, Japan, Korea, Mongolia, N Pakistan, E Russia].

172b. Artemisia desertorum var. **tongolensis** Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 651. 1927.

东俄洛沙蒿 dong e luo sha hao

Artemisia desertorum f. *glabra* Pampanini.

Stem 10–15 cm tall. Basal leaves elliptic, 3 cm or more, 2-pinnatisect; lobules linear or linear lanceolate. Involucre 1.5–2 mm in diam.

• Alpine or subalpine steppes, meadows, rocky slopes; 3500–4600 m. SW Gansu, W Sichuan, Xizang.

172c. Artemisia desertorum var. **foetida** (Jacquemont ex Candolle) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 55. 1988.

矮沙蒿 ai sha hao

Artemisia foetida Jacquemont ex Candolle, Prodr. 6: 98. 1838.

Stems clustered, less than 20 cm tall, shortly branched or not; most parts gray or yellowish pubescent. Middle stem leaves 1(or 2)-pinnatisect or -partite; segments linear. Synflorescence a racemelike panicle. Involucre (2–)2.5–3 mm in diam.; phyllaries brown, very thin.

• Alpine meadows, grasslands, gravelly slopes, in shrubs; 3500–4200 m. Qinghai, W Sichuan, Xizang.

173. Artemisia duthreuil-de-rhinsi Krascheninnikov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 22. 1922.

青藏蒿 qing zang hao

Oligosporus duthreuil-de-rhinsi (Krascheninnikov) Poljakov.

Herbs, perennial, 10–20(–30) cm tall, with a short thick rootstock, gray or yellowish pubescent, later sparsely pubescent. Lower stem leaves: petiole 1–2 cm; leaf blade ovate or oblong, 2–3 × 1.5–2 cm, 2-pinnatisect; segments 3 or 4 pairs, elliptic; lobules 3–5 pairs, lanceolate, 3–5 × 1–1.5 cm, apex obtuse. Middle and upper stem leaves: leaf blade ovate or oblong, pinnatisect; segments 2 or 3 pairs; lobes linear-lanceolate, 5–15 × 2–3 mm; leaflike bracts linear-lanceolate or falcate. Synflorescence a narrow panicle. Capitula dense, sessile. Involucre 2.5–3.5 mm in diam.; phyllaries densely pubescent or glabrescent. Marginal female florets 6–9. Disk florets 8–14, male. Achenes oblong or broadly ovoid. Fl. and fr. Jul–Oct.

• Alpine or subalpine steppes, meadows, rocky slopes; 3700–4600 m. Qinghai, W Sichuan, E Xizang.

174. Artemisia eriopoda Bunge, Enum. Pl. China Bor. 37. 1833.

南牡蒿 nan mu hao

Herbs, perennial, (30–)40–80 cm tall, much branched, with a short thick terete rootstock. Basal and lower stem leaves: petiole 1.5–3 cm; leaf blade suborbicular, broadly ovate, or obovate, 4–6(–8) × 2.5–6 cm, 1- or 2-pinnatisect to almost entire; segments 2 or 3(or 4) pairs, obovate or subspatulate, cleft or serrate at margin or leaves entire or few serrate, base attenuate. Middle stem leaves: blade suborbicular or broadly ovate, 2–4 × 2–4 cm, 1- or 2-pinnatisect or partite; lobes 2 or 3 pairs, elliptic or subspatulate, 3-partite or -cleft, serrate or entire apically. Uppermost leaves pinnatisect; lobes elliptic or lobules narrowly linear or narrowly lanceolate; leaflike bracts 3-lobed or entire. Synflorescence a broad panicle, main branches many, with short lateral branches. Capitula many, pedunculate. Involucre broadly ovoid or subglobose, 1.5–2.5 mm in diam. Marginal female florets 4–8. Disk florets 6–10, male. Achenes oblong. Fl. and fr. Jun–Nov.

Forest margins, roadsides, grasslands, shrublands, canyons, forest steppes, steppes, seashore dunes, waste areas, slopes, mountains; near sea level to 2100 m. Anhui, S and SW Gansu, Hebei, Henan, Hubei, Hunan, Jiangsu, Liaoning, Nei Mongol, S Shaanxi, Shandong, Shanxi, Sichuan, N Yunnan [Japan, Korea, E Mongolia].

1a. Stem more than (40–)50 cm tall; basal leaves broadly ovate, obovate, suborbicular, or obovate-attenuate, pinnatifid, distal lobe larger than laterals, or leaves entire, but serrate at apex, middle stem leaves pinnatisect, lobes serrate; capitula in broad, much-branched panicles.
  2a. Basal leaves broadly ovate or obovate, 1- or 2-pinnatisect ..... 174a. var. *eriopoda*
  2b. Basal leaves suborbicular or obovate-attenuate, entire, partite, or cleft at apex ..... 174c. var. *rotundifolia*
1b. Stem 30–40 cm tall; basal leaves divided, distal lobes not larger than other lobes; capitula in ± narrow panicles.
  3a. Leaves nearly succulent, lower leaves pinnatisect, segments regularly 3-cleft apically ..... 174b. var. *maritima*
  3b. Leaves papery, lower leaves pinnatisect, irregularly cleft, serrate, or entire.
    4a. Middle stem leaves pinnatisect, segments 2- or 3-cleft ..... 174d. var. *gansuensis*
    4b. Middle stem leaves 1- or 2-pinnatisect, lobules narrowly linear or narrowly linear-lanceolate ..... 174e. var. *shanxiensis*

174a. Artemisia eriopoda var. **eriopoda**

南牡蒿(原变种) nan mu hao (yuan bian zhong)

Artemisia capillaris Thunberg f. *grandiflora* Pampanini; *A. capillaris* var. *grandiflora* (Pampanini) Pampanini; *A. desertorum* Sprengel f. *latifolia* Pampanini, p.p.; *A. japonica* Thunberg f. *eriopoda* (Bunge) Pampanini; *A. japonica* var. *eriopoda* (Bunge) Komarov; *A. pubescens* Ledebour subsp. *eriopoda* (Bunge) Kitamura.

Stem more than (40–)50 cm tall. Leaves papery, basal leaves broadly ovate to obovate, 1- or 2-pinnatisect, distal lobe larger than laterals, lobes serrate. Synflorescence a broad, much-branched panicle.

Forest margins, roadsides, grasslands, shrublands, canyons, forest steppes, steppes; low elevations to 1500 m. Anhui, Hebei, Henan, Hubei, Hunan, Jiangsu, Liaoning, Nei Mongol, S Shaanxi, Shandong, Shanxi, Sichuan, N Yunnan [Japan, Korea, E Mongolia].

174b. Artemisia eriopoda var. **maritima** Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 6. 1988.

渤海滨南牡蒿 bo hai bin nan mu hao

Stem 30–40 cm tall. Leaves nearly succulent; lower leaves pinnatisect, distal lobes not larger than other lobes, segments regularly 3-cleft apically. Synflorescence a somewhat broad panicle.

• Seashore dunes; near sea level. E Shandong.

174c. Artemisia eriopoda var. **rotundifolia** (Debeaux) Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 56. 1988.

圆叶南牡蒿 yuan ye nan mu hao

Artemisia japonica var. *rotundifolia* Debeaux, Actes Soc. Linn. Bordeaux 31: 220. 1877; *A. japonica* subf. *elata* Pampanini; *A. japonica* f. *rotundifolia* (Debeaux) Franchet; *A. rotundifolia* (Debeaux) Krascheninnikov.

Stem 50–80 cm tall. Leaves papery, basal leaves suborbicular or obovate-attenuate, entire, cleft, or partite apically. Synflorescence a broad, much-branched panicle.

• Waste areas, roadsides, slopes. Hebei, N Jiangsu, Shandong.

174d. Artemisia eriopoda var. **gansuensis** Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 7. 1988.

甘肃南牡蒿 gan su nan mu hao

Stem 30–40 cm tall. Leaves papery; basal and middle leaves pinnatisect, distal lobes not larger than other lobes; lobes of basal leaves irregularly serrate or entire; those of middle leaves 2- or 3-cleft. Synflorescence a somewhat broad panicle.

• Roadsides, waste areas, slopes; low elevations to 2100 m. S and SW Gansu.

174e. Artemisia eriopoda var. **shanxiensis** Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 7. 1988.

山西南牡蒿 shan xi nan mu hao

Stem 30–40 cm tall. Leaves papery; lower leaves pinnatisect, irregularly cleft, serrate, or entire. Middle stem leaves 1- or 2-pinnatisect, distal lobes not larger than other lobes, lobules linear or narrowly linear-lanceolate, 15–30 × 1–1.5 mm. Synflorescence a narrow panicle.

• Mountains. C Shanxi.

175. Artemisia angustissima Nakai, Bot. Mag. (Tokyo) 29: 8. 1915.

狭叶牡蒿 xia ye mu hao

Artemisia japonica Thunberg subf. *angustissima* (Nakai) Pampanini; *A. japonica* var. *angustissima* (Nakai) Kitamura.

Herbs, perennial, 20–60 cm tall, stems few, slender and erect, branching from upper nodes, sparsely arachnoid pilose, ± glabrescent. Lower and middle stem leaves ± sessile; leaf blade ovate or suborbicular in outline, 1.5–2.2 × 1.5–2.2 cm, (1 or)2-pinnatisect; segments 2(or 3) pairs, 5–10 × 3–5 mm, partite or few serrate. Middle stem leaves pinnatisect; lobes linear or narrowly linear-lanceolate, 5–8(–10) × 0.8–3 mm, entire or few serrate. Uppermost leaves and leaflike bracts 3-sect or entire. Synflorescence a narrow panicle. Capitula shortly pedunculate or sessile, nodding. Involucre ovoid or subglobose, 1–1.5 mm in diam. Marginal female florets 2 or 3. Disk florets 2–5, male. Achenes obovoid. Fl. and fr. Aug–Oct.

Slopes, roadsides; low elevations to 500 m. S Gansu, Hebei, SE Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, S Shaanxi, Shandong, Shanxi [Korea].

176. Artemisia littoricola Kitamura, Acta Phytotax. Geobot. 5: 94. 1936.

滨海牡蒿 bin hai mu hao

Artemisia japonica Thunberg subsp. *littoricola* (Kitamura) Kitamura; *A. japonica* f. *resedifolia* Takeda; *A. japonica* f. *sachalinensis* Pampanini; *Oligosporus littoricola* (Kitamura) Poljakov.

Herbs, perennial, 30–100 cm tall, gray pubescent or glabrescent. Basal leaves forming a rosette; those of sterile shoots obovate, 5–10 × 3–5 cm, palmately to pinnately lobed. Lowest stem leaves ± sessile; leaf blade broadly ovate, suborbicular, or obovate, 3–5 × 3–5 cm, gray arachnoid pubescent, later glabrescent, deeply palmately lobed or 1(or 2)-pinnatipartite to -sect; segments 2(or 3) pairs, linear, 1.5–4 mm wide, base attenuate. Middle stem leaves oblong-attenuate or elliptic-spatulate, 5.5–8 × 4–6 cm, 1- or 2-pinnati- or subpalmatipartite or 3-partite; segments 1 or 2 pairs, serrate or cleft, base attenuate. Uppermost leaves and leaflike bracts elliptic-lanceolate or linear-lanceolate. Synflorescence a broad, conical panicle. Capitula shortly pedunculate. Involucre subglobose or broadly ovoid, 2–2.5(–3) mm in diam. Marginal female florets 4–8(–12); corolla 1–1.5 mm. Disk florets bisexual 5–7; corolla 2–2.5 mm, glabrous. Achenes ellipsoid-ovoid. Fl. and fr. Aug–Oct. $2n = 36$.

Riverbanks, saline-alkaline soils, in marsh grass. W Heilongjiang, E Nei Mongol [Japan, Korea, E Russia].

177. Artemisia manshurica (Komarov) Komarov in Komarov & Alissova-Klobukova, Key Pl. Far East. Reg. USSR 2: 1053. 1932.

东北牡蒿 dong bei mu hao

Artemisia japonica Thunberg var. *manshurica* Komarov, Fl. Manshur. 3: 625. 1907.

Herbs, perennial, 40–80(–100) cm tall, puberulent or glabrescent. Leaves on sterile branches spatulate or attenuate, 3–7 × 0.5–1.5 cm, apex obtuse, few cleft, or serrate. Lower leaves on fertile stems sessile; leaf blade obovate or obovate-spatulate, 5-partite, or serrate. Middle stem leaves sessile; leaf blade obovate or obovate-elliptic, 2.5–3.5 × 2–3 cm, pubescent or glabrescent, 1(or 2)-pinnati- or subpalmatisect or -partite; segments 1 or 2 pairs, narrowly spatulate or oblanceolate, 10–20 × 2–3 mm, 3-cleft or not. Uppermost leaves broadly attenuate or elliptic-obovate; leaflike bracts lanceolate or elliptic-lanceolate. Synflorescence a narrow panicle. Capitula shortly pedunculate. Involucre subglobose or broadly ovoid, 1.5–2 mm in diam. Marginal female florets 4–8. Disk florets 6–10, male. Achenes obovoid or ovoid. Fl. and fr. Aug–Oct. $2n = 36$*.

• Slopes, forest margins, steppes, forest steppes, shrublands, roadsides, canyons; low elevations. N Hebei, S Heilongjiang, Jilin, Liaoning, Nei Mongol.

178. Artemisia japonica Thunberg, Nova Acta Regiae Soc. Sci. Upsal. 3: 209. 1780.

牡蒿 mu hao

Herbs, perennial, 50–130 cm tall; rootstock 1.5–2.5 cm thick, woody, upper parts puberulent or glabrescent, strongly aromatic. Sterile stems 5–30 cm, leaves clustered at apex; leaf

blade spatulate, 3.5–8 × 1–3 cm, pinnately lobed, toothed, apex rounded. Basal and lower stem leaves ± sessile; leaf blade oblong-obovate to broadly spatulate or flabellate, (3–)4–6(–8) × (1–)2–2.5(–3) cm, puberulent or glabrescent, obliquely pinnatipartite or -cleft from apex to center, few serrate apically. Middle stem leaves: leaf blade spatulate, cuneate, or narrowly spatulate, 2.5–3.5(–4.5) × 0.5–1(–2) cm, obliquely partite or cleft and few serrate at apex or lobes linear. Uppermost leaves 3-cleft or entire; leaflike bracts elliptic, lanceolate, or linear-lanceolate. Synflorescence a ± narrow panicle, 15–20 × 3–15(–20) cm panicle; branches almost horizontal or obliquely patent, 3–20 cm. Capitula many, nodding, shortly to long pedunculate. Involucre ovoid or subglobose, 1.5–2.5 mm in diam.; phyllaries glabrous, outermost ovate, very narrowly white scarious on margin, apex acute. Florets 12–15(–20), yellow. Marginal female florets 3–8(–11); corolla narrow, 2-toothed. Disk florets 5–10, male. Achenes dark brown, 0.8–1 mm, obovoid. Fl. and fr. Jul–Nov. $2n = 18, 36, 37$.

Forest margins, waste areas, shrublands, hills, slopes, roadsides; low elevations to 3300 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Hainan, S Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, E and S Liaoning, S Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, E Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, N India, Japan, Korea, Laos, Myanmar, Nepal, Pakistan, Philippines, E Russia, Thailand, Vietnam].

1a. Middle stem leaf blades spatulate, apex truncate or obtuse, margin few serrate or obliquely cleft from middle to apex, lobes various but not linear .... 178a. var. *japonica*

1b. Middle stem leaf blades narrowly spatulate, margin not serrate toward apex, obliquely 3–5-partite or -sect, lobes linear ..... 178b. var. *hainanensis*

178a. Artemisia japonica var. **japonica**

牡蒿(原变种) mu hao (yuan bian zhong)

Artemisia cuneifolia Candolle; *A. glabrata* Wallich ex Besser; *A. japonica* subf. *intermedia* Pampanini; *A. japonica* var. *lanata* Pampanini; *A. japonica* f. *laxiflora* Nakai; *A. japonica* subf. *laxiflora* (Nakai) Pampanini; *A. japonica* var. *macrocephala* Pampanini; *A. japonica* var. *microcephala* Pampanini; *A. japonica* var. *myriocephala* Pampanini; *A. japonica* f. *silvestrii* Pampanini; *A. japonica* subf. *spatulata* Pampanini; *A. japonica* f. *vestita* Pampanini; *A. morrisonensis* Hayata var. *minima* Pampanini; *A. subintegra* Kitamura; *Chrysanthemum japonicum* Thunberg; *Oligosporus japonicus* (Thunberg) Poljakov.

Middle stem leaves spatulate, entire, obtuse or truncate, few serrate at apex or obliquely cleft from apex to center; lobes oblong or elliptic, not narrowly linear.

Forest margins, waste areas, shrublands, hills, slopes, roadsides; low elevations to 3300 m. Anhui, Fujian, S Gansu, Guangdong, Guangxi, Guizhou, S Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, E and S Liaoning, S Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, E Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, N India, Japan, Korea, Laos, Myanmar, Nepal, Philippines, E Russia, Thailand, Vietnam].

Artemisia japonica is used in the preparation of antitoxic and antifebrile medicines.

178b. Artemisia japonica var. **hainanensis** Y. R. Ling, Bull. Bot. Res., Harbin 8(4): 58. 1988.

海南牡蒿 hai nan mu hao

Middle stem leaves narrowly spatulate, obliquely 3–5-partite or -sect; lobes linear, rarely 3-serrate.

● Roadsides, waste areas. Guangxi, Hainan.

179. Artemisia parviflora Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 181. 1825.

西南牡蒿 xi nan mu hao

Artemisia japonica Thunberg var. *parviflora* (Buchanan-Hamilton ex D. Don) Pampanini; *A. japonica* subf. *tongtchouanensis* (H. Léveillé) Pampanini; *A. tongtchouanensis* H. Léveillé; *Oligosporus parviflorus* (Buchanan-Hamilton ex D. Don) Poljakov.

Herbs, perennial, or subshrubs, 40–80 cm tall, yellow or brown pubescent, sometimes glabrescent. Lower stem leaves: petiole 2–3 cm; leaf blade ovate or elliptic-ovate, 2–3 × 1.5–2 cm, 2-pinnatipartite or -sect; segments 2 or 3 pairs, elliptic or subspatulate, 15–25 × 5–10 mm, 2- or 3-partite; lobules lanceolate, or deeply serrate. Middle stem leaves ± sessile; leaf blade obovate-spatulate, flabellate, or cuneate, 2–3 × 0.5–1 cm, obliquely 3–5-partite or -sect; lobes linear, linear-lanceolate, or linear-oblanceolate, 5–10 × 1–2 mm, apex acuminate. Uppermost leaves 3-partite or entire; leaflike bracts linear or linear-lanceolate. Synflorescence a ± narrow panicle. Capitula many. Involucre ovoid or subglobose, 1–2 mm in diam. Marginal female florets 2–4. Disk florets 4–10, male. Achenes oblong. Fl. and fr. Aug–Oct. $2n = 18, 36$.

Grasslands, slopes, forest margins, roadsides, ravines, field margins; 400–4000 m. S Gansu, Guizhou, Henan, W Hubei, S Qinghai, S Shaanxi, Sichuan, Xizang, Yunnan [Afghanistan, Bhutan, India, Myanmar, Nepal, Sri Lanka].

180. Artemisia hancei (Pampanini) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 2(2): 39. 1982.

雷琼牡蒿 lei qiong mu hao

Artemisia hallaisanensis Nakai var. *hancei* Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 659. 1927.

Subshrubs, 30–50 cm tall, pubescent or glabrescent. Lower and middle stem leaves: petiole 1–2 cm; leaf blade ovate, obovate, obovate-spatulate, or spatulate, 1–1.5 × 0.7–1.2 cm, gray or yellowish and sericeous-pubescent, later sparsely pubescent or glabrescent, 1- or 2-pinnatipartite or -sect; segments 2 pairs, narrowly spatulate, oblanceolate, or falcate, 4–5 × 3–4 mm, apex usually 2- or 3-parted, rarely lobes of middle cauline leaves lanceolate or linear. Uppermost leaves and leaflike bracts 1(or 2)-pinnatisect; lobes narrowly linear or narrowly lanceolate, apex acute. Synflorescence a ± broad panicle. Capitula many. Involucre subglobose, 1.5–2 mm in diam. Marginal female florets 3–5. Disk florets 8–15, male. Achenes obovoid or oblong. Fl. and fr. Sep–Nov.

Seashore dunes; sea level to near sea level. S Guangdong, W Hainan [Vietnam].

181. Artemisia nanschanica Krascheninnikov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 19. 1922.

昆仑蒿 kun lun hao

Oligosporus nanschanicus (Krascheninnikov) Poljakov.

Herbs, perennial, 10–20(–30) cm tall, with horizontal rhizomes, with short fertile branches, gray or yellowish puberulent or glabrescent, fetid. Lower stem leaves: petiole 0.3–0.6 cm; leaf blade spatulate, obovate, or ovate, 1–2 × 0.5–1 cm, obliquely pinnati-subpalmatipartite or -cleft; lobes elliptic, oblong, or elliptic-lanceolate, 5–10 × 1–2 mm. Middle stem leaves sessile; leaf blade spatulate or obovate-spatulate, obliquely (2 or)3(or 4)-partite, rarely -sect; lobes elliptic or linear, 5–8 × 1(–2) mm. Uppermost leaves and leaflike bracts spatulate, obliquely 2- or 3-partite, -cleft, or entire. Synflorescence a narrow panicle. Capitula shortly pedunculate or sessile. Involucre subglobose or hemispheric, 3–3.5(–4) mm in diam. Marginal female florets 10–15. Disk florets 12–20, male. Achenes oblong or obovoid-oblong. Fl. and fr. Jul–Oct.

• Dry slopes, steppes, rocky terraces or slopes; 2100–5300 m. S Gansu, Qinghai, S Xinjiang, Xizang.

182. Artemisia pengchuoensis Y. R. Ling & S. Y. Zhao, Bull. Bot. Res., Harbin 5(2): 11. 1985.

彭错蒿 peng cuo hao

Herbs, perennial, 30–40 cm tall, puberulent. Lower stem leaves: petiole 1.5–2.5 cm; leaf blade ovate or oblong-ovate, 2–2.5 × 2–2.5 cm, puberulent or glabrescent, 2-pinnatisect; segments 2 pairs; lobules linear or linear-lanceolate, 3–4 × 1–1.5 mm, apex acute. Middle and upper stem leaves sessile; leaf blade ovate, 1- or 2-pinnatisect; segments 2 or 3 pairs, linear or linear-lanceolate, 3–4 × 2–2.5 mm, occasionally basal lobes lobulate; leaflike bracts 3–5-sect. Synflorescence a long, narrow panicle. Capitula closely spaced, shortly pedunculate or sessile. Involucre subglobose, 2–2.5(–3) mm in diam. Marginal female florets 3–8. Disk florets 7–15, male. Achenes obovoid. Fl. and fr. Aug–Oct.

• Roadsides; low to middle elevations. W Sichuan.

183. Artemisia dubia Wallich ex Besser, Tent. Abrot. 39. 1832.

牛尾蒿 niu wei hao

Subshrubs, 80–120(–180) cm tall, much branched; branches 15–35 cm or more, usually flexuous, pubescent or glabrescent. Leaves shortly petiolate to almost sessile, abaxially grayish green arachnoid hairy to subglabrous, adaxially green and white dotted with or without sparse T-shaped hairs. Lowermost leaves ovate or oblong, 5-partite. Middle stem leaves ovate, 5–12 × 3–7(–9) cm, 5-partite; lobes elliptic, oblong-lanceolate, or lanceolate, 30–80 × 5–12 mm, base attenuate. Uppermost leaves ternate, 3-partite; leaflike bracts entire, elliptic-lanceolate or lanceolate. Synflorescence a narrow to broad panicle, 15–30 × 10–20 cm; primary branches ascending to ± patent (upper), to 25 × 2–3 cm. Capitula many, almost sessile. Involucre broadly ovoid or globose, 1.5–2 mm in diam.; outer phyllaries sparsely arachnoid hairy, green, apex acute. Florets 8–20, purplish. Marginal florets 6–8; corolla basally broadened, 2-toothed. Disk florets 2–12, male; corolla tube glandular, apex very sparsely hairy. Achenes brown, oblong or obovoid, 1.25–1.5 mm. Fl. and fr. Aug–Oct. $2n = 34, 54$.

Slopes, steppes, riverbanks, roadsides, valleys, canyons, forest margins; low elevations to 3500 m. C and S Gansu, NW Guangxi, Guizhou, Hebei, S Henan, W Hubei, Nei Mongol, Ningxia, Qinghai, Shaanxi, W Shandong, Shanxi, Sichuan, E Xizang, Yunnan [Bhutan, India, Japan, Nepal, Thailand].

1a. Leaves abaxially persistently densely pubescent ..... 183a. var. *dubia*
1b. Leaves abaxially glabrescent ..... 183b. var. *subdigitata*

183a. Artemisia dubia var. **dubia**

牛尾蒿(原变种) niu wei hao (yuan bian zhong)

Artemisia dracunculus Linnaeus f. *thomsonii* Pampanini; *A. subdigitata* Mattfeld var. *thomsonii* (Pampanini) S. Y. Hu.

Leaf blades abaxially persistently densely pubescent.

Dry slopes, steppes, forest margins, roadsides; low elevations to 3500 m. S Gansu, Nei Mongol, W Sichuan, E Xizang, W Yunnan [Bhutan, India, Japan, Nepal, Thailand].

183b. Artemisia dubia var. **subdigitata** (Mattfeld) Y. R. Ling, Kew Bull. 42: 445. 1987.

无毛牛尾蒿 wu mao niu wei hao

Artemisia subdigitata Mattfeld, Repert. Spec. Nov. Regni Veg. 22: 243. 1926; *A. cannabina* Jacquemont ex Besser; *A. desertorum* Sprengel var. *jacquemontiana* (Besser) Candolle; *A. dracunculus* var. *inodora* Besser, p.p.; *A. dracunculus* f. *pinnata* Besser ex Pampanini; *A. dracunculus* var. *subdigitata* (Mattfeld) Pampanini; *A. jacquemontiana* Besser; *A. subdigitata* var. *falciloba* Mattfeld; *A. subdigitata* var. *intermedia* Kitagawa; *Oligosporus jacquemontianus* (Besser) Poljakov.

Leaf blades abaxially glabrescent.

Slopes, riverbanks, roadsides, valleys, canyons, forest margins; low elevations to 3000 m. C and S Gansu, NW Guangxi, Guizhou, Hebei, S Henan, W Hubei, S Nei Mongol, Ningxia, Qinghai, Shaanxi, W Shandong, Shanxi, Sichuan, Yunnan [Bhutan, N India, Nepal].

"*Artemisia wulingschanensis* Bar. et Skv." (Liou, Clav. Pl. Chin. Bor.-Orient. 393. 1959) belongs here but was not validly published because no Latin description or diagnosis, or reference to such, was provided (*Vienna Code*, Art. 36.1).

184. Artemisia tridactyla Handel-Mazzetti, Acta Horti Gothob. 12: 275. 1938.

指裂蒿 zhi lie hao

Herbs, perennial, or subshrubs, 7–60 cm tall, glabrescent; branches many, to 15 cm. Lower and middle stem leaves ± sessile; leaf blade elliptic, 2–5 × 2–3 cm, abaxially densely adpressed sericeous-pubescent except on veins, adaxially glabrous, ternately 3-partite(-cleft); lobes linear or linear-lanceolate, 20–25 × 2–4 mm, base attenuate, margin revolute. Uppermost leaves and leaflike bracts linear or linear-lanceolate, entire, 30–45 × 1–2.5 mm. Synflorescence a ± narrow conical simple panicle; lowermost ultimate branches to 7 cm; bracts linear, often longer than involucre. Capitula mostly widely spaced, sometimes in clusters of 2 or 3; peduncle to 6 mm. In-

volucre hemispheric or subglobose, 3–4 mm in diam. Marginal female florets 18–21. Disk florets 15–19, male. Achenes obovoid. Fl. Aug–Oct.

• Slopes, grasslands, forest margins; ca. 3800 m. S and W Sichuan, E Xizang.

1a. Stem 20–60 cm tall; middle stem leaves 4–5 cm, lobes 2–2.5 mm wide ..... 184a. var. *tridactyla*
1b. Stem 7–10 cm tall; middle stem leaves 2–4 cm, lobes 1–2 mm wide ..... 184b. var. *minima*

184a. Artemisia tridactyla var. **tridactyla**

指裂蒿(原变种) zhi lie hao (yuan bian zhong)

Stem 20–60 cm tall. Middle stem leaves 4–5 cm; lobes 2–2.5 mm wide.

• Slopes, grasslands, forest margins; ca. 3800 m. S Sichuan, E Xizang.

184b. Artemisia tridactyla var. **minima** Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 7. 1988.

小指裂蒿 xiao zhi lie hao

Stem 7–10 cm tall. Middle stem leaves 2–4 cm; lobes 1–2 mm wide.

• W Sichuan.

185. Artemisia giraldii Pampanini, Nuovo Giorn. Bot. Ital., n.s., 34: 657. 1927.

华北米蒿 hua bei mi hao

Subshrubs, 50–80(–120) cm tall, puberulent or glabrescent; branches 8–14 cm, obliquely ascending. Lowermost leaves ± sessile; leaf blade ovate or ovate-oblong, deeply 3(–5)-lobed or entire; lobes linear-lanceolate or -oblanceolate. Middle stem leaves: leaf blade elliptic, 2–3 × 0.8–1.5 cm, abaxially densely arachnoid pubescent, adaxially gray pubescent, ternately 3-partite; lobes linear or linear-lanceolate, 10–20 × 1–2 mm, margin revolute. Uppermost leaves and leaflike bracts 3-partite or entire. Synflorescence a lax panicle to 7 cm, lower branches to 3 cm, very slender, with flowering branches from upper nodes forming large compound panicle. Capitula shortly pedunculate or sessile. Involucre broadly ovoid, subglobose, or oblong, ca. 2 × 1.5–2 mm; phyllaries glabrous. Marginal female florets 4–8; corolla limb glabrous. Disk florets 5–7, male. Achenes obovoid. Fl. and fr. Jul–Oct.

• Terraces, slopes, dry river valleys, hills, roadsides, forest margins, forest steppes, shrublands; 1000–1200(–2300) m. Gansu, Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi, NW Sichuan.

1a. Middle stem leaves 3(or 5)-partite; capitula ± sessile ..... 185a. var. *giraldii*
1b. Middle stem leaves entire, rarely 3-partite; capitula peduncles 5–10 mm ..... 185b. var. *longipedunculata*

185a. Artemisia giraldii var. **giraldii**

华北米蒿(原变种) hua bei mi hao (yuan bian zhong)

Artemisia dracunculus Linnaeus f. *chinensis* Pampanini; *A. dracunculus* f. *falciloba* Pampanini; *A. dracunculus* f. *intermedia* Pampanini; *A. dracunculus* subf. *oblonga* Pampanini; *Oligosporus giraldii* (Pampanini) Poljakov.

Middle stem leaves 3(–5)-partite. Capitula ± sessile.

• Terraces, slopes, dry river valleys, hills, roadsides, forest margins, forest steppes, shrublands; 1000–1200(–2300) m. Gansu, Hebei, Nei Mongol, Ningxia, Shaanxi, Shanxi, NW Sichuan.

185b. Artemisia giraldii var. **longipedunculata** Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 7. 1988.

长梗米蒿 chang geng mi hao

Middle stem leaves usually entire, rarely 3-partite. Capitula pedunculate, peduncle 5–10 mm.

• Hebei, Nei Mongol.

186. Artemisia conaensis Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 511. 1980.

错那蒿 cuo na hao

Herbs, perennial, 30–80 cm tall, gray puberulent or glabrescent; branches 8–14 cm, ascending. Lower and middle stem leaves sessile; leaf blade elliptic, 5–20 × 1–1.5 cm, abaxially densely arachnoid pubescent, adaxially gray-black when dried, sparsely gray pubescent, 3–7-partite; lobes linear, linear-lanceolate, or elliptic-lanceolate, 5–8(–10) × 1–2(–3) mm, basal lobes usually lobulate; lobules elliptic. Uppermost leaves and leaflike bracts linear or linear-lanceolate. Synflorescence a ± narrow panicle. Capitula many. Involucre globose or hemispheric, 2–3 mm in diam. Marginal female florets 5–10; corolla limb puberulent. Disk florets 8–15, male. Achenes oblong or obovoid. Fl. and fr. Jul–Oct.

• Waste areas, terraces, rocky slopes; 3000–4000 m. E Xizang.

Artemisia conaensis is used medicinally.

152. SERIPHIDIUM (Besser ex Lessing) Fourreau, Ann. Soc. Linn. Lyon, sér. 2, 17: 89. 1869.

绢蒿属 juan hao shu

Lin Yourun (林有润 Ling Yeou-ruenn, Ling Yuou-ruen); Christopher J. Humphries, Michael G. Gilbert

Artemisia subg. *Seriphidium* Besser ex Lessing, Syn. Gen. Compos. 264. 1832 [*"Scriphida"*].

Shrubs or herbs, caespitose or solitary in annual herbs, strongly aromatic, sterile branched, tomentose, arachnoid pubescent, or glabrescent. Leaves alternate. Lowermost or middle stem leaves 2- or 3(or 4)-pinnatisect, -cleft, pectinately sect, or ternately 3-sect; lobes or lobules narrowly linear, or narrowly lanceolate, rarely filiform, elliptic, or pectinate. Uppermost leaves and leaflike bracts divided or entire. Capitula in narrow or broad panicles, rarely spicate panicles, sessile, ellipsoid or oblong, rarely ovoid, ovoid-campan-

ulate, or globose, heterogamous, disciform. Phyllaries in (3 or)4–6(or 7) series, densely pubescent or arachnoid pubescent. Bisexual florets (1–)3–12(–20); anther appendages linear or linear-lanceolate. Achenes ovoid or obovoid, subcompressed.

About 100 species: arid regions of C, S, and SW Asia (including Arabian peninsula), N Africa, Europe; 31 species (six endemic) in China.

Some species contain flavonoids and santonin; some are used for medicine.

Molecular data (Watson et al., BMC Evolutionary Biology; http://www.biomedcentral.com/1471-2148/2/17/; accessed 10 Apr 2011) show that the Old World members of *Seriphidium* s.s. form a well-defined monophyletic group embedded within Old World *Artemisia* s.l. The New World members (*A.* sect. *Tridentatae* L. M. Schultz) formed a polyphyletic group distributed among New World species of *Artemisia* and are here excluded from *Seriphidium* s.s.

1a. Lowermost leaves 2-ternately 3-sect, middle stem leaves ternately 3-sect (3. *S.* sect. *Juncea*) ..... 31. *S. junceum*
1b. Lowermost and middle stem leaves pinnatisect or pinnatipartite.
2a. Leaves 2(or 3)-sect, lobules pectinate or narrowly serrate (2. *S.* sect. *Minchunensia*) ..... 30. *S. minchunense*
2b. Leaves 1–3(or 4)-pinnatisect, lobules narrowly lanceolate or filiform or leaves entire or lobes with orbicular serrations (1. *S.* sect. *Seriphidium*).
3a. Leaves 1- or 2-pinnatipartite, lobes or lobules elliptic or ovate-elliptic, less than 5 mm, or leaves pinnatisect, lobes orbicular-serrate, or partly entire.
4a. Middle stem leaves 1(or 2)-pinnatipartite, segments 3 or 4 pairs, lobes or lobules elliptic or ovate, occasionally margins 2- or 3-toothed ..... 8. *S. scopiforme*
4b. Middle stem leaves pinnatifid, segments 10(–15) pairs, orbicularly lobed or leaves linear and entire ..... 23. *S. santolinum*
3b. Leaves 1–3-pinnatisect, lobules 5–8 mm.
5a. Stems caespitose, less than 25 cm tall; capitula densely spaced along branches forming short spicate or compound capitate synflorescences.
6a. Vegetative parts white tomentose; phyllaries densely gray tomentose ..... 25. *S. rhodanthum*
6b. Vegetative parts gray arachnoid tomentose or pubescent, or sometimes yellowish puberulent, sometimes partly glabrescent; phyllaries pubescent to densely arachnoid pubescent.
7a. Phyllaries gland-dotted ..... 24. *S. borotalense*
7b. Phyllaries not gland-dotted.
8a. Vegetative parts yellowish puberulent; leaf blade 0.5–0.8 cm ..... 27. *S. grenardii*
8b. Vegetative parts gray arachnoid tomentose or pubescent; leaf blade 1.5–3.5(–4) cm.
9a. Stems much branched and caespitose; lowermost leaves 1- or 2-pinnatisect, or subpalmately 2- or 3-pinnatisect ..... 26. *S. korovinii*
9b. Stems less branched, not largely caespitose; lowermost leaves 2- or 3-pinnatisect.
10a. Lowermost leaves ovate, 2- or 3-pinnatisect, segments (3 or)4 or 5(or 6) pairs, lobules 2–3(–4) mm, apex obtuse ..... 28. *S. compactum*
10b. Lowermost leaves suborbicular, (2 or)3-pinnatisect, segments (2 or)3 or 4 pairs, lobules 3–4 mm, apex acute ..... 29. *S. lehmannianum*
5b. Branches long or short; capitula spreading on branches, in narrow or broad panicles.
11a. Lowermost leaves 2- or 3-pinnatisect; middle stem leaves 1–3-pinnatisect.
12a. Branches less than 3 cm; stem, branches, and leaves arachnoid pubescent, later glabrescent; middle stem leaves with 2–5 pairs of segments; capitula in narrow panicles.
13a. Stems laxly caespitose; stem and branches arachnoid pubescent or glabrescent; middle stem leaves with (3 or)4 or 5 pairs of segments, not gland-dotted; phyllaries convex ..... 6. *S. karatavicum*
13b. Stems densely caespitose; stem and branches pubescent, later glabrescent; middle stem leaves with 2 or 3 pairs of segments, gland-dotted; phyllaries keeled ..... 17. *S. gracilescens*
12b. Branches more than (3–)5 cm; stem, branches, and leaves arachnoid tomentose or pubescent, or lower parts pubescent; middle stem leaves with 4–6 pairs of segments; capitula in broad or narrow and elongated panicles.
14a. Lower and middle stem leaves less than 2.5 cm; branches spreading.
15a. Synflorescence a narrow or somewhat broad panicle; capitula usually in groups of 2 or 3 along branchlets, ovoid-oblong or ellipsoid, ca. 2 mm in diam. ..... 13. *S. brevifolium*
15b. Synflorescence a broad, much-branched panicle; capitula solitary, subglobose, 2.5–3 mm in diam. ..... 14. *S. thomsonianum*

14b. Lower and middle stem leaves more than 2.5 cm; branches ascending.
16a. Stem arachnoid tomentose; lower leaves broadly ovate or ovate-oblong, middle stem leaf lobules 2–4 mm ..... 1. *S. schrenkianum*
16b. Stem densely tomentose or pubescent, later partly glabrescent; lower leaves elliptic-ovate or ovate-oblong, middle stem leaf lobules more than 5 mm.
17a. Stem, branches, leaves, and phyllaries arachnoid tomentose or pubescent, but stem and phyllaries glabrescent at anthesis; branches more and spreading; capitula ellipsoid or oblong, in broad or somewhat broad panicles ..... 5. *S. mongolorum*
17b. Stem, branches, leaves, and phyllaries arachnoid pubescent or tomentose, hairs present or glabrescent in lower stem at anthesis; branches from middle to above on stem; capitula oblong, oblong-ovoid, or ovoid, in somewhat broad, elongated, or narrow panicles.
18a. Middle stem leaves (1 or)2-pinnatisect, lobules 1–1.5 mm wide; capitula 2–2.5 mm in diam., in narrow or somewhat broad panicles ..... 4. *S. finitum*
18b. Middle stem leaves 2- or 3-pinnatisect, lobules 0.5–1mm wide; capitula 1–2 mm in diam., at upper part of stem in somewhat broad panicles.
19a. Rootstock thick, lower bark peeling; middle stem leaves pinnatisect, segments 4 or 5 pairs; phyllaries strongly convex ..... 2. *S. transiliense*
19b. Root solitary, lower bark not peeling; middle stem leaves (2 or)3-pinnatisect, segments 5 or 6 pairs; phyllaries ± flat ..... 7. *S. sawanense*

11b. Lowermost leaves 1- or 2-pinnatisect, middle stem leaves 1- or 2-pinnatisect.
20a. Capitula 2–2.5 mm; branches from middle part of stem, spreading, 10–15 cm; panicles broad, conical ..... 16. *S. ferganense*
20b. Capitula less than 3 mm in diam.; branches from upper part of stem, less than 10 cm, or if from lower stem then short or more than 10 cm; panicles broad or narrow.
21a. Middle stem leaves pinnatisect, segments 1 or 2(or 3) pairs; phyllaries and florets deciduous after anthesis ..... 9. *S. kaschgaricum*
21b. Middle stem leaves 1-pinnatisect, or 2-pinnatisect and then with segments (2 or)3–5; phyllaries and florets persistent after anthesis.
22a. Stems many and thickly caespitose, branches 2–3(–5) cm, ascending; lobes and lobules of leaves deciduous or nearly deciduous.
23a. Branches from middle part of stem, ascending; leaves persistent after anthesis; middle stem leaves with 3 or 4 pairs of segments, lobes or lobules needlelike, more than 3 mm, central lobes 4–12 mm.
24a. Stem 30–45 cm tall, branches 2–4(–5) cm; lowermost leaves 2-pinnatisect, middle stem leaves 1- or 2-pinnatisect; capitula in narrow or somewhat broad panicles ..... 21. *S. sublessingianum*
24b. Stem 5–25(–35) cm tall, branches 1–2(–3) cm; lower leaves 1(or 2)-pinnatisect, middle stem leaves 1(or 2)-pinnatisect; capitula in narrow, spikelike panicles ..... 22. *S. amoenum*
23b. Branches from upper part of stem, spreading or ascending; leaves deciduous or semideciduous after anthesis; middle stem leaves with 2–5 pairs of segments, central lobes 2–3 mm.
25a. Stem, branches, and leaves densely tomentose or pubescent; leaves with (3 or)4 or 5 pairs of segments, semideciduous after anthesis; capitula in dense narrow pyramidal panicles ..... 19. *S. semiaridum*
25b. Stem, branches, and leaves densely arachnoid tomentose or pubescent; leaves with 3 or 4(or 5) pairs of segments, deciduous after anthesis; capitula in loose somewhat broad panicles on upper stem.
26a. Branches from upper stem, 2–3(–5) cm; lower leaves ovate, 1–2(–3) × 0.8–1 cm; capitula in loose somewhat broad panicles ..... 18. *S. terrae-albae*

26b. Branches from upper stem, 5–8 cm; lower leaves ovate-oblong or elliptic-ovate, 2–2.5 × 1–1.5 cm; capitula in somewhat broad and elongated panicles ..... 20. *S. heptapotamicum*

22b. Stems few or several, not thickly caespitose; branches more than (3–)5 cm; lobes or lobules not deciduous.

27a. Branches ascending from upper part of stem; middle stem leaves with (3 or)4 or 5 pairs of segments.

28a. Stem, branches, leaves, and phyllaries gray puberulent or glabrescent; capitula in groups of 3–5 along branches ..... 15. *S. aucheri*

28b. Stem, branches, leaves, and phyllaries arachnoid pubescent, later partly glabrescent; capitula uniformly distributed along branches .... 3. *S. nitrosum*

27b. Branches ascending or spreading from middle or lower parts of stem; middle stem leaves with (2 or)3 or 4 pairs of segments.

29a. Lowermost leaves 3–6 × 1.5–4.5 cm; capitula in dense narrow panicles ..... 12. *S. cinum*

29b. Lowermost leaves 1–3 × 0.5–2(–2.5) mm; capitula in sparse narrow panicles.

30a. Branches spreading from lower stem; capitula in somewhat broad or narrow panicles ..... 11. *S. issykkulense*

30b. Branches ascending from middle of stem; capitula in narrow elongated panicles ..... 10. *S. fedtschenkoanum*

1. Seriphidium sect. Seriphidium

绢蒿组 juan hao zu

Herbs, perennial, or subshrubs, tomentose or glabrescent. Leaves 1–3(or 4)-pinnatisect, -partite, or entire.

About 85 species: arid regions of C, S, and SW Asia, N Africa, C, E, S, and W Europe; 29 species (five endemic) in China.

1. Seriphidium schrenkianum (Ledebour) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 172. 1961.

草原绢蒿 cao yuan juan hao

Artemisia schrenkiana Ledebour, Fl. Ross. 2: 575. 1845.

Herbs, perennial, with a strong stock, 30–50(–60) cm tall, densely gray and arachnoid tomentose. Lowermost leaves: petiole 2–4 cm; leaf blade broadly ovate or ovate-oblong, 3–6 × 1.5–2.5 cm, arachnoid tomentose, 2- or 3-pinnatisect; segments 4 or 5(or 6) pairs; lobules 2–6 × 1–1.5 mm, obtuse apically. Middle stem leaves 2-pinnatisect. Uppermost leaves and leaflike bracts pinnatisect. Synflorescence a broad or somewhat broad panicle. Involucre oblong or ellipsoid-oblong, 1.5–2(–2.5) mm in diam.; phyllaries densely gray tomentose. Florets 5 or 6. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Desert steppes, steppes, meadow steppes, waste areas, riverbanks, lakeshores, terraces, canyons, saline-alkaline soils, dunes; 100–1000 m. E Xinjiang [Kazakhstan, Mongolia, Russia].

2. Seriphidium transiliense (Poljakov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 174. 1961.

伊犁绢蒿 yi li juan hao

Artemisia transiliensis Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 417. 1954.

Subshrubs, with a thick rootstock, 40–80 cm tall, densely gray or greenish arachnoid tomentose, later glabrescent, lower bark brown, usually peeling off. Lowermost leaves: petiole 2–3.5 cm; leaf blade oblong, 3.5–6 × 2.5–5 cm, gray arachnoid pubescent, 2(or 3)-pinnatisect; segments 4 or 5(or 6) pairs; lobules narrowly linear or narrowly linear-lanceolate, 4–8 × 0.5–1 mm, mucronulate apically. Middle stem leaves 1- or 2-pinnatisect. Upper leaves pinnatisect; leaflike bracts linear, entire. Synflorescence a dense, narrow, elongated panicle. Capitula ± sessile. Involucre oblong-ellipsoid or oblong, 1–2 mm in diam.; phyllaries strongly convex, densely pubescent. Florets 3–5; corolla limb red or yellow. Achenes obovoid. Fl. and fr. Aug–Oct.

Slopes, canyons, rocky hills, riverbanks, steppes, roadsides; low to middle elevations. N Xinjiang [Kazakhstan].

3. Seriphidium nitrosum (Weber ex Stechmann) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 172. 1961.

西北绢蒿 xi bei juan hao

Herbs, perennial, or subshrubs, arachnoid pubescent or partly glabrescent; flowering stems 5–50 cm tall; root solitary; upper parts with spreading branches. Lower leaves 3–7 cm overall: petiole long; leaf blade ovate-oblong or elliptic-lanceolate, 30–40 × 5–20 mm, (1 or)2-pinnatisect; segments 4 or 5 pairs; lobules narrowly linear, 3–5 × 0.3–0.8 mm. Middle stem leaves 1- or 2-pinnatisect. Upper leaves pinnatisect; leaflike bracts linear, entire, rarely pinnatisect. Synflorescence a somewhat broad to slender, cylindric panicle. Capitula remote or grouped along branches, sessile. Involucre cylindric or ovoid-cylindric, 1.5–2 mm in diam.; phyllaries densely arachnoid pubescent, later sparsely pubescent or glabrescent. Florets 3–6; corolla purple-pink or yellow. Achenes obovoid. Fl. and fr. Aug–Oct.

Desert or semidesert steppes, Gobi Desert, rocky slopes, dry canyons, dry riverbanks, roadsides, terraces, saline-alkaline soils; low ele-

vations to 1500 m. NW Gansu, W Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia].

1a. Stem 40–50 cm; lower leaves 2-pinnatisect; capitula dispersed along branches in somewhat broad elongated panicles ..... 3a. var. *nitrosum*
1b. Stem 5–10(–15) cm; lower leaves 1- or 2-pinnatisect; capitula grouped along branches in spikelike panicles ..... 3b. var. *gobicum*

3a. Seriphidium nitrosum var. **nitrosum**

西北绢蒿(原变种) xi bei juan hao (yuan bian zhong)

Artemisia nitrosa Weber ex Stechmann, Artemis. 24. 1775; *A. humilis* M. Bieberstein (1798), not Miller (1768); *A. lercheana* Weber ex Stechmann var. *gmeliniana* (Besser) Candolle, p.p.; *A. maritima* f. *gmeliniana* (Besser) Ledebour, p.p.; *A. maritima* subsp. *gmeliniana* (Besser) Krascheninnikov, p.p.; *A. maritima* var. *gmeliniana* Besser, p.p.; *A. maritima* f. *humilis* Ledebour.

Stem 40–50 cm tall. Lowermost leaves 2-pinnatisect, somewhat glabrescent. Synflorescence a somewhat broad elongated panicle. Capitula dispersed along branches.

Gobi Desert, rocky slopes, dry canyons, dry riverbanks, roadsides, terraces, saline-alkaline soils; low elevations to 1500 m. NW Gansu, W Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia].

3b. Seriphidium nitrosum var. **gobicum** (Krascheninnikov) Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 114. 1988.

戈壁绢蒿 ge bi juan hao

Artemisia mongolorum Krascheninnikov subsp. *gobica* Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 350. 1937; *A. gobica* (Krascheninnikov) Grubov; *A. mongolorum* var. *salsuginosa* Krascheninnikov; *A. nitrosa* var. *gobica* (Krascheninnikov) Poljakov; *A. schischkinii* Krascheninnikov.

Stem 5–15 cm tall. Lowermost leaves 1- or 2-pinnatisect, persistently grayish tomentose pubescent. Synflorescence a narrow spikelike panicle. Capitula in groups along branches.

Desert or semidesert steppes, Gobi Desert, saline-alkaline soils. Xinjiang [Kazakhstan, Mongolia, Russia].

4. Seriphidium finitum (Kitagawa) Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 513. 1980.

东北蒿 dong bei hui hao

Artemisia finita Kitagawa, Rep. Inst. Sci. Res. Manchoukuo 6: 124. 1942.

Subshrubs, 50–60 cm tall, densely gray arachnoid pubescent. Lower stem leaves: petiole 2–5 cm; leaf blade oblong or ovate-oblong, 2–3(–5) × 1.2–2 cm, grayish arachnoid pubescent, 2- or 3-pinnatisect; segments (3 or)4 or 5 pairs; lobules 2 or 3 pairs, narrowly lanceolate, 3–13 × 1–1.5 mm, obtuse apically. Middle stem leaves ± sessile; leaf blade ovate or ovate-oblong, (1 or)2-pinnatisect; lobules narrowly linear or narrowly linear-lanceolate. Upper leaves and leaflike bracts 3-lobed or entire. Synflorescence a narrow or somewhat broad panicle. Involucre oblong-obovoid or oblong, 2–2.5 mm in diam.; phyllaries gray pubescent. Florets 3–9(–13). Achenes obovoid. Fl. and fr. Aug–Oct.

• Rocky slopes, semidesert steppes, riverbanks, lakeshores, meadows. E Nei Mongol.

5. Seriphidium mongolorum (Krascheninnikov) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 115. 1988.

蒙青绢蒿 meng qing juan hao

Artemisia mongolorum Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 350. 1937.

Subshrubs, 30–45 cm tall, gray tomentose, later partly glabrescent. Lower stem leaves: petiole 15–25 mm; leaf blade elliptic or ovate-oblong, 3–4 × 2–3 cm, densely incanous tomentose, later sparsely tomentose or glabrescent, 2(or 3)-pinnatisect; segments 4 or 5 pairs; lobules linear or lanceolate, 2–3 × 1–1.5 mm. Middle stem leaves 1- or 2-pinnatisect; lobules narrowly linear, ca. 1 mm wide. Upper leaves and leaflike bracts pinnatisect or 3-lobed. Synflorescence a somewhat broad elongated panicle. Involucre ellipsoid or oblong, 2–3 mm in diam.; phyllaries pubescent. Florets 3–6. Achenes obovoid. Fl. and fr. Aug–Oct.

Desert or semidesert steppes, rocky slopes, Gobi Desert; 1100–2700 m. Nei Mongol, N Qinghai [SW Mongolia].

6. Seriphidium karatavicum (Krascheninnikov & Abolin ex Poljakov) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 115. 1988.

卡拉套绢蒿 ka la tao juan hao

Artemisia karatavica Krascheninnikov & Abolin ex Poljakov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 16: 396. 1954.

Subshrubs, 35–60(–70) cm tall, with a thick rootstock, densely gray tomentose, later partly glabrescent. Lower stem leaves ± sessile; leaf blade ovate, 2.5–3(–5) × 1.5–2 cm, incanous arachnoid tomentose, 2- or 3-pinnatisect; segments (3 or)4 or 5 pairs; lobules linear or linear-lanceolate, [40–60(–80) × 5–10 mm,] acute apically. Middle stem and upper leaves 1- or 2-pinnatisect; leaflike bracts narrowly linear. Synflorescence a narrow panicle. Involucre ellipsoid-ovoid, 1.5–2 mm in diam.; phyllaries gray arachnoid tomentose or glabrescent. Florets 3–7. Achenes ovoid or obovoid. Fl. and fr. Sep–Oct.

Rocky slopes: low elevations. NW Xinjiang [Kazakhstan].

7. Seriphidium sawanense Y. R. Ling & Humphries, Bull. Bot. Res., Harbin 10(1): 49. 1990.

沙湾绢蒿 sha wan juan hao

Subshrubs, 40–60 cm tall, silvery tomentose. Lower and middle stem leaves: petiole 3–6 mm; leaf blade ovate-elliptic or oblong, 3–4.5 × 1–2.5 cm, 3-pinnatisect; segments 5 or 6 pairs; lobules linear, 2.5–3.5 × ca. 0.5 mm. Upper leaves 2(or 3)-pinnatisect; leaflike bracts 1- or 2-pinnatisect. Synflorescence a narrow panicle. Involucre oblong, 1–1.5 mm in diam.; phyllaries densely silvery pubescent. Florets 3–5. Achenes obovoid. Fl. and fr. Aug–Oct.

• Gobi Desert, semidesert steppes; low elevations to 1500 m. N Xinjiang.

8. Seriphidium scopiforme (Ledebour) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 172. 1961.

帚状绢蒿 zhou zhuang juan hao

Artemisia scopiformis Ledebour, Fl. Ross. 2: 575. 1845 [*"scopaeformis"*]; *A. scopiformis* f. *longiracemosa* Poljakov.

Herbs, perennial, 20–40(–50) cm tall, forming compact tussocks, gray arachnoid pubescent, later glabrescent. Lower and middle stem leaves: petiole 0.5–1 cm; leaf blade elliptic or ovate-elliptic, 1.5–3 × 0.5–1 cm, gray arachnoid pubescent, later glabrescent, 1(or 2)-pinnatipartite; segments 3 or 4 pairs, elliptic or ovate, margin 2 or 3-toothed. Upper leaves and leaflike bracts pinnatipartite, 3-partite, or entire. Synflorescence a somewhat broad conical panicle. Involucre ovoid or oblong, 2–3 mm in diam.; phyllaries gray arachnoid pubescent. Florets 3–5. Achenes obovoid. Fl. and fr. Aug–Oct.

Gobi Desert. E and N Xinjiang [Kazakhstan].

9. Seriphidium kaschgaricum (Krascheninnikov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 175. 1961.

新疆绢蒿 xin jiang juan hao

Subshrubs, 30–35 cm tall, with vertical woody rootstock, branching from lower parts, branches slender, erect, densely arachnoid pubescent or glabrescent. Lower and middle stem leaves: petiole 5–8 mm; leaf blade elliptic or oblong-ovate, 1.5–2 × 1–1.5 cm, stiff, arachnoid pubescent or ± glabrescent, 1- or 2-pinnatisect; segments 2 or 3 pairs; lobes or lobules 1–5 × 0.5–1.5(–2) mm. Uppermost leaves and leaflike bracts linear, entire. Synflorescence a ± broad conical to ovoid panicle. Capitula ± dense or spreading along branches, sessile or shortly pedunculate. Involucre oblong-obovoid or ovoid-ellipsoid, 2–3 mm in diam., base ± cuneate; phyllaries recurved, arachnoid pubescent, later glabrescent. Florets 4–6; corolla purple-red. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Slopes, Gobi Desert, dry valleys, rocky hills, roadsides; low elevations to 1200 m. N Xinjiang [Kazakhstan].

1a. Lobules of leaves 3–5 mm; capitula spreading along branches ..... 9a. var. *kaschgaricum*
1b. Lobules of leaves 1–3 mm; capitula ± dense along branches ..... 9b. var. *dshungaricum*

9a. Seriphidium kaschgaricum var. **kaschgaricum**

新疆绢蒿(原变种) xin jiang juan hao (yuan bian zhong)

Artemisia kaschgarica Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 350. 1937.

Lobules of leaves 3–5 mm. Synflorescence a broad and ovoid panicle. Capitula spreading along branches.

Slopes, Gobi Desert, dry valleys, rocky hills, roadsides; low elevations to 1200 m. N Xinjiang [Kazakhstan].

9b. Seriphidium kaschgaricum var. **dshungaricum** (Filatova) Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 116. 1988.

准噶尔绢蒿 zhun ga er juan hao

Artemisia kaschgarica var. *dschungarica* Filatova, Fl. Kazakhst. 9: 128. 1966.

Lobules of leaves 1–3 mm. Capitula ± dense along branches and in somewhat broad panicles.

• N Xinjiang.

10. Seriphidium fedtschenkoanum (Krascheninnikov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 176. 1961.

苍绿绢蒿 cang lü juan hao

Artemisia fedtschenkoana Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 351. 1937.

Herbs, perennial, 15–35 cm tall, gray pubescent or glabrescent. Lower stem leaves: petiole 5–15 mm; leaf blade ovate or elliptic, 1.5–3 × 1–2(–2.5) cm, pubescent, 2-pinnatisect; segments 2 or 4 pairs; lobules linear or linear-lanceolate, distal lobules 4–6, lateral lobules 2–3 × 0.3–0.8 mm, apex mucronulate. Middle stem leaves pinnatisect. Upper leaves and leaflike bracts linear, entire. Synflorescence a long narrow panicle. Involucre ovoid-oblong or ovoid, 1.5–2 mm in diam.; phyllaries puberulent, later glabrescent. Florets 2 or 3. Achenes oblong-ovoid. Fl. and fr. Aug–Oct.

Semidesert steppes, meadows, hills, dry slopes, terraces, roadsides; below 1500 m. W Gansu, E, S, and SW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

11. Seriphidium issykkulense (Poljakov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 173. 1961.

伊塞克绢蒿 yi sai ke juan hao

Artemisia issykkulensis Poljakov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 17: 415. 1955; *A. fedtschenkoana* Krascheninnikov var. *issykkulensis* (Poljakov) Poljakov.

Subshrubs, 20–40 cm tall, gray puberulent. Lowermost leaves: petiole 5–15 mm; leaf blade oblong-ovate or ovate, 10–25 × 4–6 mm, gray puberulent, 2-pinnatisect; segments 2–4 pairs; lobules narrowly linear, distal lobules 4 or 5, lateral lobules 1.5–3 × 0.3–0.6 mm, obtuse apically. Middle stem and upper leaves pinnatisect; leaflike bracts narrowly linear-lanceolate. Capitula ± dense along branches and in somewhat broad or narrow panicles. Involucre oblong-ovoid or ovoid, 1–1.5 mm in diam.; phyllaries puberulent. Florets 3–5. Achenes ovoid or obovoid. Fl. and fr. Aug–Nov.

Rocky slopes, Gobi Desert, semidesert and desert steppes; low elevations to 1400 m. N Xinjiang [Kazakhstan].

12. Seriphidium cinum (O. Berg & C. F. Schmidt) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 176. 1961.

蛔蒿 hui hao

Artemisia cina O. Berg & C. F. Schmidt, Darstell. Beschr. Off. Gew. 4: t. 29. 1863.

Herbs, perennial, 20–40(–70) cm tall, gray arachnoid pu-

bescent or glabrescent. Lowermost leaves ovate or ovate-oblong, 3–6 × 1.5–4.5 cm, 2(or 3)-pinnatisect; segments 3 or 4 pairs; lobules narrowly linear-lanceolate, 2–5 × 0.3–0.8 mm, mucronulate apically. Middle stem and uppermost leaves pinnatisect; leaflike bracts narrowly linear. Synflorescence a narrow panicle. Capitula ± dense. Involucre ellipsoid-ovoid or ovoid-oblong, ca. 2 mm in diam.; phyllaries glabrescent. Florets 3–5. Achenes ovoid. Fl. and fr. Aug–Oct.

Cultivated. N Gansu, N Shaanxi, Xinjiang [Kazakhstan].

Seriphidium cinum is a source of α-santonin, used as an anthelmintic drug.

13. Seriphidium brevifolium (Wallich ex Candolle) Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 513. 1980.

短叶绢蒿 duan ye juan hao

Artemisia brevifolia Wallich ex Candolle, Prodr. 6: 103. 1838.

Subshrubs or shrubs, 15–35(–45) cm tall, gray arachnoid pubescent, later glabrescent. Lower stem leaves: petiole 3–5 mm; leaf blade ovate, 1.5–2.5 × 1–2 cm, 2- or 3-pinnatisect; segments 2–4 pairs; lobules linear, 2–4 mm. Middle stem leaves 2-pinnatisect. Upper leaves and leaflike bracts pinnatisect or entire. Synflorescence a narrow or somewhat broad panicle. Capitula usually 2 or 3 together along branchlets. Involucre ovoid-oblong or ellipsoid, ca. 2 mm in diam.; phyllaries densely pubescent. Florets 3 or 4(–8). Achenes oblong-ovoid or ovoid-ellipsoid. Fl. and fr. Aug–Oct.

Slopes, valleys, saline-alkaline soils; 2700–4500 m. W Xizang [Afghanistan, N India, N Pakistan].

14. Seriphidium thomsonianum (C. B. Clarke) Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 513. 1980.

西藏绢蒿 xi zang juan hao

Artemisia maritima Linnaeus var. *thomsoniana* C. B. Clarke, Compos. Ind. 160. 1876; *A. thomsoniana* (C. B. Clarke) Filatova.

Subshrubs, 30–80 cm tall, gray arachnoid pubescent. Lower and middle stem leaves: petiole short; leaf blade ovate or broadly ovate, 2–3 × 2–3 cm, gray pubescent, 2- or 3-pinnatisect; segments 4(or 5) pairs; lobules linear, 0.5–1.5 mm. Upper leaves 1- or 2-pinnatisect; leaflike bracts 3–5-lobed. Synflorescence a broad, much-branched panicle. Involucre subglobose, 2.5–3 mm in diam.; phyllaries densely puberulent or ± glabrescent. Florets 6–10. Achenes oblong. Fl. and fr. Aug–Oct.

Slopes; 3600–4300 m. W Xizang [Afghanistan, N India, N Pakistan].

15. Seriphidium aucheri (Boissier) Y. Ling & Y. R. Ling, Acta Phytotax. Sin. 18: 513. 1980.

光叶绢蒿 guang ye juan hao

Artemisia aucheri Boissier, Fl. Orient. 3: 367. 1875; *A. maritima* Linnaeus var. *aucheri* (Boissier) Pampanini.

Subshrubs, 30–40 cm tall, gray pubescent, later glabrescent. Lower and middle stem leaves: petiole 5–10 mm; leaf blade ovate, 2–3 × 1–2 cm, pubescent, later glabrescent, 2-pinnatisect; segments 3 or 4(or 5) pairs; lobules linear, 5–10(–15) mm. Upper leaves pinnatisect; leaflike bracts narrowly linear, entire, rarely 3- or 5-lobed. Synflorescence a broad or somewhat broad and elongated panicle. Capitula usually in groups of 3–5 along branchlets. Involucre oblong, 1.5–2 mm in diam.; phyllaries puberulent, later glabrescent. Florets 3–5. Achenes oblong-ovoid or obovoid. Fl. and fr. Aug–Oct.

Slopes, canyons, roadsides; 2400–3700 m. W Xizang [Afghanistan, Pakistan; SW Asia (Iran)].

16. Seriphidium ferganense (Krascheninnikov ex Poljakov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 173. 1961.

费尔干绢蒿 fei er gan juan hao

Artemisia ferganensis Krascheninnikov ex Poljakov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 16: 409. 1954.

Herbs, perennial, 40–50 cm tall, densely gray tomentose, later partly glabrescent. Lowermost leaves: petiole 1–1.5 cm; leaf blade oblong, densely tomentose, 2-pinnatisect; segments 3 or 4 pairs; lobules narrowly linear, (3–)6–9(–12) × 0.5–1(–1.5) mm, acute apically. Middle stem and upper leaves pinnatisect; leaflike bracts linear. Capitula in broad pyramidal paniculate synflorescences. Involucre ovoid-ellipsoid, 2–2.5 mm; phyllaries pubescent. Florets 5–6. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Desert margins, saline-alkaline soils, desert steppes, rocky slopes and canyons; low to middle elevations. SW Xinjiang [Kazakhstan, Kyrgyzstan].

17. Seriphidium gracilescens (Krascheninnikov & Iljin) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 175. 1961.

纤细绢蒿 xian xi juan hao

Artemisia gracilescens Krascheninnikov & Iljin, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1949(1–2): 2. 1949.

Subshrubs, 15–30 cm tall, with a thick rootstock, gray pubescent, later glabrescent. Lower stem leaves: petiole 3–5 mm; leaf blade triangular-ovate, 1–2 × 0.6–1 cm, gray pubescent and gland-dotted, 2- or 3-pinnatisect; segments 2 or 3 pairs, 3-lobuled; lobules narrowly linear. Middle stem leaves ovate-oblong, 1- or 2-pinnatisect. Upper leaves oblong-ovate, 1- or 2-pinnatisect; leaflike bracts narrowly linear, entire. Synflorescence a narrow conical panicle. Involucre oblong or ellipsoid, 1–1.5 mm in diam.; phyllaries keeled, gland-dotted and puberulent or later sparsely puberulent. Florets 2–5. Achenes oblong. Fl. and fr. Aug–Oct.

Rocky slopes, Gobi Desert, dry canyons, terraces, roadsides, semidesert or desert steppes, saline-alkaline soils; 800–2300 m. N Xinjiang [Kazakhstan, Mongolia, Russia].

18. Seriphidium terrae-albae (Krascheninnikov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 175. 1961.

白茎绢蒿 bai jing juan hao

Artemisia terrae-albae Krascheninnikov, Otchet Rabotakh

Pochv.-Bot. Otryada Kazakhstansk. Eksped. Akad. Nauk S.S.S.R. 4(2): 269. 1930.

Herbs perennial, 8–15(–30) cm tall, with a thick rootstock, densely white arachnoid tomentose, sometimes partly glabrescent. Lower stem leaves: petiole short; leaf blade ovate, 1–2(–3) × 0.8–1 cm, 1- or 2-pinnatisect; segments 3 or 4 pairs; lobules linear, 2–3 × 0.3–0.5 mm. Middle and upper stem leaves pinnatisect; leaflike bracts linear. Synflorescence a lax, somewhat broad panicle. Involucre oblong-ovoid or ovoid, 1.5–3 mm in diam.; phyllaries keeled, white arachnoid pubescent. Florets 4 or 5. Achenes obovoid or ovoid. Fl. and fr. Aug–Oct.

Dunes, desert margins, Gobi Desert; low or middle elevations. N Xinjiang [Kazakhstan, Mongolia].

19. Seriphidium semiaridum (Krascheninnikov & Lavrova) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 118. 1988.

半凋萎绢蒿 ban diao wei juan hao

Artemisia terrae-albae Krascheninnikov subsp. *semiarida* Krascheninnikov & Lavrova in Krylov, Fl. Zapadnoi Sibiri 11: 2787. 1949; *A. semiarida* (Krascheninnikov & Lavrova) Filatova; *A. terrae-albae* var. *semiarida* (Krascheninnikov & Lavrova) Poljakov.

Herbs, perennial, 20–30 cm tall, densely gray tomentose, later partly glabrescent. Lower stem leaves: petiole 3–10 mm; leaf blade ovate-elliptic, 1–2(–3) × 1–1.5 cm, 1- or 2-pinnatisect; segments (3 or)4 or 5 pairs; lobules linear or linear-lanceolate, 2–4 × 0.3–0.5 mm. Middle stem leaves pinnatisect; leaflike bracts linear. Synflorescence a narrow conical panicle. Involucre ovoid-oblong or ovoid-ellipsoid, 1.5–2.5 mm in diam.; phyllaries densely gray tomentose. Florets 3–5. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Desert and semidesert steppes, saline-alkaline soils; low to middle elevations. N Xinjiang [Kazakhstan].

20. Seriphidium heptapotamicum (Poljakov) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 119. 1988.

半荒漠绢蒿 ban huang mo juan hao

Artemisia heptapotamica Poljakov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 18: 278. 1957; *A. terrae-albae* Krascheninnikov var. *heptapotamica* (Poljakov) Poljakov.

Herbs, perennial, 20–35(–40) cm tall, with a thick rootstock, densely gray arachnoid tomentose, later partly glabrescent. Lower and middle stem leaves: petiole short; leaf blade oblong-ovate or ovate-elliptic, 2–2.5 × 1–1.5 cm, 2-pinnatisect (1(or 2)-pinnatisect in middle leaves); segments 3 or 4(or 5) pairs; lobules linear, 3–5 × 0.3–0.5 mm, acute apically. Upper leaves and leaflike bracts pinnatisect or entire. Synflorescence a somewhat broad and elongated panicle. Involucre oblong or ovoid, 1.5–2.5 mm in diam.; phyllaries sparsely arachnoid pubescent. Florets 3 or 4. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Semidesert and desert steppes; 800–1500 m. N Xinjiang [Kazakhstan].

21. Seriphidium sublessingianum (Krascheninnikov ex Poljakov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 174. 1961.

针裂叶绢蒿 zhen lie ye juan hao

Artemisia sublessingiana Krascheninnikov ex Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 395–396. 1954; *A. gorjaevii* Poljakov; *A. polysthicha* Poljakov; *A. sublessingiana* var. *gorjaevii* (Poljakov) Poljakov; *A. sublessingiana* var. *polysthicha* (Poljakov) Poljakov.

Subshrubs, 30–45 cm tall, gray arachnoid puberulent; nonflowering stems developing fibrous brownish bark. Lowermost leaves: petiole 1–2(–2.5) cm; leaf blade oblong-ovate or ovate, 3–4 × 1–2 cm, 2-pinnatisect; segments 3 or 4(or 5) pairs; lobules narrowly linear, 5–12 × 0.3–0.5 mm, subacuminate. Middle stem and uppermost leaves sessile, 1(or 2)-pinnatisect with palmatisect, sometimes pinnatisect, auricles; leaflike bracts pinnatisect or 3- or 5-lobed, or entire. Capitula sessile, in narrow or somewhat broad and elongated panicles. Involucre cylindric-ovoid or ellipsoid-ovoid, 3–4 × 1–2 mm; phyllaries gray tomentose, later glabrescent. Florets 2–7(–8). Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Rocky slopes, Gobi Desert, dry valleys, semidesert steppes, dunes; 800–1300 m. N Xinjiang [Kazakhstan, Mongolia, Russia].

Poljakov (Fl. URSS 26: 596–597. 1961) recognized two further varieties of *Artemisia sublessingiana*: var. *gorjaevii*, with slender erect stems usually 20–30 cm tall and short narrowly linear leaf lobes, and var. *polysthicha*, with lower stem leaves not more than 2 cm and often 3 stigmatic lobes.

"*Artemisia maritima* Linnaeus [var.] *sublessingiana*" (Keller, Bot.-Geogr. Issledov. Zaisansk. Semipalatinsk. Obl. 2: 89. 1912) belongs here but is a nomen nudum and was therefore not validly published (*Vienna Code*, Art. 32.1(d)).

22. Seriphidium amoenum (Poljakov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 174. 1961.

小针裂叶绢蒿 xiao zhen lie ye juan hao

Artemisia amoena Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 421. 1954.

Subshrubs, 5–25(–35) cm tall, with a thick rootstock, gray arachnoid pubescent, later glabrescent. Lower stem leaves: petiole short; leaf blade ovate or oblong-ovate, 4–8 × 1.5–2(–2.5) cm, 1(or 2)-pinnatisect; segments 3 or 4(or 5) pairs, occasionally middle of lateral lobes 3-lobed; lobules or lobes narrowly linear or narrowly linear-lanceolate, 4–12 × 1–2.5 mm, mucronulate apically. Middle stem leaves pinnatisect; lobes narrowly linear. Upper leaves and leaflike bracts narrowly linear, 4–5 mm. Synflorescence a narrow spikelike panicle. Involucre oblong-ovoid or oblong, 1.5–2 mm in diam.; phyllaries cyst-form, gray pubescent. Florets 4 or 5. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

• Rocky slopes, Gobi Desert, saline-alkaline soils; low elevations to 1500 m. N Xinjiang.

Seriphidium amoenum contains the anthelmintic α-santonin.

23. Seriphidium santolinum (Schrenk) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 173. 1961.

沙漠绢蒿 sha mo juan hao

Artemisia santolina Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 3: 106. 1845.

Subshrubs, 25–35(–45) cm tall, with a thick rootstock, densely gray tomentose, later glabrescent. Lower and middle stem leaves ± sessile; leaf blade elliptic-linear or broadly linear, 1–7 × 0.5–1.5 mm, pinnatifid; segments 10(–15) pairs, small, suborbicular or oblong, or orbicularly 2- or 3-lobed. Upper leaves and leaflike bracts entire. Synflorescence a broad lax panicle. Involucre ovoid or ovoid-oblong, 2–3.5 mm in diam.; phyllaries densely gray puberulent. Florets 3 or 4. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Desert dunes; below 1400 m. N Xinjiang [Kazakhstan; SW Asia (Caucasus, Iran)].

24. Seriphidium borotalense (Poljakov) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 120. 1988.

博洛塔绢蒿 bo luo ta juan hao

Artemisia borotalensis Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 425. 1954.

Herbs, perennial, 12–20 cm tall, with a thick rootstock, gray arachnoid tomentose. Lower stem leaves: petiole 5–8 mm; leaf blade elliptic, 1–2(–3) × 0.8–1.5(–2) cm, densely gray tomentose, 2-pinnatisect; segments (3 or)4 or 5 pairs; lobules linear, 1.5–3 × 0.5–1 mm, obtuse apically. Middle stem leaves pinnatisect. Upper leaves and leaflike bracts narrowly linear, entire. Synflorescence a narrow spikelike panicle. Involucre oblong-ovoid, 1.5–2 mm in diam.; phyllaries densely arachnoid pubescent, gland-dotted. Florets 5–7. Achenes obovoid or obovoid-ellipsoid. Fl. and fr. Aug–Oct.

• Gobi Desert, desert and semidesert steppes, rocky slopes, terraces; 1000–1500 m. N Xinjiang.

25. Seriphidium rhodanthum (Ruprecht) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 175. 1961.

高山绢蒿 gao shan juan hao

Artemisia rhodantha Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 14(4): 52. 1869.

Herbs, perennial, 4–15(–20) cm tall, with a thick rootstock and capitate branches, densely white tomentose. Lower stem leaves: petiole 5–10 mm; leaf blade suborbicular or ovate, densely incanous tomentose, 2(or 3)-pinnati- or subpalmatisect; segments 3 or 4(or 5) pairs; lobules linear, 2–3 mm. Middle stem leaves shortly petiolate, 2-pinnatisect. Upper leaves pinnatisect; leaflike bracts linear or elliptic, entire. Synflorescence a narrow, spikelike panicle. Involucre ovoid or ovoid-oblong, 1.5–2(–2.5) mm in diam.; phyllaries densely gray tomentose. Florets 5–7; corolla limb red. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Rocky slopes, steppes, terraces; (1500–)2100–3700 m. SW Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

26. Seriphidium korovinii (Poljakov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 175. 1961.

昆仑绢蒿 kun lun juan hao

Artemisia korovinii Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 279. 1957.

Herbs, perennial, 15–25 cm tall, with a thick rootstock, gray pubescent, later glabrescent. Lower stem leaves: petiole short; leaf blade ovate, 1–2.5 × 0.5–1 cm, pubescent, 1- or 2-pinnatisect; segments 2(or 3) pairs, 3-lobuled or not; lobes or lobules linear, elliptic, or elliptic-lanceolate, 1.5–3 mm. Middle stem leaves pinnatisect. Upper leaves and leaflike bracts linear, elliptic-lanceolate, or elliptic, entire. Synflorescence a narrow spikelike panicle. Involucre ovoid or ovoid-oblong, 2–2.5(–3) mm in diam.; phyllaries puberulent, gland-dotted. Florets 4 or 5; corolla limb yellow or red. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Gobi Desert, rocky slopes, semidesert steppes; 2000–3000 m. S Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan].

27. Seriphidium grenardii (Franchet) Y. R. Ling & Humphries, Bull. Bot. Res., Harbin 8(3): 121. 1988.

高原绢蒿 gao yuan juan hao

Artemisia grenardii Franchet, Bull. Mus. Hist. Nat. (Paris) 3: 323. 1897 [*"grenardi"*]; *A. stracheyi* J. D. Hooker & Thomson ex C. B. Clarke var. *grenardii* (Franchet) Y. R. Ling.

Subshrubs, 15–20 cm tall, yellowish puberulent. Lower and middle stem leaves: petiole 5–10 mm; leaf blade ovate or oblong, 0.5–0.8 × 0.3–0.5 cm, (1 or)2-pinnatisect; segments 3 or 4 pairs; lobules or lobes lanceolate or elliptic-lanceolate, 2–3 × 0.5–1 mm. Upper leaves and leaflike bracts pinnatisect, 3-lobed or entire. Synflorescence a narrow spikelike panicle. Involucre ovoid or subglobose, 2–3 mm in diam.; phyllaries yellowish puberulent. Florets 4–6. Achenes obovoid. Fl. and fr. Aug–Oct.

• High mountains. S Xinjiang.

28. Seriphidium compactum (Fischer ex Candolle) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 175. 1961.

聚头绢蒿 ju tou juan hao

Artemisia compacta Fischer ex Candolle, Prodr. 6: 102. 1838; *A. lercheana* Weber ex Stechmann var. *gmeliniana* (Besser) Candolle, p.p.; *A. maritima* Linnaeus var. *compacta* (Fischer ex Candolle) Ledebour; *A. maritima* var. *fischeriana* Besser; *A. maritima* f. *gmeliniana* (Besser) Ledebour, p.p.; *A. maritima* subsp. *gmeliniana* (Besser) Krascheninnikov, p.p.; *A. maritima* var. *gmeliniana* Besser, p.p.

Herbs, perennial or subshrubs, 15–40 cm tall, with a rootstock, gray arachnoid tomentose, later glabrescent. Lower stem leaves: petiole 5–10 mm; leaf blade ovate, 1.5–3.5(–4) × 1–2(–3) cm, arachnoid pubescent, later glabrescent, 2- or 3-pinnatisect; segments (3 or)4 or 5(or 6) pairs; lobules linear, 2–3(–4) × 0.5–1 mm, obtuse apically. Middle stem leaves 1- or 2-pinnatisect. Upper leaves pinnatisect or 3–5-lobed; leaf-

like bracts linear. Synflorescence a narrow racemelike panicle; branches short and dense. Capitula sessile. Involucre ovoid or ovoid-oblong, 2–3 mm in diam.; phyllaries pubescent. Florets 3–5; corolla limb red. Achenes obovoid. Fl. and fr. Aug–Oct.

Rocky slopes, semideserts, from low elevations to subalpine areas. W Gansu, W Nei Mongol, Ningxia, NE Qinghai, Xinjiang [Kazakhstan, Mongolia, Russia].

29. Seriphidium lehmannianum (Bunge) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 175. 1961.

球序绢蒿 qiu xu juan hao

Artemisia lehmanniana Bunge, Beitr. Fl. Russl. 164. 1852.

Subshrubs, 15–40(–50) cm tall, with many short sterile branches, densely arachnoid pubescent, later glabrescent. Lower stem leaves: petiole 10–20 mm; leaf blade suborbicular, 1.5–2.5(–3) × 1.5–2.5(–3) cm, (2 or)3-pinnatisect; segments (2 or)3 or 4 pairs; lobules linear, 3–4 × 0.5–0.8 mm. Middle stem leaves 2-pinnatisect; lobules short, narrow to linear. Upper leaves 1(or 2)-pinnatisect; leaflike bracts divided or entire. Synflorescence a very narrow panicle; branches very short with densely crowded capitula. Involucre ovoid-oblong or ovoid, 1.5–2.5 mm in diam.; phyllaries sparsely arachnoid pubescent. Florets 4–8; corolla limb red. Achenes ovoid or obovoid. Fl. and fr. Aug–Oct.

Rocky slopes, canyons, roadsides; 1800–2400 m. N Xinjiang [Afghanistan, India, Kazakhstan; SW Asia (Iran)].

2. Seriphidium sect. **Minchunensia** Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 122. 1988 [*"Minchünensa"*].

民勤绢蒿组 min qin juan hao zu

Perennial herbs, arachnoid tomentose. Leaves pectinately 2(or 3)-pinnatisect; lobules serrate or subserrate, arachnoid pubescent or glabrescent.

• One species: China.

30. Seriphidium minchunense Y. R. Ling, Bull. Bot. Res., Harbin 5(3): 159. 1985 [*"minchünense"*].

民勤绢蒿 min qin juan hao

Herbs, perennial, 30–50 cm tall, densely gray arachnoid tomentose, later partly glabrescent or sparsely tomentose. Lower stem leaves: petiole 5–8 mm; leaf blade ovate, densely arachnoid pubescent, later sparsely pubescent, 2(or 3)-pectinately pinnatisect; segments 3(or 4) pairs; lobules 10–25 × 0.5–1 mm, serrate or pectinate, obtuse apically. Middle stem leaves 1- or 2-pectinately pinnatisect; segments 2 or 3 pairs; lobules serrate or shortly linear. Upper leaves and leaflike bracts pinnatisect or 3-lobed. Synflorescence a lax, broad conical panicle; branches at ca. 90° to main stem. Involucre oblong or oblong-campanulate, 2–2.5 mm in diam.; phyllaries arachnoid puberulent. Florets 5–8. Achenes obovoid or oblong-ovoid. Fl. and fr. Aug–Oct.

• Rocky terraces; 1300–1400 m. C and W Gansu, E Xinjiang.

3. Seriphidium sect. **Juncea** (Poljakov) Y. R. Ling & Humphries, Bull. Bot. Res., Harbin 8(3): 122. 1988.

三裂叶绢蒿组 san lie ye juan hao zu

Artemisia sect. *Junceae* Poljakov in Schischkin & Bobrov, Fl. URSS 26: 626. 1961 [*"Junceum"*].

Subshrubs or shrubs, tomentose or pubescent. Leaves 1- or 2-ternate.

Thirteen species: N Africa, Asia, Europe; one species in China.

31. Seriphidium junceum (Karelin & Kirilov) Poljakov, Trudy Bot. Inst. Akad. Nauk Kazakhsk. S.S.R. 11: 175. 1961.

三裂叶绢蒿 san lie ye juan hao

Subshrubs, 24–40 cm tall, gray pubescent. Lower stem leaves: petiole 15–40 mm; leaf blade ovate or obovate, 1.5–5 × 1.5–3.5 cm, densely incanous pubescent, 2-ternate; lobules linear or linear-oblanceolate, 10–15 × 1–1.5 mm, mucronulate apically. Middle stem leaves: petiole 5–15 mm; leaf blade ternately 3-lobed; lobes linear-lanceolate or linear, 10–15 × 2–4 mm. Upper leaves and leaflike bracts entire. Synflorescence a narrow or somewhat broad panicle. Involucre oblong-ovoid or ellipsoid-ovoid, 2.5–4 mm in diam.; phyllaries densely or sparsely pubescent. Florets 4–7. Achenes obovoid. Fl. and fr. Aug–Oct.

Rocky slopes, Gobi Desert, desert steppes; 800–1500 m. N Xinjiang [Kazakhstan].

1a. Leaf blade 2.5–4 cm, distal lobes 10–15 mm; involucre 2.5–3(–3.5) mm in diam. ..... 31a. var. *junceum*

1b. Leaf blade 1.5–2 cm, distal lobes 4–6 mm; involucre 3–4 mm in diam. ..... 31b. var. *macrosciadium*

31a. Seriphidium junceum var. **junceum**

三裂叶绢蒿(原变种) san lie ye juan hao (yuan bian zhong)

Artemisia juncea Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 383. 1842.

Leaves 2.5–4 cm; distal lobes 1–1.5 cm. Involucre 2.5–3(–3.5) cm in diam.; phyllaries sparsely pubescent.

Rocky slopes, Gobi Desert, desert steppes; 800–1500 m. N Xinjiang [Kazakhstan].

31b. Seriphidium junceum var. **macrosciadium** (Poljakov) Y. Ling & Y. R. Ling, Bull. Bot. Res., Harbin 8(3): 123. 1988.

大头三裂叶绢蒿 da tou san lie ye juan hao

Artemisia macrosciadia Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 16: 423. 1954; *A. juncea* var. *macrosciadia* (Poljakov) Poljakov.

Leaves 1.5–2 cm; distal lobes 4–6 mm. Involucre 3–4 mm in diam.; phyllaries densely pubescent.

Rocky slopes, Gobi Desert, desert steppes; 800–1500 m. N Xinjiang [Kazakhstan].

153. CROSSOSTEPHIUM Lessing, Linnaea 6: 220. 1831.

芙蓉菊属 fu rong ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Subshrubs, pubescent. Leaves alternate, narrowly spatulate or oblanceolate, apically few lobed or entire. Capitula disciform, heterogamous, many, in a frondose raceme or panicle. Involucres hemispheric; phyllaries in 3 rows, outer ones herbaceous, inner ones broadly scarious at margin. Receptacle hemispheric, epaleate. Marginal female florets in 1 row, tubular, 2- or 3-denticulate, gland-dotted outside. Disk florets tubular, 5-lobed, gland-dotted outside. Anther obtuse at base, with apical oblong appendage; style branches linear, apex truncate. Achenes obovoid, weakly 5-ribbed. Pappus coroniform, of small scales.

One species: China, Japan.

Molecular data (Watson et al., BMC Evolutionary Biology; http://www.biomedcentral.com/1471-2148/2/17/; accessed 10 Apr 2011) suggests that *Crossostephium* is embedded within *Artemisia*.

1. Crossostephium chinensis (Linnaeus) Makino, Bot. Mag. (Tokyo) 20: 33. 1906.

芙蓉菊 fu rong ju

Artemisia chinensis Linnaeus, Sp. Pl. 2: 849. 1753; *Chrysanthemum artemisioides* (Lessing) Kitamura; *Crossostephium artemisioides* Lessing; *Tanacetum chinense* (Linnaeus) A. Gray ex Maximowicz.

Plants 10–40 cm tall, much branched in upper part, densely gray-white pubescent. Leaves sessile, aggregated at apex of branches; leaf blade narrowly spatulate or narrowly lanceolate, 2–4 × 0.4–0.5 cm, both surfaces densely gray-white pubescent, base cuneate-attenuate, margin entire or sometimes apex 3- or 4-lobed, thick. Capitula rather small, disciform, ca. 7 mm in diam., many, in a frondose raceme along branches. Involucres hemispheric; phyllaries in 3 rows, outer and middle ones equal, elliptic, herbaceous, abaxially densely gray-white pubescent, apex obtuse or acute, inner ones oblong, small, abaxially subglabrous, margin broadly scarious. Marginal female florets in 1 row, tubular, ca. 1.5 mm, gland-dotted outside, apex 2- or 3-denticulate. Disk florets many, tubular, densely gland-dotted outside, 5-lobed. Pappus ca. 0.5 mm, coroniform, of small scales. Fl. and fr. year-round.

Littoral plant found on raised coral outcrops. Fujian, Guangdong, Taiwan, Yunnan, Zhejiang [Japan].

Crossostephium chinensis is rare and possibly threatened in the wild but is often cultivated for ornamental and medicinal purposes. The whole plant is used medicinally for treating infantile convulsions.

154. FILIFOLIUM Kitamura, Acta Phytotax. Geobot. 9: 157. 1940.

线叶菊属 xian ye ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, perennial, base somewhat woody, covered with fibrous leaf sheaths; indumentum absent or of medifixed hairs. Leaves alternate, pinnatisect with long filiform lobes. Synflorescence a ± flat-topped cyme. Capitula small, heterogamous, disciform. Involucre hemispheric; phyllaries in 4 rows. Receptacle conical, epaleate. Marginal florets female; corolla tapering above, apex minutely 4-toothed. Disk florets apparently bisexual but functionally male, apex 5-lobed, compressed into resinous mass. Anther apical appendage triangular. Achenes obliquely obovoid, thinly walled, with 2 adaxial-lateral rows of myxogenic cells. Corona absent.

One species: China, Japan, Korea, Mongolia, Russia (Siberia).

Molecular data (Watson et al., BMC Evolutionary Biology; http://www.biomedcentral.com/1471-2148/2/17/; accessed 10 Apr 2011) place *Filifolium* as the sister group to *Artemisia* subg. *Dracunculus* (Besser) Rydberg.

1. Filifolium sibiricum (Linnaeus) Kitamura, Acta Phytotax. Geobot. 9: 157. 1940.

线叶菊 xian ye ju

Tanacetum sibiricum Linnaeus, Sp. Pl. 2: 1844. 1753; *Artemisia sibirica* (Linnaeus) Maximowicz; *Chrysanthemum trinioides* Handel-Mazzetti.

Herbs, perennial, 20–60 cm tall, roots robust, woody; base densely clothed by old fibrous leaf sheaths; stems solitary or few and tightly clustered, corymbosely branched in upper parts, striate, glabrous. Basal leaves long petiolate; leaf blade obovate or oblong in outline, ca. 20 × 5–6 cm, 2(or 3)-pinnatisect, both surfaces green, glabrous; primary lateral segments many paired; ultimate segments filiform, alternate. Synflorescence a flat-

topped cyme; capitula 1–10(–15). Involucres hemispheric, 4–5 mm in diam.; phyllaries in 3 rows, ovate to broadly ovate, margin scarious, apex rounded. Florets yellow. Marginal female florets 6; corolla ascidiform, tapering above, minutely 2–4-denticulate, exterior with sessile glands. Disk florets many, tubular, ca. 2 mm, 5-lobed. Achenes dark, obovate or elliptic, slightly compressed, glabrous, 2-striate adaxially. Fl. and fr. Jun–Sep. $2n = 16, 18$.

Grasslands on mountain slopes; 1500–2600 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shanxi [Japan, Korea, Mongolia, Russia (Siberia)].

155. NEOPALLASIA Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 429. 1955.

栉叶蒿属 zhi ye hao shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, annual or perennial. Leaves alternate, pectinate to pinnatisect. Synflorescence of short axillary spikes grouped into a slender, leafy panicle. Capitula rather small, heterogamous, disciform. Involucre ovoid or broadly ovoid; phyllaries in 3 or 4 rows, scarious margins broad. Receptacle narrowly conical, epaleate. Marginal florets usually 3 or 4, female, fertile; corolla narrowly tubular, apex not toothed. Disk florets of two kinds; outer bisexual, inner completely male with reduced ovaries; all central florets with corolla apex 5-lobed. Anther bases obtuse; apical appendage rhomboid-acuminate. Style branches linear. Achenes in a row around base of receptacle, ellipsoid, somewhat compressed or triquetrous, brown, striate. Corona absent.

One species: China, Kazakhstan, Mongolia, Russia.

Molecular data (Watson et al., BMC Evolutionary Biology; http://www.biomedcentral.com/1471-2148/2/17/; accessed 10 Apr 2011) indicate that *Neopallasia* is closely related to *Seriphidium* s.s. and could be included with that genus within a more broadly conceived *Artemisia*.

1. Neopallasia pectinata (Pallas) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 430. 1955.

栉叶蒿 zhi ye hao

Artemisia pectinata Pallas, Reise Russ. Reich. 3: 755. 1776; *A. pectinata* var. *yunnanensis* Pampanini; *A. yunnanensis* (Pampanini) Krascheninnikov (1958), not Jeffrey ex Diels (Jun 1912), nor H. Léveillé (Nov 1912); *Neopallasia tibetica* Y. R. Ling; *N. yunnanensis* (Pampanini) Y. R. Ling.

Herbs, 12–40 cm tall; stems erect, unbranched or branched from base, purplish, ± densely white sericeous. Lower and middle stem leaves sessile; leaf blade oblong-elliptic, 1.5–3 × 0.5–1 cm, both surfaces green, glabrous, sometimes with sessile glands, pectinately pinnatisect; segments linear-subulate, somewhat rigid. Upper stem leaves to below synflorescence similar, but smaller. Synflorescence of short axillary spikes grouped into a slender, leafy panicle. Capitula many, rather small, sessile. Involucres ovoid or broadly ovoid, 2.5–3 mm in diam.; phyllaries in 3 or 4 rows, abaxially glabrous, scarious margin broad, outer ones somewhat short, inner ones rather narrow. Marginal female florets 3 or 4, fertile, narrowly tubular, without apical teeth. Disk florets tubular, 5-lobed, of two kinds: outer bisexual, inner completely male with reduced ovaries. Achenes brown, elliptic, 1.2–1.5 mm, somewhat compressed.

Deserts, gravelly places of river valleys, wastelands; 1300–3400 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shanxi, Sichuan, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia].

Neopallasia pectinata is a highly variable species, and the Chinese entities *N. tibetica* and *N. yunnanensis* seem best treated as synonymous with it.

156. ALLARDIA Decaisne in Jacquemont, Voy. Inde 4(Bot.): 87. 1841.

扁毛菊属 bian mao ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Waldheimia Karelin & Kirilov.

Herbs, perennial, glabrous to densely tomentose. Leaves alternate, closely spaced, sometimes rosulate, spatulate or cuneate, apex 3–5-lobed or -parted, or oblong, pinnatisect or pinnatipartite. Capitula solitary, pedunculate, heterogamous, radiate. Involucre hemispheric; phyllaries in 3 or 4 rows, scarious margins dark brown. Receptacle convex, epaleate. Marginal florets in 1 row, female or neuter, usually sterile; lamina pink, white, or bluish violet. Disk florets many, yellow or bluish violet, bisexual, fertile; corolla tubular, apex 5-lobed. Anther bases obtuse, apical appendage ovate-lanceolate. Style branches linear, apex truncate. Achenes somewhat curved, faintly 5–10-ribbed, generally with sessile glands, sometimes pilose. Corona of 20–50 bristlelike scales, with flat and palmate base, apex brownish, sometimes wider.

Eight species: Afghanistan, China, India, Kazakhstan, Mongolia, Nepal, Pakistan, Russia, Tajikistan, Uzbekistan; eight species (one endemic) in China.

The exact date of publication of *Allardia* is uncertain, but such evidence as there is (Zain-ul-Abidin, Biologia 4: 212–214. 1958) suggests that it was in 1841, thus predating *Waldheimia*, which was published in 1842.

1a. Leaves 4–5 cm; blade oblong, pinnatisect or pinnatipartite; ray florets female; achenes pilose, with distinct corona.
2a. Leaves arachnoid lanate on both surfaces; capitula 1.2–2 cm wide; achenes ca. 3 mm, pilose ..... 1. *A. tomentosa*
2b. Leaves glabrous on both surfaces; capitula to 1 cm wide; achenes ca. 1.5 mm, glabrescent ..... 2. *A. stoliczkae*
1b. Leaves 0.8–2 cm; blade spatulate or cuneate, palmately 3–5-lobed or -parted; ray florets sometimes sterile; achenes mostly glabrous (pilose in *A. lasiocarpa*), with reduced corona.
3a. Achenes pilose ..... 8. *A. lasiocarpa*
3b. Achenes glabrous.
4a. Plants glabrous or tomentose only below involucre and on peduncle; achene 2.5–4 mm.
5a. Capitula 2.5–3.5 cm in diam., peduncles glabrous; phyllaries 6–7 mm, glabrous, apex cuspidate; achenes 2.5–4 mm ..... 3. *A. tridactylites*
5b. Capitula 1.5–2.5 cm in diam., peduncles sparsely hairy; phyllaries 3.5–4.5 mm, basally hairy, apex ± obtuse; achenes 2.5–3.5 mm ..... 4. *A. glabra*
4b. Plants grayish white lanate; achenes 1.2–2 mm.
6a. Plants rather sparsely lanate; capitula ca. 2 cm in diam.; leaves 8–12 mm ..... 5. *A. huegelii*
6b. Plants densely lanate, hairs thick.
7a. Capitula 3.5–4 cm in diam.; leaves 10–15 mm, distinctly 3–5-lobed ..... 6. *A. vestita*
7b. Capitula 1.5–2 cm in diam.; leaves 4–8 mm, obscurely 3-lobed ..... 7. *A. nivea*

1. Allardia tomentosa Decaisne in Jacquemont, Voy. Inde 4(Bot.): 87. 1841.

羽裂扁毛菊 yu lie bian mao ju

Waldheimia tomentosa (Decaisne) Regel.

Herbs, perennial, 10–15 cm tall, with procumbent much-branched rhizomes. Stems many, laxly caespitose, branched or not, bases with remains of brown scarious leaf sheaths. Petioles enlarged at base; leaf blade oblong to linear-oblong, 4–5 × 0.2–1.5 cm, 2-pinnatipartite, both surfaces white arachnoid lanate, primary lateral pinnae 6–9-paired, distal pinnae gradually smaller; ultimate pinna lanceolate to ovate, apex long mucronulate. Capitulum solitary, pedunculate. Involucre hemispheric, 17–20 mm in diam.; phyllaries in 3 or 4 rows, abaxially lanate, scarious margin broad, dark brown, outer ones lanceolate, short, apex acute, inner ones linear-oblong, subscarious. Ray florets 10–20, white or pale pink; lamina linear-oblong, 6–11 mm. Disk florets yellow, 5-lobed. Achenes narrowly oblong, ca. 4.5 mm, 6–8-ribbed; ribs pale red-brown in upper part, sparsely villous in upper 1/2, with sessile glands; corona scales many, ca. 6 mm, brownish at apex. Fl. and fr. Aug–Sep.

Talus on mountain slopes; 4200–5200 m. W Xizang (Burang) [Afghanistan, India, Kazakhstan, Pakistan, Uzbekistan].

2. Allardia stoliczkae C. B. Clarke, Compos. Ind. 145. 1876.

光叶扁毛菊 guang ye bian mao ju

Waldheimia korolkowii Regel & Schmalhausen; *W. stoliczkae* (C. B. Clarke) Ostenfeld.

Herbs, perennial, ca. 15 cm tall, with procumbent, many-branched rhizomes; stems glabrous. Leaf blades 4–5 × 1(–1.5) cm, glabrous, 1- or 2-pinnatisect. Capitulum solitary, terminal, pedunculate. Phyllaries glabrous, scarious margin dark. Ray floret lamina white or pale pink, ca. 15 mm. Achenes sparsely pilose or glabrous.

Rocky slopes, stony riverbeds; [3000–5000 m]. Xinjiang, W Xizang [Afghanistan, India, Kazakhstan, Pakistan, Uzbekistan].

No Chinese specimens were seen. The account is based on Fl. URSS (26: 268. 1961) and Rast. Tsentral. Azii (14a: 23. 2007).

3. Allardia tridactylites (Karelin & Kirilov) Schultz Bipontinus, Pollichia 20–21: 442. 1863.

三指扁毛菊 san zhi bian mao ju

Waldheimia tridactylites Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 126. 1842.

Herbs, perennial, to 6 cm, with woody, procumbent, much-branched rhizome; stems many; entire plant glabrous. Leaves in dense rosettes, sessile; leaf blade cuneate, 1–2 × 0.5–1 cm, glabrous, base cuneate-attenuate, apex 3(–5)-lobed or -parted. Capitulum solitary, terminal, 2.5–3.5 cm in diam., sessile. Involucre hemispheric, 1.5–2 cm in diam.; phyllaries in 3 or 4 rows, abaxially glabrous, scarious margin broad, dark brown, outer phyllaries ovate-oblong to oblong, ca. 7 mm, apex cuspidate, inner ones oblong, ca. 8 mm. Ray florets 8–15; lamina pinkish white, pink, or purple-red, elliptic-oblong, 7–11 × 2.5–4 mm, apex 2- or 3-denticulate. Disk florets: corolla yellow, 4–5.5 mm, apex 5-lobed. Achenes 2.5–4 × 0.6–0.8 mm, somewhat curved, 5-ribbed, glabrous, with sessile glands. Corona scales many, bristlelike, usually tinged reddish or brownish, 6.5–8 mm. Fl. Jul–Sep.

Floodlands, talus on mountain slopes; 3000–4000 m. Xinjiang, Xizang [Kazakhstan, Mongolia, Russia].

4. Allardia glabra Decaisne in Jacquemont, Voy. Inde 4(Bot.): 88. 1841.

扁毛菊 bian mao ju

Waldheimia glabra (Decaisne) Regel; *W. tridactylites* Karelin & Kirilov subsp. *glabra* (Decaisne) Podlech.

Herbs, perennial, to 4 cm, with woody, procumbent, much-branched rhizomes; stems many; entire plant grayish or grayish green, loosely tomentose to pubescent with long simple hairs. Leaves in dense rosettes, sessile; leaf blade cuneate, 1–1.5 × 0.5–0.8 cm, both surfaces glabrous, base cuneate-attenuate, apex 3(–5)-lobed or -parted. Capitulum solitary, terminal, 2.5–3.5 cm in diam., sessile. Involucre hemispheric, 1–1.5 cm in diam.; phyllaries in 3 or 4 rows, abaxially hairy at base, scarious margin broad, dark brown, apex ± obtuse, outer phyllaries ovate-oblong to oblong, ca. 7 mm, inner ones oblong, ca. 8 mm.

Ray florets 8–15; lamina deep pink to almost white, elliptic-oblong, 6–10 × 2.5–4 mm, apex 2- or 3-denticulate. Disk florets: corolla yellow, 3.5–5 mm, apex 5-lobed. Achenes 2.5–3.5 × 0.5–0.7 mm, somewhat curved, 5-ribbed, glabrous, with sessile glands. Corona scales 6–7.5 mm, tinged pinkish violet or brownish. Fl. Jul–Sep.

Scree slopes, rock crevices; (3500–)4900–5500 m. Xizang [Afghanistan, Bhutan, N India, Kazakhstan, Pakistan, Uzbekistan].

5. Allardia huegelii Schultz Bipontinus, Pollichia 20–21: 442. 1863.

多毛扁毛菊 duo mao bian mao ju

Waldheimia huegelii (Schultz Bipontinus) Tzvelev; *W. stracheyana* Regel.

Herbs perennial, ca. 2 cm tall, with creeping much-branched rhizomes; stems many, short, strongly fragrant. Leaves sessile; leaf blade oblong-cuneate, 8–12 × 3–5 mm, both surfaces gray-white lanate, apex 3-parted. Capitulum solitary, ca. 2 cm in diam., pedunculate or not. Involucre hemispheric, ca. 15 mm in diam.; phyllaries in 3 rows, abaxially lanate, oblong-lanceolate to oblong-linear, scarious margin broad or narrow, dark, apex obtuse or acute. Ray florets pink; lamina oblong, ca. 7 mm, apex minutely 2- or 3-toothed. Disk florets many, yellow, 5-lobed. Achenes ca. 1.5 mm, glabrous, with sessile glands. Corona scales many, apically greenish, subulate, ca. 3 mm. Fl. and fr. Aug.

Among stones; ca. 5800 m. S Xizang (Zhongba) [Tajikistan (Pamirs)].

6. Allardia vestita J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 145. 1876.

厚毛扁毛菊 hou mao bian mao ju

Waldheimia vestita (J. D. Hooker & Thomson ex C. B. Clarke) Pampanini.

Herbs, perennial, 4–6 cm tall, with creeping woody rhizomes; stems many, erect; most parts densely and thickly yellowish or gray-white lanate. Leaves sessile; leaf blade cuneate, 1–1.5 × 0.4–0.5 cm, apex 3-lobed. Capitulum solitary at apex, shortly pedunculate. Involucre hemispheric, ca. 1.5 cm in diam.; phyllaries in 4 or 5 rows, ovate to oblong, 4–6 mm, abaxially lanate, scarious margin deep brown. Ray florets pink; lamina broadly elliptic. Disk florets yellow, 5-lobed. Achenes ca. 2 mm, with sessile glands. Pappus many, bristlelike, deplanate, 2–3 mm, apically brownish. Fl. and fr. Aug–Sep.

Mountain slopes; 5000–5300 m. S Xizang (Tingri) [India, Pakistan].

7. Allardia nivea J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 145. 1876.

小扁毛菊 xiao bian mao ju

Waldheimia nivea (J. D. Hooker & Thomson ex C. B. Clarke) Regel.

Herbs, perennial, villous, with dense appressed gray-white hairs. Rhizome procumbent, woody, much branched. Stems many, erect, with dense lanate leaves. Leaves sessile; leaf blade cuneate, 4–8 × 1.5–2.5 mm, apex 3-lobed. Capitulum solitary at apex, shortly pedunculate. Involucre hemispheric, 8–11 mm in diam.; phyllaries in 3 or 4 rows, abaxially lanate, margin narrowly brown scarious, outer and middle ones ovate to oblong, 4–5 mm, inner ones oblanceolate, ca. 6 mm. Ray florets 17–20, red; lamina oblong, 7–8 mm, apex 2-denticulate. Disk florets yellow, 5- or 6-lobed. Achenes ca. 1.2 mm, glabrous, with sessile glands. Pappus many, bristlelike, pale yellow, ca. 2.5 mm. Fl. and fr. Jul.

Lateral moraines of glaciers; 5300–5400 m. S Xizang (N slopes of Qomolangma Feng) [Afghanistan, India, Nepal, Pakistan].

8. Allardia lasiocarpa (G. X. Fu) Bremer & Humphries, Bull. Nat. Hist. Mus. London, Bot. 23: 98. 1993.

毛果扁毛菊 mao guo bian mao ju

Waldheimia lasiocarpa G. X. Fu, Acta Phytotax. Sin. 17(2): 113. 1979.

Herbs, perennial. Stems procumbent, much branched. Leaves sessile; leaf blade spatulate, 1.5–2 × 0.6–0.7 cm, both surfaces sparsely lanate, apex 5–7-parted or -lobed. Capitulum solitary, to 3 cm in diam., sessile. Involucre hemispheric; phyllaries in 3 or 4 rows, triangular-lanceolate to oblong, 5–7 mm, abaxially sparsely lanate. Ray florets deep pink; lamina elliptic-oblong, ca. 13 mm, apex entire. Disk florets yellow. Achenes terete, ca. 2.5 mm, 5-ribbed, white villous, with sessile glands. Pappus many, bristlelike, deplanate, yellow-brown, longer than corolla.

• Stony grasslands by rivers, broken stony places on mountain slopes; 4700–5200 m. S Xizang (N slopes of Qomolangma Feng).

157. CANCRINIA Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 124. 1842.

小甘菊属 xiao gan ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Poljakovia Grubov & Filatova.

Subshrubs or perennial herbs, compact, tomentose. Leaves alternate to rosulate, dense or lax. Capitula terminal, solitary or several and corymbose, homogamous, discoid. Involucres hemispheric or cup-shaped; phyllaries herbaceous, in 3 or 4 rows, margin brown, dark brown, or hyaline scarious. Receptacle convex or flat, epaleate. Florets all bisexual, yellow, tubular, fertile, 5-lobed, with a narrow tube and a distinct limb. Anther obtuse at base, with apical ovate-lanceolate appendage. Style branches linear. Achenes trigonously terete, faintly 5- or 6-ribbed, glabrous or sparsely pilose. Corona of 5–12 pappuslike lanceolate scales ca. as long as or slightly longer than corolla.

About 30 species: C Asia, China, Mongolia, Russia; five species in China.

1a. Subshrubs (30–)40–50 cm tall ..... 1. *C. maximowiczii*
1b. Compact ± scapose herbs 5–20 cm tall.
2a. Phyllaries with scarious margins colorless; pappus of 5 scales; plants growing at 500–2000 m.
3a. Plants annual or biennial, easily pulled out of ground; achenes glabrous; pappus with all scales acute; receptacle conspicuously conical-globose ..... 2. *C. discoidea*
3b. Plants perennial, often forming mats; achenes sparsely pilose; pappus with 3 scales aristate mucronate; receptacle flat or slightly convex ..... 3. *C. lasiocarpa*
2b. Phyllaries with scarious margins brown; pappus of 8–12 scales; plants growing above 3000 m.
4a. Scarious phyllary margins broad, dark brown, enlarged at apex; achenes glabrous or pilose only toward apex ..... 4. *C. chrysocephala*
4b. Scarious phyllary margins narrow, pale brown, not enlarged at apex; achenes uniformly sparsely pilose ..... 5. *C. tianschanica*

1. Cancrinia maximowiczii C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 29. 1892.

灌木小甘菊 guan mu xiao gan ju

Cancrinia paucicephala Y. Ling; *Poljakovia falcatolobata* (Krascheninnikov) Grubov & Filatova; *Tanacetum falcatolobatum* Krascheninnikov.

Subshrubs, (30–)40–50 cm tall; branchlets ribbed, white tomentose, brown gland-dotted. Leaves petiolate; leaf blade oblong-linear, 1.5–3 × 0.5–1.2 cm, pinnatipartite, abaxially gray-white tomentose, adaxially sparsely tomentose or glabrescent, both surfaces brown gland-dotted, lateral lobes 2–5-paired, falcate, margin entire or 1- or 2-denticulate. Uppermost leaves linear, entire or denticulate. Synflorescence a flat-topped cyme; capitula 2–5. Involucres campanulate or broadly campanulate, 5–7 mm in diam.; phyllaries in 3 or 4 rows, abaxially sparsely pilose, brown gland-dotted, scarious margin narrow, pale brown; outer ones ovate-triangular or oblong-ovate, inner ones oblong-obovate, scarious margin hyaline. Florets yellow, 5-lobed. Achenes ca. 2 mm, 5-ribbed, gland-dotted. Corona scales 5, lanceolate. Fl. and fr. Jul–Oct.

Gravelly mountain slopes, alluvial fans by riverbanks; 2100–3600 m. Gansu, Nei Mongol, Qinghai, Xinjiang, Yunnan [Mongolia].

2. Cancrinia discoidea (Ledebour) Poljakov ex Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 313. 1961.

小甘菊 xiao gan ju

Pyrethrum discoideum Ledebour, Icon. Pl. 2: t. 153. 1830; *Cancrinia brachypappus* C. Winkler; *Chrysanthemum ledebourianum* Y. Ling; *Matricaria ledebourii* (Schultz Bipontinus) Schischkin; *Microcephala discoidea* (Ledebour) K. Bremer et al.; *Tanacetum ledebourii* Schultz Bipontinus.

Herbs, perennial or biennial, 5–20 cm tall, with slender taproot; stems erect or ascending, branched from base, scapose, conspicuously lanate. Leaves all basal, petiolate; leaf blade oblong or ovate, 2–4 × 0.5–1.5 cm, 2-pinnatipartite, both surfaces gray-green, white lanate or subglabrescent; primary lateral lobes 2–5-paired; ultimate lobes ovate or broadly linear. Capitula solitary, terminal, several per plant; peduncle 4–15 cm. Involucre coryliform, 7–12 mm in diam.; phyllaries in 3 or 4 rows, herbaceous, abaxially sparsely lanate to glabrescent, scarious margin hyaline; outer phyllaries linear-lanceolate, 3–4 mm, inner ones longer, linear-oblong. Receptacle conspicuously convex, conical-globose. Florets yellow, 5-lobed. Achenes ca. 2 mm, 5-ribbed, glabrous. Corona scales 5. Fl. and fr. Apr–Sep.

Mountain slopes, Gobi Desert; 500–1200 m. Gansu, Nei Mongol, Xinjiang, Xizang [Kazakhstan, Mongolia, Russia].

3. Cancrinia lasiocarpa C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 12: 30. 1892.

毛果小甘菊 mao guo xiao gan ju

Herbs, perennial, 7–15 cm tall, with slender woody taproot; stems erect or ascending, branched from base to ± form mat, white lanate. Petiole lanate, base enlarged; leaf blade lanceolate-ovate to oblong, 0.7–1.5 × 0.5–0.8 cm, pinnatisect, both surfaces gray-green, white lanate. Capitula solitary, terminal, several per plant; peduncle 4–8 cm. Involucres coryliform, 8–12 mm in diam.; phyllaries in 3 rows, herbaceous, scarious margin nearly absent, outer phyllaries linear-lanceolate, apex acute, inner ones linear-oblong, scarious margin broad, hyaline. Florets yellow, 5-lobed. Achenes ca. 2 mm, 5-ribbed, sparsely villous. Corona scales 5, 3 of these aristate mucronate. Fl. and fr. Jun–Sep.

Mountain slopes; 1500–2000 m. Gansu, Ningxia, Xizang [Mongolia].

4. Cancrinia chrysocephala Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 125. 1842.

黄头小甘菊 huang tou xiao gan ju

Herbs, perennial, scapose, with slender taproot; stems lanate. Leaves in basal rosettes; petiole longer than blade; leaf blade oblong or ovate, 2–3 × 0.5–1 cm, 2-pinnatipartite, both surfaces gray-white, densely lanate; primary lateral lobes 3- or 4-paired, linear-oblong to obovate; ultimate lobes obtuse or slightly acute at apex. Capitula solitary, terminal, several per plant; peduncle 2–8 cm. Involucre coryliform, 1–1.7 cm in diam.; phyllaries in 3 rows, abaxially densely lanate, scarious margin broad, brown or deep brown; outer phyllaries lanceolate or linear-lanceolate, inner ones longer, oblong-linear. Florets yellow, 5-lobed. Achenes 1.5–2.2 mm, 5- or 6-ribbed, glabrous, rarely sparsely pilose at apex. Corona scales 8–12, lanceolate, brownish. Fl. and fr. Jul–Aug.

Rocky places on mountain slopes, meadows, gravelly places, floodlands; 3300–3800(–4000) m. Xinjiang (Tian Shan) [Kazakhstan].

5. Cancrinia tianschanica (Krascheninnikov) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 315. 1961.

天山小甘菊 tian shan xiao gan ju

Cancrinia chrysocephala Karelin & Kirilov subsp. *tianschanica* Krascheninnikov, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 3: 81. 1922.

Herbs, perennial, ± scapose, to 10 cm tall, sparsely grayish hirsute, hairs simple. Basal leaves many, petiolate; leaf blade oblong or ovate, 2–3 × 0.5–1 cm, 2-pinnatipartite, both surfaces densely lanate; primary lateral lobes 3- or 4-paired; ultimate lobes obtuse or slightly acute at apex. Stem leaves very reduced, margin entire. Capitulum solitary, long pedunculate. Involucres coryliform, 4–6 mm in diam.; phyllaries in 3 rows, herbaceous, scarious margin narrow, glossy brown, outer phyllaries lanceolate or linear-lanceolate, inner ones longer, oblong-linear. Florets yellow, 5-lobed. Achenes 1.5–2.2 mm, 5- or 6-ribbed, sparsely pilose. Corona scales 8–12, linear or elliptic-linear. Fl. and fr. Jul–Aug.

Rocky places on mountain slopes, meadows, gravelly places, floodlands; ca. 3200 m. Xinjiang (Tian Shan) [Kazakhstan (C Tian Shan)].

158. RICHTERIA Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 126. 1842.

灰叶匹菊属 hui ye pi ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Subshrubs, basally woody; most parts tomentose; stems covered by sheathing leaf bases. Leaves alternate and basally rosulate, blade pinnatisect. Capitula solitary, pedunculate, radiate. Phyllaries with dark brown margins. Receptacle convex, epaleate. Ray florets female; lamina white. Disk corolla 5-lobed. Achenes faintly 6–10-ribbed, with sessile glands. Pappus of 6–10 obovate, apically brownish scales at least 1/2 as long as corolla.

Three species: Afghanistan, NW China, N India, Mongolia, Russia; C Asia, SW Asia (Iran); one species in China.

1. Richteria pyrethroides Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 127. 1842.

灰叶匹菊 hui ye pi ju

Chrysanthemum arassanicum C. Winkler; *C. artemisiifolium* Klatt; *C. pyrethroides* (Karelin & Kirilov) B. Fedtschenko; *C. richteria* Bentham; *C. transiliense* (Herder) Minkwitz; *Pyrethrum arassanicum* (C. Winkler) O. Fedtschenko; *P. pyrethroides* (Karelin & Kirilov) B. Fedtschenko ex Krascheninnikov; *P. transiliense* (Herder) Regel; *P. transiliense* var. *subsessile* Regel; *P. transiliense* var. *subvillosum* Regel; *P. transiliense* var. *tomentosum* Regel; *Tanacetum transiliense* Herder.

Herbs, perennial, (5–)10–40 cm tall, rhizomatous; stems erect or ascending, base covered with sheathing leaf bases, fascicled, rarely solitary, few branched or not, gray-white, villous with curved long simple hairs especially below capitulum. Basal leaves: petioles to 4 cm; leaf blade narrowly elliptic, 1.5–7 × 0.6–2 cm, 2-pinnatisect, both surfaces gray-white, densely or sparsely villous; primary lateral segments 3–8-paired; ultimate segments linear-lanceolate or ovate-lanceolate, sessile, rather small. Synflorescence terminal, with 1(–3) capitula, not conspicuously flat-topped. Involucre coryliform, 1–1.4 cm in diam.; phyllaries in 4 rows, scarious margin dark brown, outer phyllaries ovate or long ovate-triangular, 3–4(–6) mm, middle and inner ones narrowly lanceolate or oblanceolate, 5–15 mm, middle ones abaxially densely villous with fluffy curved long simple hairs, inner ones glabrous or nearly so abaxially. Ray florets white or pale red; lamina elliptic or narrowly elliptic, 5–15 mm, apex 3-denticulate. Achenes ca. 2.5 mm. Corona ca. 1 mm, divided to base. Fl. and fr. Jun–Aug.

Meadows, rocky mountain slopes, floodlands; below 3700 m. Xinjiang [N India, Kazakhstan, Russia, Uzbekistan].

159. HANDELIA Heimerl, Oesterr. Bot. Z. 71: 215. 1922.

天山蓍属 tian shan shi shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, perennial; stems 1 to few, thick, with wide pith; indumentum of basifixed hairs. Basal leaves large, petiolate; stem leaves small, sessile, oblong, 3-pinnatisect. Synflorescences cymose, dense or lax, ± flat-topped. Capitula homogamous, discoid. Involucres hemispheric; phyllaries in 3 rows, oblong, scarious margins broad. Receptacle conical, paleate; palea narrowly oblong or oblanceolate, scarious. Florets yellow, bisexual; corolla tubular, apex 5-lobed, gland-dotted. Anther bases obtuse, apical appendage acute. Style branches claviform-oblong. Achenes small, cuneate, inconspicuously 5-ribbed adaxially, with abaxial rim. Corona absent.

One species: Afghanistan, China, Kazakhstan, Pakistan, Uzbekistan.

1. Handelia trichophylla (Schrenk ex Fischer & C. A. Meyer) Heimerl, Oesterr. Bot. Z. 71: 215. 1922.

天山蓍 tian shan shi

Achillea trichophylla Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 48. 1841.

Herbs, perennial, 30–100 cm tall, with robust taproot; stem usually solitary, thick, striate, lower part densely dirty white

lanate, upper part glabrescent. Basal leaves petiolate; leaf blade oblong, 5–30 × 2–12 cm, 3-pinnatisect, densely pilose; ultimate segments subfiliform, sessile, smaller. Synflorescence lax or dense, ± flat-topped. Involucres hemispheric, ca. 5 mm in diam.; phyllaries in 3 rows, oblong, scarious margin broad, adaxially sparsely villous. Florets many, yellow, tubular, 5-lobed, gland-dotted. Achenes yellow-brown, cuneate, 1–1.5 × 0.3–0.5 mm, with abaxial rim. Corona absent.

Xinjiang [Afghanistan, Kazakhstan, Pakistan, Uzbekistan].

The description above is based on specimens from Kazakhstan and Uzbekistan and on the account in Fl. URSS (26: 125. 1961).

160. PSEUDOHANDELIA Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 878. 1961.

拟天山蒿属 ni tian shan shi shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, biennial to perennial, dying after flowering; stems 1–4, thick with wide pith; indumentum of basifixed hairs, arachnoid. Leaves alternate, 2- or 3-pinnatisect. Capitula many in dense pseudoumbel, long pedunculate, homogamous, discoid. Involucre hemispheric; phyllaries in 2 or 3 rows, margins scarious, pale; innermost phyllaries resembling receptacle scales. Receptacle hemispheric to conical, epaleate or with a few marginal palea. Florets yellow, bisexual, fertile, narrowly tubular with abruptly expanded campanulate limb, 5-lobed; tube glandular papillate. Anthers without basal appendages; apical appendage ovate-lanceolate, apex obtuse. Style branches linear, apex truncate. Achenes narrowly cylindric, curved, circular in cross section, inconspicuously 4- or 5-ribbed, glandular-papillate. Pappus absent.

One species: Afghanistan, China, Kazakhstan, Tajikistan, Turkmenistan; SW Asia (Iran).

1. Pseudohandelia umbellifera (Boissier) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 363. 1961.

拟天山蒿 ni tian shan shi

Tanacetum umbelliferum Boissier, Diagn. Pl. Orient., ser. 2, 3: 30. 1856; *Chrysanthemum floccosum* Kitamura; *C. trichophyllum* (Regel & Schmalhausen) Kuntze; *C. umbelliferum* (Boissier) Hoffmann; *Lepidolopsis umbellifera* (Boissier) Poljakov; *Pyrethrum trichophyllum* (Regel & Schmalhausen) Bornmüller & Sintenis (1900–1901), not Grisebach (1846); *P. umbelliferum* (Boissier) Boissier; *T. trichophyllum* Regel & Schmalhausen.

Herbs, biennial or short-lived perennial, dying after flowering, 20–100 cm tall, roots long and thick; stems solitary or few, robust, unbranched below synflorescence, base covered with persistent leaf bases; most parts densely arachnoid hairy. Leaf blade to 30 × 5–6 cm, bipinnate, ultimate segments linear, to 0.6 mm wide, with cartilaginous cusp. Synflorescence umbel-like. Capitula many, long pedunculate. Involucres hemispheric, 3–5 × 6–9 mm; outer phyllaries oblong, margin broadly scarious, erose; innermost phyllaries much narrower. Florets many; corolla yellow, with linear tube and abruptly expanded campanulate limb, 5-lobed, strongly glandular papillate. Achenes cylindric, 1.8–2.4 × ca. 0.3 mm, obscurely 4- or 5-ribbed, tuberculate, glandular. Corona absent.

Stony slopes, sands, gravel beds, etc. Xinjiang [Afghanistan, Kazakhstan, Tajikistan, Turkmenistan; SW Asia (Iran)].

No material from China was seen by the present authors. The description is based primarily on the account in Fl. URSS.

161. HIPPOLYTIA Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18. 288. 1957.

女蒿属 nü hao shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, perennial, sometimes stemless, small subshrubs, or cushion plants; indumentum of medifixed hairs. Leaves alternate, pinnatifid or 3-lobed. Synflorescences cymose, dense or lax, forming panicles, clusters, or heads. Capitula few to many, homogamous, discoid. Involucre campanulate or conical; phyllaries in 3 or 4 rows, herbaceous or rigidly herbaceous, scarious margins white or brown. Receptacle flat to convex, epaleate. Florets all bisexual; corolla tubular, apex 5-lobed. Anther bases obtuse, apical appendage ovate-lanceolate. Style branches linear, apex truncate. Achenes subterete, 4–7-ribbed, with a ± distinct apical rim. Corona absent.

Nineteen species: C Asia, China, Himalaya, Mongolia; 11 species (six endemic) in China.

Hippolytia dolichophylla (Kitamura) K. Bremer & Humphries (Bull. Nat. Hist. Mus. London, Bot. 23: 106. 1993; *Chrysanthemum dolichophyllum* Kitamura, Acta Phytotax. Geobot. 23: 73. 1968, based on *Tanacetum longifolium* Wallich ex Candolle, Prodr. 6: 130. 1838, not Thunberg (1800); *C. longifolium* K. H. Rechinger (1955), not Sessé & Mociño (1894); *T. dolichophyllum* (Kitamura) Kitamura; *T. himachalense* Aswal & Mehrotra, nom. illeg. superfl.) was recorded from Sichuan in Annot. Checkl. Fl. Pl. Nepal (69. 2000, as *T. dolichophyllum*), disjunct from the main area of distribution in the Himalaya between Kashmir and Nepal (see http://www.efloras.org/florataxon.aspx?flora_id=110&taxon_id=242425863; accessed 8 Apr 2011). No specimen has been seen by the present authors. This species would key out as *H. herderi*, but it differs from that species and all others in *Hippolytia* by having leaves 12–25 cm.

1a. Rosette or cushion plants with concealed stems, to 7 cm tall, usually less; capitula in very dense sessile clusters.
2a. Rosette plants with a single central cluster of capitula.
3a. Leaves 2-pinnatisect ..... 8. *H. glomerata*
3b. Leaves 3–7-pinnatisect ..... 9. *H. syncalathiformis*
2b. Cushion plants with several distinct clusters of capitula.
4a. Leaves spatulate, apex 3–6-lobed ..... 10. *H. gossypina*
4b. Leaves orbicular or flabelliform, biternate-palmately divided ..... 11. *H. kennedyi*
1b. Plants with obvious stems, 7–50 cm tall; capitula in pedunculate panicles.
5a. Capitula fascicled-corymbose at apices of branches or stem; involucres campanulate, glossy, yellowish or straw-colored, phyllaries in 4 or 5 rows, scarious margins pale brownish or white.
6a. Perennial herbs, often with a solitary stem ..... 3. *H. delavayi*
6b. Subshrubs.
7a. Leaves 2-pinnatisect, abaxially green or deep green, glabrous; florets ca. 3.2 mm ..... 2. *H. desmantha*
7b. Leaves pinnatipartite, abaxially gray-white, densely appressed pubescent; florets ca. 2 mm ..... 1. *H. kaschgarica*
5b. Capitula corymbose or glomerulate; involucres cuneate or cuneate-campanulate, matt, phyllaries in 3 or 4 rows, scarious margins dark brown.
8a. Leaves 3-pinnatisect; capitula many ..... 4. *H. yunnanensis*
8b. Leaves 2-pinnatisect; capitula 4–12.
9a. Plants to 30 cm tall; leaves narrowly elliptic or ovate, 2–4 cm, ultimate segments narrowly elliptic ..... 5. *H. herderi*
9b. Plants to 12 cm tall; leaves ovate, ultimate segments linear.
10a. Stem leaves sessile ..... 6. *H. senecionis*
10b. Stem leaves petiolate, petiole 5–10 mm ..... 7. *H. tomentosa*

1. Hippolytia kaschgarica (Krascheninnikov) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 290. 1957.

贺兰山女蒿 he lan shan nü hao

Tanacetum kaschgaricum Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 1: 175. 1933; *Chrysanthemum alashanense* (Y. Ling) Y. Ling; *Hippolytia alashanensis* (Y. Ling) C. Shih; *Poljakovia alashanensis* (Y. Ling) Grubov & Filatova; *P. kaschgarica* (Krascheninnikov) Grubov & Filatova; *T. alashanense* Y. Ling.

Subshrubs or small shrubs, 25–50 cm tall; old branches dark gray or gray-brown; branchlets of current year somewhat gray-white, indumentum dense and appressed powdery. Leaves in basal rosettes and scattered along stems; petiole 3–8 mm; leaf blade narrowly elliptic, lanceolate, or elliptic, 1.5–2 × 0.5–1 cm, pinnatipartite, abaxially gray-white, densely appressed pubescent, adaxially green, glabrescent; lateral lobes 2–5-paired, all lobe margins entire or 1- or 2-toothed on one side; leaves below synflorescences sometimes simple, entire. Synflorescence a dense terminal flat-topped cyme; capitula 3–10, peduncle 0.5–1.5 cm, pubescent with appressed white powdery hairs. Involucre campanulate, 4–5 mm in diam.; phyllaries in 4 rows, rigidly herbaceous, glossy, yellowish or straw-colored, scarious margin brown or white, outer phyllaries lanceolate, ca. 1.8 mm, middle and inner ones oblanceolate, ca. 3 mm. Florets yellow, ca. 2 mm. Achenes ca. 1.5 mm. Fl. and fr. Aug–Oct.

• Mountain slopes, fissures of rocks, grasslands, desert steppes; 1900–2300 m. Gansu, Nei Mongol, Ningxia, Xinjiang.

Tzvelev (Fl. URSS 26: 412. 1961) suggested that this species would have to be removed from *Hippolytia*. Bremer and Humphries (Bull. Nat. Hist. Mus. London, Bot. 23: 106. 1993) also regarded this species as anomalous, and it was subsequently transferred by Grubov and Filatova to the new genus *Poljakovia* (Novosti Sist. Vyssh. Rast. 33: 227. 2001).

Filatova (Rast. Tsentral. Azii 14a: 30–31. 2007) treated *Hippolytia alashanensis* and *H. kaschgarica* as distinct species in *Poljakovia*: *P. alashanensis* with lower cauline leaves and leaves of sterile shoots pinnatisect, lateral segments linear, apex shortly cuspidate; and *P. kaschgarica* with lower cauline leaves and leaves of sterile shoots pinnatifid, lateral segments oblong-lanceolate, entire, apex subobtuse.

2. Hippolytia desmantha C. Shih, Acta Phytotax. Sin. 17(4): 63. 1979.

束伞女蒿 shu san nü hao

Subshrubs, 10–15 cm tall; old branches gray; young branches greenish or brown-green, pubescent with appressed powdery hairs. Leaves with petioles ca. 5 mm; leaf blade ovate, elliptic, obliquely elliptic, or narrowly flabelliform, 0.5–2 × 1–1.5 cm, both surfaces green, glabrous, 2-pinnatisect; primary lateral segments 2- or 3-paired; ultimate segments linear, narrowly elliptic, or lanceolate; leaves below synflorescence sometimes pinnatisect. Capitula 3–5, fascicled-corymbose at apices of branches, pedunculate; peduncle slender, ca. 1.5 cm, pubescent with appressed powdery hairs. Involucres campanulate, 4–5 mm in diam.; phyllaries in 4 rows, rigidly herbaceous, glossy, yellow-white or straw-colored, margin brownish, outer ones triangular-ovate, 1.5–2 mm, middle and inner ones narrowly elliptic or oblanceolate, ca. 4 mm. Florets yellow, ca. 3.2 mm. Achenes ca. 2 mm. Fl. and fr. Aug.

• Meadows, rock outcrops on valley slopes; 3800–3900 m. Qinghai (Yushu).

3. Hippolytia delavayi (Franchet ex W. W. Smith) C. Shih, Acta Phytotax. Sin. 17(4): 65. 1979.

川滇女蒿 chuan dian nü hao

Tanacetum delavayi Franchet ex W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 345. 1915; *Chrysanthemum bulbosum* (Handel-Mazzetti) Handel-Mazzetti; *C. delavayi* (Franchet ex W. W. Smith) Handel-Mazzetti; *T. bulbosum* Handel-Mazzetti.

Herbs, perennial, 7–25 cm tall; stems erect, solitary, unbranched, somewhat scapelike, densely villous. Leaves in basal rosettes and scattered along stems; basal leaves: petiole 2–6 cm; leaf blade elliptic or narrowly elliptic, 2–7.5 × 1–2.5 cm, 2-pinnatisect, abaxially densely or sparsely villous, adaxially glabrous or nearly so; primary lateral segments 4–11-paired; ultimate segments linear, triangular-lanceolate, or falcate. Stem leaves few, similar to basal leaves, small; uppermost stem leaves pinnatifid. Synflorescence a terminal flat-topped cluster. Capitula 6–11; peduncles ca. 2 mm, villous or pubescent. Involucres campanulate, ca. 5 mm in diam.; phyllaries in 4 rows, rigidly herbaceous, glossy, yellow-white, scarious margin pale brown or white, outer phyllaries lanceolate, ca. 4 mm; middle and inner ones narrowly elliptic, elliptic-oblanceolate, or oblanceolate, 4.5–5 mm. Achenes ca. 2 mm, with a ± distinct apical rim. Fl. and fr. Aug–Oct.

• Alpine meadows; 3300–4000 m. Sichuan, Yunnan.

4. Hippolytia yunnanensis (Jeffrey) C. Shih, Acta Phytotax. Sin. 17(4): 65. 1979.

云南女蒿 yun nan nü hao

Tanacetum yunnanense Jeffrey, Notes Roy. Bot. Gard. Edinburgh 5: 188. 1912; *Chrysanthemum yunnanense* (Jeffrey) Handel-Mazzetti.

Herbs, perennial, 27–40 cm tall; stems erect, stout, upper parts corymbosely branched, red-purple, gray-white below synflorescence, densely villous, progressively sparsely villous toward base. Leaves in basal rosettes and scattered along stems; basal leaves: petiole to 13 cm; leaf blade elliptic or narrowly elliptic, 5–12 × 3–6 cm, 3-pinnatisect, abaxially villous, adaxially glabrescent or glabrous; primary lateral segments 11–14-paired; ultimate segments linear; stem leaves similar to basal leaves. Synflorescence a terminal ± flat-topped panicle or compound panicle. Capitula many, branches densely villous. Involucres cuneate or cuneate-campanulate, ca. 5 mm in diam.; phyllaries in 3 rows, abaxially sparsely villous, scarious margin dark brown, outer phyllaries lanceolate, ca. 3.5 mm, middle and inner ones lanceolate, oblanceolate, or narrowly elliptic, 3.5–4 mm, abaxially glabrous. Florets yellow, ca. 3 mm. Fl. Jun–Sep.

• Alpine meadows; 3400–4000 m. Yunnan.

5. Hippolytia herderi (Regel & Schmalhausen) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 289. 1957.

新疆女蒿 xin jiang nü hao

Tanacetum herderi Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 169. 1878; *Hippolytia leucophylla* (Regel) Poljakov; *T. leucophyllum* Regel.

Herbs, perennial, 10–30 cm tall; stems erect or ascending, with short flowering branches toward apex, sparsely pubescent, or glabrescent. Leaves in basal rosettes and scattered along stems; basal leaves and leaves on vegetative branches: petiole 3–5 cm; leaf blade narrowly elliptic or ovate, 2–4 × 1–1.5 cm, 2-pinnatisect, both surfaces gray-white, pubescent; primary lateral segments 2–4-paired; ultimate segments narrowly elliptic. Stem leaves similar to basal leaves, shortly petiolate. Synflorescence a terminal dense or lax flat-topped cyme. Capitula 3–10. Involucre broadly cuneate or hemispheric, ca. 1 cm in diam.; phyllaries in 3 rows, abaxially sparsely pubescent, scarious margin broad, dark brown, outer phyllaries lanceolate, ca. 2 mm, middle and inner ones narrowly elliptic, 5–6 mm. Florets yellow, ca. 3.5 mm. Fl. Sep.

Mountain regions, meadows; ca. 2500 m. Xinjiang (Xinyuan) [Kazakhstan].

6. Hippolytia senecionis (Jacquemont ex Besser) Poljakov ex Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 414. 1961.

普兰女蒿 pu lan nü hao

Artemisia senecionis Jacquemont ex Besser, Bull. Soc. Imp. Naturalistes Moscou 9: 75. 1836; *Tanacetum senecionis* (Jacquemont ex Besser) J. Gay ex Candolle.

Herbs, perennial, ca. 12 cm tall; stem solitary, gray-white, appressed pubescent especially below capitula. Leaves in basal rosettes and scattered along stems; basal leaves: petiole 0.8–1.5 cm; leaf blade ovate, ca. 1.2 × 1 cm, 2-pinnatisect, both surfaces gray, densely pubescent; primary lateral segments 3-paired; ultimate segments narrowly elliptic. Stem leaves similar to basal leaves, few; leaves below synflorescence pinnatifid. Synflorescence a terminal flat-topped cyme, ca. 2 cm in diam. Capitula ca. 6; peduncle densely lanate. Involucres cuneate-campanulate, 5–6 mm in diam.; phyllaries in 4 rows, abaxially lanate, scarious margin dark brown, outer phyllaries lanceolate, ca. 4 mm, middle ones narrowly lanceolate or oblanceolate, 5–5.5 mm, abaxially pubescent, inner ones similar but abaxially glabrous. Florets yellow, ca. 3.5 mm. Fl. Aug.

Desert steppes; 2000–3700 m. W Xizang (Burang) [India].

7. Hippolytia tomentosa (Candolle) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 416. 1961.

灰叶女蒿 hui ye nü hao

Tanacetum tomentosum Candolle, Prodr. 6: 130. 1838.

Herbs, perennial; stems solitary or fascicled, ca. 9 cm tall, erect, gray-white, appressed pubescent especially near capitula. Basal leaves with petiole 1–1.5 mm; leaf blade ovate, ca. 1.3 × 1 cm, both surfaces gray-white, densely pubescent, 2-pinnatisect; primary lateral segments 2- or 3-paired; ultimate segments narrowly elliptic. Stem leaves similar to basal leaves; leaves below synflorescence pinnatisect. Capitula 4–6, in apical dense corymb, pedunculate; peduncle very short, densely lanate or villous. Involucres campanulate, ca. 7 mm in diam.; phyllaries in 3 rows, abaxially villous, margin dark brown or pale brown scarious, outer ones lanceolate, ca. 4 mm, middle and inner ones elliptic or narrowly elliptic, 3–5 mm. Florets yellow, ca. 3.5 mm. Fl. Jun.

Deserts; 3500–3700(–4700) m. Xizang [Kashmir].

8. Hippolytia glomerata C. Shih, Acta Phytotax. Sin. 17(4): 67. 1979.

团伞女蒿 tuan san nü hao

Herbs, perennial, stemless; taproot long. Leaves in a single dense basal rosette around synflorescence; leaf blade narrowly ovate, elliptic, or narrowly elliptic, 1–1.5 × 0.5–0.8 cm, 2-pinnatisect, both surfaces densely villous; primary lateral segments 2–4-paired; ultimate segments narrowly elliptic or elliptic-lanceolate. Synflorescence a dense hemispheric glomerule, ca. 2 cm in diam. Capitula many. Involucres cuneate-campanulate, ca. 6 mm in diam.; phyllaries in 3 rows, abaxially villous, scarious margin dark brown; outer phyllaries lanceolate, 5–7 mm, middle and inner ones oblanceolate, 4–5 mm. Florets yellow, ca. 3.5 mm. Fl. Aug.

• Alpine meadows; ca. 4600 m. Xizang (Nyêmo).

9. Hippolytia syncalathiformis C. Shih, Acta Phytotax. Sin. 17(4): 66. 1979.

合头女蒿 he tou nü hao

Herbs, perennial, stemless; taproot long. Leaves in a single dense basal rosette around synflorescence; petiole 0.7–1.7 cm; leaf blade narrowly elliptic, 0.5–1 × 0.3–0.5 cm, 3–7-pinnatisect, abaxially densely villous, adaxially sparsely villous or subglabrescent; segments linear; sometimes leaves linear and entire. Synflorescence a dense hemispheric glomerule ca. 2 cm in diam. Capitula many. Involucres cuneate-campanulate, ca. 6 mm in diam.; phyllaries in 3 rows, herbaceous, abaxially villous, scarious margin dark brown, outer phyllaries lanceolate, 5–7 mm, middle and inner ones oblanceolate, 4–5 mm. Florets yellow, ca. 3 mm. Fl. Sep.

• Alpine meadows, rocky slopes; 4500–5500 m. Xizang.

10. Hippolytia gossypina (C. B. Clarke) C. Shih, Acta Phytotax. Sin. 17(4): 67. 1979.

棉毛女蒿 mian mao nü hao

Tanacetum gossypinum C. B. Clarke, Compos. Ind. 154. 1876.

Cushion plants, ca. 7 cm tall. Leafy shoots densely compact, with dense overlapping leaves. Leaves inconspicuously petiolate; leaf blade spatulate, 1–1.2 × 0.35–0.7 cm, white or gray-white, both surfaces densely long lanate, apex truncate or rounded, 3–6-divided. Capitula 10, in a dense corymb ca. 2.5 cm in diam. at apices of branches. Involucres cuneate, ca. 6 mm in diam.; phyllaries in 3 rows, outer ones linear, ca. 7 mm, abaxially densely long lanate, middle and inner ones oblanceolate, ca. 5 mm, abaxially lanate above middle part or at upper part in inner ones. Florets yellow, ca. 3 mm. Fl. Aug–Oct.

Deserts, alpine gravel heaps, exposed rocks at mountain summits; 4500–5400 m. Xizang (Yadong) [Bhutan, India, Nepal].

11. Hippolytia kennedyi (Dunn) Y. Ling, Acta Phytotax. Sin. 17(4): 67. 1979.

垫状女蒿 dian zhuang nü hao

Tanacetum kennedyi Dunn, Bull. Misc. Inform. Kew 1922: 117. 1922; *Chrysanthemum kennedyi* (Dunn) Kitamura.

Cushion plants, dense, 2–4 cm tall, with long thick roots; stems much branched, branches with dense thick leaf remnants. Leaves in dense rosettes at or near ground level; petiole 0.5–1.2 cm; leaf blade orbicular or flabelliform, 0.2–0.4 × 0.3–0.6 cm, biternately palmatisect or 2-pinnatisect, both surfaces densely dirty yellow, gray-white villous, or lanate. Synflorescence a large, dense, hemispheric glomerule, ca. 10 cm in diam. Capitula many; peduncle ca. 4 mm, densely villous. Involucres cuneate, ca. 7 mm in diam.; phyllaries in 3 rows, abaxially villous, especially in outer and middle ones, scarious margin dark brown, outer phyllaries lanceolate, ca. 4 mm, middle ones narrowly elliptic, ca. 3.5 mm, inner ones oblanceolate, ca. 3 mm. Florets yellow, ca. 3.5 mm. Achenes ca. 1.5 mm. Fl. and fr. Aug–Sep.

Gravelly places of alpine deserts; 4700–5200 m. Xizang [India].

The whole plant is used medicinally for treating laryngitis.

162. KASCHGARIA Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 282. 1957.

喀什菊属 ka shi ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Subshrubs; indumentum of stellate hairs. Leaves alternate, sessile, margin entire or at least apically parted. Synflorescences cymose; capitula in dense panicles or clusters, rather small, heterogamous, disciform. Involucres ovoid cupular; phyllaries in 2–4 rows. Receptacle convex, epaleate. Marginal florets 3–5, female, fertile; corolla pitcher-shaped, tapering above, apex 2- or 3-toothed. Disk florets many, bisexual; corolla tubular, apex 5-lobed, with scattered stellate hairs at apex. Anther bases obtuse; apical appendage lanceolate. Style branches linear, apex truncate. Achenes obovoid, obtusely angular, upper part striate. Corona absent.

Two species: China, Kazakhstan, Mongolia; two species in China.

1a. Fertile shoots with long declined branchlets; leaves narrowly lanceolate to linear, 1.7–5 mm wide, margin usually entire, occasionally 3-parted ..... 1. *K. brachanthemoides*

1b. Fertile shoots with short branchlets; leaves spatulate or oblanceolate, 7–15 mm wide, apex 3–5-partite, rarely pinnatisect ..... 2. *K. komarovii*

1. Kaschgaria brachanthemoides (C. Winkler) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 283. 1957.

密枝喀什菊 mi zhi ka shi ju

Artemisia brachanthemoides C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 422. 1886; *Tanacetum brachanthemoides* (C. Winkler) Krascheninnikov.

Subshrubs, ca. 50 cm tall; old branches grayish, year-old

branches virgate, narrowly angular, straw-colored in lower part, green in upper part. Middle leaves sessile; leaf blade linear to narrowly lanceolate, 1–2 × 0.17–0.5 cm, both surfaces glabrous or scattered pubescent with stellate hairs, margin entire, occasionally 3-parted. Distal leaves gradually smaller, linear. Synflorescence an irregular panicle, longer than wide, individual cymes with 2–5 capitula. Capitula ovoid, sessile or shortly pedunculate. Involucres cupular, ca. 2 mm in diam.; phyllaries in 2–4 rows, margin scarious, abaxially with scattered sessile glands, outer ones small, suborbicular, inner ones large, broadly elliptic or lanceolate-elliptic. Corolla yellow, exterior with scattered stellate hairs and sessile glands outside; marginal female florets 3–5, narrowly clavate, tapering above, ca. 1.7 mm, apex minutely 3-toothed; disk florets many, tubular, 1.8–2 mm, 5-lobed. Achenes narrowly obovoid, 1–1.3 mm, glabrous, inconspicuously obtusely 2- or 3-angular, apex truncate. Pappus absent.

Dry mountain valleys, old dry riverbeds; 1000–1500 m. Xinjiang (Toksun) [Kazakhstan].

2. Kaschgaria komarovii (Krascheninnikov & N. I. Rubtzov) Poljakov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 18: 284. 1957.

喀什菊 ka shi ju

Tanacetum komarovii Krascheninnikov & N. I. Rubtzov in Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 168. 1946; *Chrysanthemum komarovii* (Krascheninnikov & N. I. Rubtzov) S. Y. Hu.

Subshrubs, 40–55 cm tall; old branches grayish; year-old branches with lower parts straw-colored, upper parts pale green, scattered stellate pubescent. Middle stem leaves sessile; leaf blade spatulate or oblanceolate, 1–3 × 0.7–1.5 cm, apex 3–5-partite, rarely pinnatisect, sparsely stellate pubescent; upper stem leaves entire. Synflorescence a dense flat-topped fascicle sometimes with additional axillary capitula below. Capitula 3–5(–8). Involucre cupular, 2–3 mm in diam.; phyllaries in 2–4 rows, margin scarious, outer phyllaries suborbicular, inner ones broadly ovate. Florets yellow, exterior scattered stellate pubescent; marginal female florets 3–5, ascidiform, tapering above, 3-denticulate; disk florets many, tubular. Achenes ovoid, 1–1.2 mm.

Barren rocky slopes, rocky floors of gorges; 800–2000 m. Xinjiang [Kazakhstan, Mongolia].

163. LEUCANTHEMELLA Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 137. 1961.

小滨菊属 xiao bin ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Decaneurum Schultz Bipontinus, Tanaceteen, 44. 1844, not Candolle (1833).

Herbs, perennial, with procumbent rhizomes; indumentum absent or of basifixed and medifixed hairs. Leaves alternate, entire or pinnatipartite. Synflorescence a lax, ± flat-topped cyme, often reduced to solitary capitulum. Capitula heterogamous, radiate. Involucre coryliform; phyllaries in 2 or 3 rows, scarious margins brown or dark brown. Receptacle convex, epaleate. Marginal florets in 1 row, female, usually sterile; lamina white or reddish. Disk florets many, yellow, bisexual; corolla tubular, apex 5-lobed. Anther bases obtuse, apical appendage ovate or elliptic-ovate. Style branches linear, apex truncate. Achenes distinctly 8–12-ribbed, with apical rim. Corona absent.

Two species: China, Japan, Korea, Russia; Europe; one species in China.

1. Leucanthemella linearis (Matsumura) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 139. 1961.

小滨菊 xiao bin ju

Chrysanthemum lineare Matsumura, Bot. Mag. (Tokyo) 13: 83. 1899; *C. lineare* var. *manshuricum* Komarov; *Tanacetum lineare* (Matsumura) Kitamura.

Herbs, perennial, 25–90 cm tall, with long procumbent rhizomes; stems erect, usually clustered, unbranched except for synflorescence, pubescent or glabrous. Basal and lower stem leaves withered by anthesis. Middle stem leaves sessile; leaf blade elliptic or lanceolate, 5–8 × 2–4 cm, pinnatipartite below middle, abaxially gland-dotted, adaxially asperous with acute papillae; terminal and lateral lobes ± linear, lateral lobes 1–3-paired. Synflorescence a terminal flat-topped cyme. Capitula 1–8, long pedunculate. Involucre coryliform, 1–1.5 cm in diam.; phyllaries in 2 or 3 rows, abaxially glabrous or nearly so, scarious margin brown or dark brown, outer phyllaries linear-lanceolate, inner ones narrowly elliptic. Ray florets: limb white, 1–2 cm, apex 2- or 3-denticulate. Disk florets yellow, 5-lobed. Achenes ca. 3 mm, with apical rim. Fl. and fr. Aug–Sep. $2n = 18$.

Marshlands, wet grasslands. Heilongjiang, Jilin, Nei Mongol [Japan, Korea, Russia].

164. MICROCEPHALA Pobedimova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 356. 1961.

小花菊属 xiao hua ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, annual; indumentum of basifixed hairs. Leaves alternate, pinnatisect. Synflorescence of solitary terminal capitula. Capitula pedunculate, heterogamous, radiate or disciform. Involucre hemispheric; phyllaries in 2 or 3 rows, scarious margins broad, pale.

Receptacle conical, hollow, epaleate. Marginal florets female, fertile; lamina when present white, usually absent in Chinese material. Disk florets yellow or reddish, bisexual, fertile; corolla tubular, inflated at base, apex 5-lobed. Anther appendages ovoid, almost 1/2 as long as anthers. Achenes circular to slightly dorsiventrally compressed in cross section, with 3–5 adaxial ribs, with multicellular hairs between ribs. Corona lacerate or fimbriate, slightly longer adaxially. $x = 7$.

Five species: Afghanistan, China, Kazakhstan, Kyrgyzstan, Pakistan, Turkmenistan; SW Asia (Iran); one species in China.

1. Microcephala subglobosa (Krascheninnikov) Pobedimova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 358. 1961.

近球状小花菊 jin qiu zhuang xiao hua ju

Matricaria subglobosa Krascheninnikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 345. 1937.

Herbs, annual, 3–15 cm tall; stems simple or branched from base, sparsely white lanate. Leaves succulent, petiolate; leaf blade (0.8–)1–2(–3) × (0.3–)0.5–0.7(–1) cm, pinnate, sparsely grayish lanate; segments linear-lanceolate, apex acute; uppermost leaves linear. Capitula solitary; peduncle long, apically thicker, pubescent. Involucre very broadly obconical, 4–10 mm wide; phyllaries linear-oblong, slightly recurved, green, margin narrowly membranous. Marginal florets usually absent, white when present; usually florets all tubular, lemon-yellow, slightly constricted in middle but not inflated below this, exserted from involucre. Achenes 1–1.5 × 0.25–0.5 mm, abaxially slightly convex, adaxially with 3 or 4 obscure ribs, densely white scaly in broader part. Corona oblique, to 0.5 mm, not deeply lacerate, lobes acuminate.

Xinjiang (Tian Shan) [Kazakhstan, Kyrgyzstan, Turkmenistan].

Microcephala subglobosa is atypical of the genus as a whole, which usually has prominent ray florets and disk florets that are obviously inflated at the base. It is known from China by only a single gathering.

165. OPISTHOPAPPUS C. Shih, Acta Phytotax. Sin. 17(3): 110. 1979.

太行菊属 tai hang ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, perennial, with somewhat woody stem basally. Leaves pinnatisect. Capitula heterogamous, radiate, 1–3 at apex, corymbose. Involucres cup-shaped; phyllaries in 4 rows, with broad scarious margins. Receptacle convex to conical, epaleate. Ray florets in 1 row; lamina white or pink. Disk florets many, bisexual, yellow, tubular, 5-lobed. Anthers obtuse at base, with apical lanceolate appendage. Style branches linear, apex truncate. Achenes obovoid, 3- or 4-ribed. Pappus represented by 4–6 separate, unequal, mainly abaxial subulate scales.

• One species: China.

1. Opisthopappus taihangensis (Y. Ling) C. Shih, Acta Phytotax. Sin. 17(3): 112. 1979.

太行菊 tai hang ju

Chrysanthemum taihangense Y. Ling, Contr. Bot. Surv. N.W. China 1(2): 22. 1939; *Opisthopappus longilobus* C. Shih.

Herbs, perennial, 10–30 cm tall; stems ascending, purple-red or brown, densely or sparsely appressed pubescent, base somewhat woody. Basal leaves: petiole more than 0.5 cm; leaf blade ovate, broadly ovate, or elliptic, 2.5–3.5 × 2–2.5 cm, 1- or 2-pinnatisect, both surfaces sparsely pubescent or glabrous; primary lateral segments 2- or 3-paired; ultimate segments linear, falcate, lanceolate, or obliquely triangular. Stem leaves similar to basal leaves; uppermost leaves pinnatifid. Capitula 1–3 at apices of branches. Involucre coryliform, ca. 1.5 cm in diam., abaxially glabrous or nearly so; phyllaries in 4 rows, abaxially rather densely pubescent, outer and middle phyllaries linear or oblanceolate, 4–5.5 mm, inner ones narrowly elliptic, 6–7 mm. Ray florets white or pink; lamina linear, ca. 2 cm, apex 3-denticulate. Disk florets yellow, 5-lobed. Achenes obovoid, ca. 1.2 mm, 3–5-ribbed. Corona scales 4–6, mainly abaxial.

• On rocks of mountain slopes, cliffs; 800–1200 m. Hebei, Henan, Shanxi.

The capitula are used to treat diseases of the liver.

166. STILPNOLEPIS Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 207. 1946.

百花蒿属 bai hua hao shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Elachanthemum Y. Ling & Y. R. Ling.

Herbs, annual. Leaves opposite or alternate, pinnatisect, few lobed or entire. Capitula hemispheric or globose, homogamous, discoid, laxly corymbose or solitary at apex of branches. Involucres hemispheric or cupular-hemispheric; phyllaries in 3–5 rows, herbaceous, margin broadly scarious. Receptacle convex-subconical, epaleate. Florets tubular, bisexual, 5-lobed, with distinct tube and ± crateriform limb. Anther obtuse at base, with apical acuminate-triangular appendage. Style branches linear, apex truncate. Achenes obliquely obovoid to narrowly obovoid-oblanceolate, densely glandular, striate. Pappus absent.

Two species: China, Mongolia; two species in China.

Oberprieler et al. (in Kadereit & C. Jeffrey, Fam. Gen. Vasc. Pl. 8: 349, 357, 364. 2007) accepted *Elachanthemum* as a distinct genus on the basis of the smooth pollen, which placed it in a different group of genera from *Stilpnolepis*.

1a. Capitula 8–20 mm in diam., nodding or declined; phyllaries abaxially glabrous, without midrib; lateral leaf segments grouped at leaf base ..... 1. *S. centiflora*
1b. Capitula 5–6 mm in diam.; phyllaries abaxially floccose, with green midrib; lateral leaf segments uniformly distributed along leaf ..... 2. *S. intricata*

1. Stilpnolepis centiflora (Maximowicz) Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 209. 1946.

百花蒿 bai hua hao

Artemisia centiflora Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 26: 493. 1880; *A. centiflora* var. *pilifera* Y. Ling; *Stilpnolepis centiflora* var. *pilifera* (Y. Ling) H. C. Fu.

Herbs, annual, ca. 40 cm tall, with robust fusiform taproots; stems erect, striate, corymbosely branched in upper part, pubescent. Leaves sessile; leaf blade narrowly lanceolate to linear, 3.5–10 × 0.2–0.4 cm, pinnatisect, both surfaces sparsely pubescent; lateral segments 2- or 3-paired, crowded at base of leaf, stipulelike, short, linear; terminal segments linear, long. Synflorescence a lax, flat-topped cyme. Capitula nodding or declined; peduncle 1.5–3 cm. Involucre cupular-hemispheric, 0.8–2 cm in diam.; phyllaries in 4 or 5 rows, scarious margin broad, outer phyllaries broadly ovate, ca. 7 mm, middle and inner ones ovate or broadly obovate, ca. as long as outer ones or somewhat shorter. Florets many, bisexual, fertile, yellow, 5-lobed, with distinct tube and bowl-shaped limb. Achenes narrowly obovoid-triangular, 5–6 mm, densely glandular, inconspicuously striate. Pappus absent.

Dunes; 1100–1300 m. Gansu, Nei Mongol, Ningxia, Shaanxi [Mongolia].

2. Stilpnolepis intricata (Franchet) C. Shih, Acta Phytotax. Sin. 23: 471. 1985.

紊蒿 wen hao

Artemisia intricata Franchet, Nouv. Arch. Mus. Hist. Nat., sér. 2, 6: 50. 1883; *Elachanthemum intricatum* (Franchet) Y. Ling & Y. R. Ling; ?*E. intricatum* var. *macrocephalum* H. C. Fu.

Herbs, annual, with robust taproots; stems much branched from base, reddish or yellow-brown, sparsely pubescent. Leaves sessile; leaf blade elliptic or broadly ovate, 1–3 × 0.5–1.5 cm, pinnatisect, both surfaces sparsely pubescent; lateral segments 3-paired, linear; distal leaves 3–5-divided or entire. Synflorescences racemelike, forming lax panicle. Capitula pedunculate. Involucres hemispheric, 5–6 mm in diam.; phyllaries in 3–5 rows, ovate or broadly ovate, equal or outer ones somewhat shorter, with green midvein, abaxially sparsely pilose, scarious margin hyaline. Florets many, bisexual, yellow, 5-lobed, with a distinct tube and cupular limb. Achenes obliquely obovoid, 10–20-striate. Fl. and fr. Sep–Oct.

Deserts, steppes; 1300–1400 m. Gansu, Nei Mongol, Ningxia, Qinghai, Xinjiang [Mongolia].

167. ACHILLEA Linnaeus, Sp. Pl. 2: 896. 1753.

蓍属 shi shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Millefolium Miller; *Ptarmica* Miller.

Herbs, perennial, usually rhizomatous; indumentum of basifixed or sometimes submedifixed hairs. Leaves alternate, pinnatilobed to pinnatisect, rarely entire. Synflorescences cymose, usually ± flat-topped panicles, rarely capitula few together or solitary. Capitula relatively small, heterogamous, radiate, rarely homogamous and discoid. Involucres oblong, ovoid, or hemispheric; phyllaries in 2 or 3 rows, scarious margins brown- or yellowish white. Receptacle flat to convex, conical or rarely much elongated, paleate. Marginal florets in 1 row, female, fertile; lamina white, pink, red, or yellow, rather short and wide, occasionally absent. Disk florets yellow or pink, bisexual, corolla tubular, apex 5-lobed, ± winged, flattened, basally slightly saccate around achene especially adaxially. Anther bases obtuse, apical appendage lanceolate. Achenes dorsiventrally flattened with 2 lateral ribs. Corona absent.

About 200 species: mostly in Europe and temperate Asia; 11 species (one endemic, one introduced) in China.

Achillea sibirica Ledebour subsp. *subcartilaginea* Heimerl (Denkschr. Kaiserl. Akad. Wiss., Wien. Math.-Naturwiss. Kl. 48(2): 188. 1884; *A. subcartilaginea* (Heimerl) Heimerl, Acta Horti Gothob. 12: 254. 1938), described from Japan and reported from Shaanxi (*Giraldi 2943*; *Limpricht 2803*), may be a form of *A. alpina*. The taxon was not mentioned in Fl. URSS (26. 1961) or Rast. Tsentral. Azii (14a. 2007).

1a. Leaves entire, margin serrulate.
2a. Leaves glabrous; ray floret lamina ca. 7 × 5 mm; paleae yellow villous at apex ..... 4. *A. acuminata*
2b. Leaves densely pubescent, depressed gland-dotted; ray floret lamina 3.2–3.5 × 3–3.8 mm; paleae white villous at apex ..... 5. *A. salicifolia*
1b. Leaves pinnately to tripinnately divided.
3a. Leaves pinnately divided.

4a. Ray floret lamina 4–7 × 4–6 mm; segments or pinnae of leaves minutely spiniform-serrulate or 1- or 2-dentate or lobed.
5a. Rhizomes short; leaves pinnatisect; capitula 5–8 or more ..... 6. *A. impatiens*
5b. Rhizomes long and slender; leaves pinnatilobed or pinnatipartite to pinnatisect; capitula 3–5 ..... 7. *A. ledebourii*
4b. Ray floret lamina 0.8–2.5 × 1–3 mm; pinnae of leaves with unequal teeth.
6a. Involucres subglobose or broadly ovoid, (4–)5–7 mm in diam.; phyllaries with broad brown margin; leaves sparsely gland-dotted or not gland-dotted ..... 8. *A. alpina*
6b. Involucres ovoid, 3.5–4 mm in diam.; phyllaries with narrow yellow or brown margin; leaves densely gland-dotted ..... 9. *A. ptarmicoides*
3b. Leaves bipinnately or tripinnately divided.
7a. Leaves 2-pinnatisect, primary segments elliptic-lanceolate, 5–10 × 2–4 mm, ultimate segments few, lanceolate, not overlapping.
8a. Involucres 4–6 mm in diam. ..... 10. *A. wilsoniana*
8b. Involucres 1.5–2(–2.5) mm in diam. ..... 11. *A. nobilis*
7b. Leaves mostly tripinnatisect, lower stem leaf blades very narrow, ultimate segments 1–2(–3) mm, overlapping transversely.
9a. Rachis 1.5–2 mm wide; ultimate segments of leaves relatively broad, lanceolate, rarely linear, 0.3–0.5 mm wide ..... 1. *A. millefolium*
9b. Rachis 0.5–1 mm wide; ultimate segments of leaves relatively narrow, 0.1–0.5 mm wide, filiform-linear or linear to lanceolate.
10a. Ray floret lamina yellowish white, relatively small; involucres narrowly oblong, 4–4.5 × 2–2.5 mm; phyllaries sometimes with brownish narrow margin ..... 2. *A. setacea*
10b. Ray floret lamina pink, rarely turning white, relatively large; involucres oblong, 4–5 × 2.5–3 mm, with conspicuous brown or brownish margin ..... 3. *A. asiatica*

1. Achillea millefolium Linnaeus, Sp. Pl. 2: 899. 1753.

蓍 shi

Herbs, perennial, 40–100 cm tall, with long rhizomes; stems erect, unbranched or branched in upper part, often with short sterile branches at leaf axils above middle, striate, usually white villous. Leaves sessile; leaf blade lanceolate, oblong-lanceolate, or sublinear, 5–20 × 1–2.5 cm, (2 or)3-pinnatisect, abaxially densely villous, adaxially densely depressed glandular punctuate; ultimate segments lanceolate to linear, 0.5–1.5 × 0.3–0.5 mm, apex cartilaginous-mucronulate. Synflorescence a terminal flat-topped panicle 2–6 cm in diam. Capitula many. Involucres oblong or subovoid, ca. 4 × 3 mm; phyllaries in 3 rows, elliptic or oblong, 1.5–3 × 1–1.3 mm, scarious margin pale yellow or brown; midvein convex. Paleae oblong-elliptic, scarious, abaxially yellow gland-dotted. Ray florets 5; lamina white, pink, or violet-red, suborbicular, 1.5–3 × 2–2.5 mm, apex 2- or 3-denticulate. Disk florets yellow, tubular, 2.2–3 mm, exterior gland-dotted, apex 5-lobed. Achenes greenish, oblong, ca. 2 mm, with white lateral ribs. Corona absent. Fl. and fr. Jul–Sep. $2n = 18, 27, 36 + 0–2B, 45, 54 + 0–3B, 72$.

Widely cultivated in China, locally naturalized. Nei Mongol, Xinjiang [native to temperate and alpine regions of N Hemisphere].

Achillea millefolium is a very variable species with many synonyms outside of China.

The whole plant is used medicinally for inducing sweat and dispelling diseases.

2. Achillea setacea Waldstein & Kitaibel, Descr. Icon. Pl. Hung. 1: 82. 1802.

丝叶蓍 si ye shi

Achillea millefolium Linnaeus var. *setacea* (Waldstein & Kitaibel) W. D. J. Koch.

Herbs, perennial, 30–70 cm tall, with procumbent slender rhizomes; stems erect, unbranched or few branched in upper part, usually with short sterile branches at leaf axils above middle, white villous, especially in lower part. Basal leaves petiolate; leaf blade linear-lanceolate, rarely linear-oblong, 8–20 × 1–2 cm, (2 or)3-pinnatisect, both surfaces villous; primary segments many, 1–1.5 mm apart; ultimate segments filiform-linear or linear-lanceolate to lanceolate, 0.5–1.5 × 0.1–0.2 mm, apex cartilaginous-mucronulate; middle and upper stem leaves similar, sessile, gradually smaller. Synflorescence a terminal flat-topped panicle, 2.5–7 cm in diam. Capitula many. Involucres narrowly oblong or ovoid-oblong, 4–4.5 × 2–2.5 mm; phyllaries in 3 rows, yellowish green, midvein greenish, convex, abaxially brownish pilose, oblong-ovate to oblong, 2–4 × 0.8–1.2 mm, scarious margin sometimes with narrow pale brown edge, apex somewhat acute or obtuse. Paleae oblong-lanceolate to lanceolate, glabrous or appressed pilose on upper part. Ray florets 5; lamina yellowish white, semiorbicular or suborbicular, 1.2–1.3 × 1.3–1.8 mm, apex subtruncate or 3-dentate. Disk florets yellow, tubular, 5-lobed. Achenes oblong-cuneate, 1.8–2 × ca. 0.8 mm, with narrow lateral ribs. Corona absent. Fl. and fr. Jul–Aug. $2n = 18, 36$.

Wastelands, forest margins, grasslands on mountain slopes, meadows, river valleys; 500–2400 m. Heilongjiang, Xinjiang [Kazakhstan, Mongolia, Russia; N Africa, SW Asia, Europe].

3. Achillea asiatica Sergievskaya, Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1946(1): 6. 1946.

亚洲蓍 ya zhou shi

Achillea millefolium Linnaeus var. *mandshurica* Kitamura; *A. setacea* Waldstein & Kitaibel subsp. *asiatica* (Sergievskaya) Voroschilov.

Herbs, perennial, (4–)18–60 cm tall, with procumbent slender rhizomes; stems erect, unbranched or upper parts few branched, usually with sterile branches at leaf axils, striate, conspicuously lanate-villous. Basal stem leaves petiolate or subsessile; leaf blade linear-oblong, linear-lanceolate, or linear-oblanceolate, (2 or)3-pinnatisect, abaxially densely villous, adaxially sparsely villous; primary segments many, 1–1.5 mm apart; ultimate segments linear to lanceolate, 0.5–2 mm, apex cartilaginous-mucronulate; middle and upper stem leaves similar, sessile, progressively smaller. Synflorescence a dense, rarely lax, flat-topped panicle. Capitula many. Involucre oblong, 4–5 × 2.5–3 mm; phyllaries in 3 or 4 rows, ovate or oblong to lanceolate, 1.5–4 × 0.8–1.5 mm, scarious, midvein yellow-green, convex, margin brown or brownish. Paleae oblong-lanceolate, scarious, margin hyaline, sparsely pilose in upper part. Ray florets 5; lamina pink or violet-red, rarely turning white, suborbicular, 2–2.5 × 2–2.2 mm. Disk florets tubular, 5-lobed. Achenes oblong-cuneate, 2–2.2 mm, with lateral ribs. Corona absent. Fl. and fr. Jul–Sep. $2n = 18, 36$.

Grasslands on mountain slopes, moist forest margins, by rivers; 600–2600 m. Hebei, Heilongjiang, Liaoning, Nei Mongol, Xinjiang [Kazakhstan, Mongolia, Russia].

4. Achillea acuminata (Ledebour) Schultz Bipontinus, Flora 38: 15. 1855.

齿叶蓍 chi ye shi

Ptarmica acuminata Ledebour, Fl. Ross. 2: 529. 1845; *Achillea ptarmica* Linnaeus var. *acuminata* (Ledebour) Heimerl; *A. ptarmica* var. *angustifolia* Heimerl.

Herbs, perennial, 30–100 cm tall; stems solitary, erect, corymbosely branched, lower part glabrous, upper part densely pubescent. Basal and lower stem leaves withered by anthesis. Middle stem leaves sessile; leaf blade lanceolate or linear-lanceolate, 3–8(–11) × 0.4–0.9 cm, both surfaces pubescent at first, glabrescent or pubescent along veins abaxially, base slightly attenuate, margin double-serrulate, apex acuminate. Synflorescence a lax terminal flat-topped panicle. Capitula rather many. Involucres hemispheric, ca. 5 × 9 mm; phyllaries in 3 rows, scarious margin broad, yellowish or brownish, outer short, ovate-oblong, apex acute, inner ones oblong, apex rounded. Paleae similar to phyllaries, upper part and apex yellow villous. Ray florets 10–23; lamina white, 3–8 × 2.5–5.5 mm, apex 3-crenate. Disk florets white, tubular. Achenes oblanceolate, 2.5–3 × ca. 1.5 mm, with white lateral ribs. Corona absent. Fl. and fr. Jul–Aug.

Moist places on mountain slopes, meadows, forest margins; 500–2900 m. Gansu, Hebei, Henan, Jilin, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi [Japan, Korea, Mongolia, Russia].

5. Achillea salicifolia Besser, Catal. Jard. Bot. Krzemieniec, Suppl. 1: 3. 1812.

柳叶蓍 liu ye shi

Herbs, perennial, 36–90 cm tall, with short rhizomes; stems erect, upper parts corymbosely branched, striate, densely pubescent with curved hairs, lower part sometimes glabrescent. Basal stem leaves withered by anthesis. Middle stem leaves sessile; leaf blade linear-lanceolate, 1.5–6 × 0.3–0.6 cm, both surfaces densely pubescent, depressed gland-dotted, base attenuate, margin double-serrulate, apex acuminate. Upper stem leaves gradually smaller. Synflorescence a flat-topped panicle. Capitula many. Involucres hemispheric, 3–4 mm in diam.; phyllaries in 3 rows, broadly lanceolate, 1.2–1.5 mm, abaxially densely pubescent, scarious margin yellowish or brown, midvein convex. Paleae similar to phyllaries. Ray florets ca. 8; lamina white, broadly elliptic, 3.2–3.5 × 3–3.8 mm, apex 2-crenate. Disk florets ca. 2.5 mm, 5-lobed. Achenes oblanceolate, ca. 1.8 × 1 mm, with white lateral ribs, sometimes 1-ribbed abaxially. Corona absent. Fl. and fr. Aug–Sep. $2n = 18, 36$.

Forest understories along rivers and marshes, moist grasslands; 500–1200 m. Shaanxi, Xinjiang [Kazakhstan, Russia; Europe].

6. Achillea impatiens Linnaeus, Sp. Pl. 2: 898. 1753.

褐苞蓍 he bao shi

Achillea impatiens subsp. *euimpatiens* Heimerl; *Ptarmica impatiens* (Linnaeus) Candolle.

Herbs, perennial, 40–60 cm tall, with short rhizomes; stem erect, few branched in upper part, pubescent above middle. Middle stem leaves sessile; leaf blade lanceolate, 1.5–4.5 × 0.3–0.9 cm, both surfaces sparsely pilose; rachis 1–2 mm wide, segments linear-lanceolate, margin entire, minutely serrulate or with 1 or 2 teeth on one side, apex acute. Upper stem leaves similar, gradually smaller. Synflorescence a terminal flat-topped cyme. Capitula 5–8 or more. Involucre hemispheric, 5–7 mm in diam.; phyllaries in 3 rows, broadly lanceolate, 3.5–4.5 × ca. 1.8 mm, abaxially sparsely villous, margin scarious, midvein convex, red-brown or deep brown. Paleae lanceolate, apex sparsely villous. Ray florets 8; lamina white, broadly elliptic, apex 3-crenate. Disk florets white, tubular. Achenes oblanceolate, ca. 2.5 × 1.3 mm, with winged lateral ribs. Corona absent. Fl. and fr. Jul–Aug. $2n = 18$.

Forest margins, riverbanks; 1500–2000 m. Xinjiang [Kazakhstan, Mongolia, Russia].

7. Achillea ledebourii Heimerl, Flora 66: 389. 1883 [*"ledebouri"*].

阿尔泰蓍 a er tai shi

Achillea impatiens Linnaeus subsp. *ledebourii* (Heimerl) Heimerl.

Herbs, perennial, ca. 40 cm tall, with long slender rhizomes; stems erect, corymbosely branched in upper part, pilose above middle. Middle stem leaves sessile; leaf blade lanceolate, 1.5–4 × 0.5–0.9 cm, pinnatilobed to pinnatisect or pinnatipartite, both surfaces sparsely villous, rachis 1.5–3 mm wide; lobes or segments linear-lanceolate, basal ones large, margin minutely serrulate, sometimes 1-dentate on one side, apex acuminate or acute. Synflorescence a terminal, clustered, flat-topped cyme. Capitula 3–5. Involucres hemispheric, 5–6 mm in diam.; phyllaries in 3 rows, ovate or broadly elliptic, 3–5.2 × 2–3 mm, scarious margin broad, midvein deep brown, convex. Paleae brown, lanceolate-elliptic, 4–5 × ca. 1.5 mm, scarious, apex sparsely white villous. Ray florets 8; lamina white, broadly elliptic, apex 3-crenate. Disk florets white, tubular. Achenes broadly lanceolate, ca. 2 mm, with white lateral ribs. Corona absent. Fl. and fr. Jul–Sep.

Forest understories; 2200–2500 m. Xinjiang [Kazakhstan, Russia].

8. Achillea alpina Linnaeus, Sp. Pl. 2: 899. 1753.

高山蓍 gao shan shi

Achillea mongolica Fischer ex Sprengel; *A. sibirica* Ledebour; *A. sibirica* subsp. *mongolica* (Fischer ex Sprengel) Heimerl; *A. sinensis* Heimerl; *Ptarmica mongolica* (Fischer ex Sprengel) Candolle; *P. sibirica* (Ledebour) Ledebour.

Herbs, perennial, 30–80 cm tall, with short rhizomes; stems erect, branched in upper part, usually with sterile branches at leaf axils above middle, sparsely or densely pilose. Basal stem leaves withered by anthesis. Middle stem leaves sessile; leaf blade linear-lanceolate, 6–10 × 0.7–1.7 cm, pectinately pinnatilobed or pinnatipartite, abaxially densely villous, adaxially sparsely villous; lobes linear or linear-lanceolate, basally amplexicaul, margin unequally serrulate, apex acute; upper stem leaves similar, progressively smaller. Synflorescence a dense terminal flat-topped panicle. Capitula many. Involucres broadly oblong or subglobose, (4–)5–7 mm in diam.; phyllaries in 3 rows, broadly lanceolate to elliptic, 2–4 × 1.2–2 mm, abaxially sparsely villous, scarious margin brown, midvein convex. Paleae similar to phyllaries. Ray florets 6–8; lamina white, broadly elliptic, apex 3-denticulate. Disk florets white, 5-lobed. Achenes broadly oblanceolate, ca. 2 × 1.1 mm, with white lateral ribs, sometimes 1- or 2-ribbed abaxially. Corona absent. Fl. and fr. Jul–Sep. $2n = 36$.

Grasslands on mountain slopes, forest margins, under thickets, meadows, river valleys; 800–2400 m. Anhui, Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan [Japan, Korea, Mongolia, Nepal, Russia].

9. Achillea ptarmicoides Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 154. 1859.

短瓣蓍 duan ban shi

Achillea sibirica Ledebour var. *discoidea* Regel; *A. sibirica* subsp. *ptarmicoides* (Maximowicz) Heimerl; *A. sibirica* var. *ptarmicoides* (Maximowicz) Makino; *Ptarmica ptarmicoides* (Maximowicz) Voroschilov.

Herbs, perennial, 70–100 cm tall, with short rhizomes; stems erect, usually unbranched, middle leaf axils with sterile branches, sparsely white pilose. Basal stem leaves withered by anthesis. Middle stem leaves sessile; leaf blade linear or linear-lanceolate, 6–8 × 0.5–0.7 cm, pectinately pinnatipartite or subpinnatisect, abaxially sparsely pilose, adaxially densely pilose, densely glandular punctuate; pinnae linear, margin irregularly serrulate, apex acute. Upper stem leaves similar, gradually smaller. Synflorescence a dense terminal flat-topped panicle. Capitula many. Involucres campanulate, 5–6 × 3.5–4 mm; phyllaries in 3 rows, scarious margin yellowish or brownish, outer phyllaries ovate, 1.5–2 × 1.2–1.5 mm, apex somewhat acute, middle ones elliptic, ca. 2.8 × 1.5 mm, apex obtuse, inner ones oblong, ca. 3.2 × 2 mm. Paleae similar to phyllaries. Ray florets 6–8; lamina yellowish white, broadly elliptic, very small, 0.8–1.5 × ca. 1.1 mm, apex 3-crenate. Disk florets white, tubular, 5-lobed. Achenes oblong or broadly oblanceolate, ca. 2.2 × 1.2 mm, with white lateral ribs. Corona absent. Fl. and fr. Jul–Sep.

River valleys, meadows, mountain slopes, under thickets; 200–400 m. Hebei, Heilongjiang, Liaoning, Nei Mongol [Japan, Korea, Mongolia, Russia].

10. Achillea wilsoniana (Heimerl ex Handel-Mazzetti) Heimerl in Handel-Mazzetti, Symb. Sin. 7: 1110. 1936.

云南蓍 yun nan shi

Achillea sibirica Ledebour subsp. *wilsoniana* Heimerl ex Handel-Mazzetti, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 61: 22. 1924; *A. wilsoniana* f. *obconica* Heimerl.

Herbs, perennial, with short rhizomes. Stems erect, 35–100 cm tall, densely villous above middle, glabrescent in lower part, usually corymbosely branched, with sterile branches at leaf axils in upper part. Proximal stem leaves withered by anthesis. Middle stem leaves sessile; leaf blade oblong, 4–6.5 × 1–2 cm, abaxially sparsely pilose, adaxially densely pilose, 2-pinnatisect; primary segments many, close together, elliptic-lanceolate, 5–10 × 2–4 mm; secondary segments few, lanceolate, proximal ones large, distal ones small; rachis ca. 1.5 mm wide, margin entire or dentate. Capitula many, in an apical compound corymb. Involucres broadly campanulate or hemispheric, 4–6 mm in diam.; phyllaries in 3 rows, overlapping, outer ovate-lanceolate, short, ca. 2.3 × 1.2 mm, apex slightly acute, middle ones ovate-elliptic, ca. 2.5 × 1.8 mm, inner ones long elliptic, ca. 4 × 1.8 mm, apex obtuse or rounded; midvein convex. Paleae lanceolate, ca. 4.5 mm, sparsely villous in upper part. Ray florets 6–8(–16); lamina white, occasionally with pinkish margin, ca. 2.2 × 2.2 mm, apex deeply or shallowly 3-denticulate. Disk florets yellowish or white, tubular. Achenes oblong-cuneate, ca. 2.5 × 1.1 mm, with winged lateral ribs. Pappus absent. Fl. and fr. Jul–Sep.

• Grasslands on mountain slopes, under thickets; 400–3700 m. Gansu, Guizhou, Hubei, Hunan, Shaanxi, Shanxi, Sichuan, Yunnan.

The entire plant is used in medicines to stop bleeding, to alleviate pain, and for strengthening the stomach.

11. Achillea nobilis Linnaeus, Sp. Pl. 2: 899. 1753.

壮观蓍 zhuang guan shi

Herbs, perennial, (15–)25–35(–50) cm tall, with short rhizomes; stems few, erect or slightly ascending, simple or branched near top, ± densely lanate-floccose, densely leafy. Middle stem leaves sessile; leaf blade ovate or oblong-elliptic, (2–)3–6 cm, 2-pinnatisect, lanate-floccose; primary segments few, distant especially toward base, linear, 10–15 mm; secondary segments lanceolate or linear, pinnatifid, lobules lanceolate, 0.5–1(–2) mm. Synflorescence a dense, terminal, rounded panicle. Capitula many. Involucre ovoid, less often cylindric-ovoid, 1.5–2(–2.5) mm in diam.; phyllaries keeled, pale, scarious margin narrow, usually white. Paleae white, membranous, lanceolate, slightly shorter than floret. Ray floret lamina white or yellowish white, orbicular-reniform to semicircular, (0.6–)1–1.6(–1.9) mm, apex truncate, unequally 3-toothed. Achenes oblong, ca. 1 mm.

Open grasslands, forest margins, naturalizing in disturbed sites. Xinjiang [Kazakhstan, Russia, Turkmenistan; SW Asia (Caucasus, Turkey), C and S Europe].

Achillea nobilis is apparently known from China only by a single 19th century gathering by Karelin and Kirilov. A similar record for the European *A. magna* Linnaeus, which is not otherwise recorded from C Asia, is most likely a misidentification of *A. nobilis*.

168. ANTHEMIS Linnaeus, Sp. Pl. 2: 893. 1753.

春黄菊属 chun huang ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, annual or perennial, or subshrubs; indumentum of medifixed hairs. Leaves alternate, pinnatisect to variously lobed, occasionally entire. Synflorescences cymose; capitula solitary or in lax, ± flat-topped panicles, pedunculate, heterogamous and radiate, rarely homogamous and discoid. Involucres usually ± hemispheric to ovoid; phyllaries in 3 rows, scarious margins narrow. Receptacle convex to narrowly conical, paleate, rarely basally or completely epaleate; palea oblong or subulate, scarious, apex truncate or acute to acuminate. Marginal florets in 1 row, female, fertile; lamina white or yellow [or rarely reddish]. Disk florets many, yellow, rarely reddish, bisexual; corolla tubular, apex 5-lobed. Anther bases obtuse. Style branches truncate. Achenes oblong or obconic, smooth to prismatic to 4 or 5(or 8)-ribbed, dorsiventrally compressed. Corona absent or shallow, often adaxially more developed or forming an adaxial auricle.

About 100(–150) species: mainly in S Europe and SW Asia; one species (introduced) in China.

Anthemis arvensis Linnaeus (田春黄菊 tian chun huang ju) is cultivated in E China.

1a. Phyllary margins narrowly scarious; achenes tuberculate; plants fetid ..... 1. *A. cotula*
1b. Phyllary margins broadly scarious; achenes smooth; plants not fetid ..... *A. arvensis* (see comment above)

1. Anthemis cotula Linnaeus, Sp. Pl. 2: 894. 1753.

臭春黄菊 chou chun huang ju

Anthemis foetida Lamarck; *Maruta cotula* (Linnaeus) Candolle; *M. foetida* (Lamarck) Cassini.

Herbs, annual, (15–)30–50 cm tall, fetid; stems erect, corymbosely branched, sparsely pubescent or subglabrescent. Leaves sessile; leaf blade ovate-oblong, 1.5–6 × 0.5–3 cm, 2-pinnatisect; ultimate segments narrowly linear. Capitula terminal, solitary, long pedunculate, 1–2 cm in diam. Involucre hemispheric; phyllaries in 3 rows, oblong, scarious margin narrow, apex obtuse. Ray florets white; lamina 5–14 × 3–6 cm, elliptic. Disk florets yellow, tubular, 5-lobed. Achenes oblong-turbinate, 1–1.5 mm, tuberculate, obscurely 8(–10)-ribbed. Corona absent. Fl. and fr. Jun–Jul. $2n = 18$.

Cultivated and possibly naturalized. Nei Mongol [native to N Africa, SW Asia, and Europe; introduced elsewhere].

Anthemis cotula has been recorded as a weed from E Mongolia and can be expected to behave similarly in China.

169. TANACETUM Linnaeus, Sp. Pl. 2: 843. 1753.

菊蒿属 ju hao shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Gymnocline Cassini; *Pontia* Bubani; *Pyrethrum* Zinn.

Herbs, perennial, subshrubs, or shrubs, lower parts somewhat woody; indumentum absent or of basifixed and/or medifixed hairs. Leaves alternate, rarely rosulate, pinnatifid to 3-pinnatisect, rarely entire. Synflorescences cymose, mostly flat-topped, sometimes reduced to a solitary capitulum. Capitula heterogamous or homogamous, radiate, disciform or discoid. Involucres campanulate; phyllaries in 3–5 rows, scarious margins broad or narrow, usually brown, less often white. Receptacle convex or flat, epaleate, usually pilose. Marginal florets in 1, very rarely 2, rows, or absent, female, fertile; lamina white or red, less often yellow, or absent, ovate, elliptic, or linear. Disk florets many, yellow, bisexual; corolla tubular, apex 5-lobed. Anther bases obtuse; apical appendage ovate-lanceolate or broadly lanceolate. Style branches linear, apex truncate. Achenes terete or obscurely 3-angled, 5–10(–12)-ribbed, often with sessile glands, never with myxogenic cells. Corona present, 0.1–0.4 mm, sometimes of free scales, rarely an adaxial auricle (very rarely absent).

About 100 species: N Africa, C Asia, Europe; 19 species (two endemic, two introduced) in China.

Tanacetum partheniifolium (Willdenow) Schultz Bipontinus (Tanaceteen, 56. 1844; *Pyrethrum partheniifolium* Willdenow, Sp. Pl. 3: 2156. 1803, *"parthenifolium"*; 伞房匹菊 san fang pi ju), native to C and SW Asia, and *T. parthenium* (Linnaeus) Schultz Bipontinus (Tanaceteen, 55. 1844; *Matricaria parthenium* Linnaeus, Sp. Pl. 2: 890. 1753; 短舌匹菊 duan she pi ju), originating within Europe, possibly through selection from *T. partheniifolium*, are cultivated as ornamentals in China and are included in the following key. *Tanacetum parthenium* is used medicinally.

A gathering by Karelin and Kirilov from Xinjiang ("Sinkiang: Songaria-Kirghisici"), not seen by the present authors, has been named as *Pyrethrum achilleifolium* M. Bieberstein (Fl. Taur.-Caucas. 2: 327. 1808; *Tanacetum achilleifolium* (M. Bieberstein) Schultz Bipontinus, Tanaceteen, 47. 1844), a C Asian species recorded west of the W Altai. It would key out below as *T. santolina*, from which it differs by its phyllaries broader, pubescent only at their bases, and with broader membranous margins.

1a. Ray florets absent: capitula disciform or discoid.
2a. Florets orange-red; plants 7–25 cm tall ..... 10. *T. tatsienense*
2b. Florets yellow; plants 30–150 cm tall.
3a. Synflorescence with (5–)10–70(–100) capitula; stem leaves elliptic or elliptic-ovate, to 20 cm, ultimate segments ovate, obliquely triangular, or narrowly elliptic; capitula disciform ..... 1. *T. vulgare*
3b. Synflorescence with 3–10(–12) capitula; stem leaves linear-oblong or oblong, 1–9 cm, ultimate segments linear or oblong; capitula discoid.
4a. Leaves less than 3 cm, with inconspicuous or short petioles, ultimate segments oblong, apex obtuse ..... 18. *T. artemisioides*
4b. Leaves more than 4 cm, with long petioles, ultimate segments linear, acute ..... 19. *T. falconeri*
1b. Ray florets conspicuous: capitula radiate.
5a. Ray florets yellow.
6a. Capitula 1 per stem; indumentum with curved simple hairs only ..... 11. *T. atkinsonii*
6b. Capitula 3–16 per stem; indumentum with a mixture of simple hairs and T-shaped hairs.
7a. Basal leaves inconspicuously tripinnatisect, petiole to ca. 2.5 cm ..... 6. *T. scopulorum*
7b. Basal leaves 2-pinnatisect, petiole 3–8 cm.
8a. Capitula 3–7, densely corymbose or compound-corymbose; peduncle becoming thick at apex, 0.5–1.5 cm ..... 3. *T. crassipes*
8b. Capitula 5–16, laxly irregularly corymbose; peduncle 1–10 cm.
9a. Leaves narrowly elliptic or narrowly linear-elliptic; involucre 7–17 mm in diam. ..... 4. *T. barclayanum*
9b. Leaves linear or broadly linear; involucre 4–7 mm in diam. ..... 5. *T. santolina*
5b. Ray florets white, pink, red, orange-red, or purplish.
10a. Ray florets red, orange-red, or purplish.
11a. Plants 25–50 cm tall; basal leaves 2.5–4 cm wide; outer phyllaries ca. 3.5 mm ..... 8. *T. coccineum*
11b. Plants 7–35 cm tall; basal leaves 1–2 cm wide; outer phyllaries 5–6 mm.
12a. Ray florets orange-red; corona ca. 0.1 mm, divided to base ..... 10. *T. tatsienense*
12b. Ray florets red or purple-red; corona 0.3–0.5 mm, divided for half length ..... 16. *T. richterioides*
10b. Ray florets white or pink.
13a. Small subshrubs; ray florets pink ..... 9. *T. petraeum*
13b. Perennial herbs; ray florets white (sometimes pink in *T. kaschgarianum*).
14a. Stems and leaves with T-shaped or forked hairs, sometimes mixed with simple hairs.
15a. Basal leaves with petiole 6–9 cm, blade ca. 10 × 2.5 cm; stems and leaves green or gray-green; indumentum spreading, hairs a mixture of simple and T-shaped hairs; involucres campanulate ..... 2. *T. tanacetoides*
15b. Basal leaves with petiole 10–20 cm, blade 1.5–4 × 1–2 cm; stems and leaves silvery gray; indumentum appressed, all hairs T-shaped or forked; involucres shallowly cup-shaped ..... 7. *T. cinerariifolium*
14b. Stems and leaves with simple hairs only, sometimes these glandular.
16a. Involucres straw-colored; scarious margins of phyllaries narrowly white; leaves petiolate (cultivated ornamentals).
17a. Plants green or deep green; ray floret lamina 7–10 mm; achenes ca. 3 mm ..... *T. partheniifolium* (see comment above)
17b. Plants yellow-green; ray floret lamina 3–6 mm; achenes ca. 1.2 mm ..... *T. parthenium* (see comment above)
16b. Involucres not straw-colored; scarious margins of phyllaries dark brown or brown; stem leaves sessile or shortly petiolate.
18a. Leaf surfaces gray-white; receptacle pilose with easily shed hairs ..... 17. *T. kaschgarianum*
18b. Leaf surfaces green; receptacle persistently pilose.
19a. Capitula 2–7, very rarely solitary.
20a. Indumentum with a mixture of glandular and eglandular hairs; ultimate segments of leaves filiform ..... 14. *T. abrotanoides*
20b. Indumentum with glandular hairs only; ultimate segments of leaves linear to obliquely triangular ..... 12. *T. alatavicum*
19b. Capitula solitary, very rarely 2 or 3.
21a. Basal leaves 1–2 cm wide; achene corona 1–1.2 mm, divided to base ..... 15. *T. pulchrum*
21b. Basal leaves 2–5 cm wide; achene corona 0.4–0.7 mm, divided for half length ..... 13. *T. krylovianum*

1. Tanacetum vulgare Linnaeus, Sp. Pl. 2: 844. 1753.

菊蒿 ju hao

Chrysanthemum boreale (Fischer ex Candolle) B. Fedtschenko (1915), not Makino (1909); *C. tanacetum* Visiani; *C. vulgare* (Linnaeus) Bernhardi (1800), not (Lamarck) Gaterau (1789); *C. vulgare* subsp. *boreale* (Fischer ex Candolle) Voroschilov; *C. vulgare* var. *boreale* (Fischer ex Candolle) Makino; *Pyrethrum vulgare* (Linnaeus) Boissier; *Tanacetum boreale* Fischer ex Candolle; *T. crispum* Steudel; *T. vulgare* subsp. *boreale* (Fischer ex Candolle) Kuvaev; *T. vulgare* var. *boreale* (Fischer ex Candolle) Trautvetter & C. A. Meyer.

Herbs, perennial, 30–150 cm tall, from creeping, ± branched rhizome; stems solitary or clustered, erect, upper part corymbosely branched, usually glabrous. Basal stem leaves petiolate; leaf blade elliptic or elliptic-ovate, ca. 20 × 8–10 cm, 2-pinnatisect, both surfaces green or pale green; primary lateral segments to 12-paired; ultimate segments ovate, obliquely triangular, or narrowly elliptic; middle and upper stem leaves similar, sessile. Synflorescence a ± dense flat-topped panicle. Capitula (5–)10–70(–100), heterogamous, disciform. Involucre campanulate, 5–13 mm in diam.; phyllaries in 3 rows, scarious margin narrow, white or brown, outer phyllaries ovate-lanceolate, ca. 1.5 mm; middle and inner ones lanceolate, 3–4 mm. All florets yellow, tubular; outer ones female, disk florets bisexual; corolla 1.5–2.4 mm. Achenes 1.2–2 mm. Corona 0.1–0.4 mm, margin dentate. Fl. and fr. Jun–Aug. $2n = 18, 18 + 2B$.

Mountain slopes, grasslands, floodlands, meadows, meadowy steppes, hills, forest understories; 200–2400 m. Heilongjiang, Nei Mongol, Xinjiang [Japan, Kazakhstan, Korea, Mongolia, Russia, Turkmenistan; Europe, North America].

The whole plant is used as an insecticide.

2. Tanacetum tanacetoides (Candolle) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 337. 1961.

伞房菊蒿 san fang ju hao

Pyrethrum tanacetoides Candolle, Prodr. 6: 59. 1838; *Chrysanthemum tanacetoides* (Candolle) B. Fedtschenko.

Herbs, perennial, 20–85 cm tall, with branched rhizomes; stems erect, solitary or fascicled, upper parts corymbosely branched, sparsely pilose with T-shaped and simple hairs. Basal leaves: petiole 6–9 cm; leaf blade elliptic, ca. 10 × 2.5 cm, 2-pinnatisect, both surfaces green or gray-green, sparsely pilose; primary lateral segments 10–15-paired; ultimate segments linear or ovate. Stem leaves similar, sessile; uppermost leaves pinnatisect. Synflorescence a lax flat-topped panicle. Capitula 3–10(–18); peduncle slender, 2–5 cm. Involucre campanulate; phyllaries in 4 rows, abaxially villous or pubescent with long or short hairs, outer and middle ones triangular-lanceolate or narrowly lanceolate, 2–4.5 mm, apex scarious-ampliate, inner ones linear-elliptic, ca. 4 mm. Ray florets white, apex 3-denticulate. Achenes ca. 2.5 mm. Corona 0.1–0.3 mm, margin denticulate. Fl. and fr. Jun–Aug.

Rocky slopes; 500–1800 m. Xinjiang (Altay Shan) [Kazakhstan, Russia].

3. Tanacetum crassipes (Stscheglejew) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 338. 1961.

密头菊蒿 mi tou ju hao

Pyrethrum crassipes Stscheglejew, Bull. Soc. Imp. Naturalistes Moscou 27: 172. 1854; *Chrysanthemum crassipes* (Stscheglejew) B. Fedtschenko.

Herbs, perennial, 20–60 cm tall, with branched rhizomes; stems solitary or fascicled, upper parts corymbosely branched, sparsely pilose with T-shaped and simple hairs. Basal leaves: petiole 3–5 cm; leaf blade narrowly elliptic, 8–15 × ca. 2 cm, 2-pinnatisect, green or deep green, appressed pilose; primary lateral segments 10–15-paired; ultimate segments linear-elliptic. Stem leaves similar, few, sessile. Synflorescence a dense flat-topped cyme. Capitula 3–7; peduncle 0.5–1.5 cm, apex thicker. Involucre campanulate, 7–10(–14) mm in diam.; phyllaries in 3 or 4 rows, abaxially with simple hairs, outer and middle phyllaries lanceolate, 2.5–4 mm, apex scarious-ampliate, inner ones narrowly linear-elliptic, ca. 4 mm. Ray florets yellow, apex 3-denticulate. Achenes ca. 2 mm. Corona ca. 0.3 mm, margin denticulate. Fl. and fr. Jun–Aug.

Rocky slopes, forest understories, grasslands; ca. 2100 m. Xinjiang (Altay Shan) [Kazakhstan, Russia].

4. Tanacetum barclayanum Candolle, Prodr. 6: 128. 1838.

阿尔泰菊蒿 a er tai ju hao

Pyrethrum achilleifolium M. Bieberstein var. *discoideum* Karelin & Kirilov; *P. turlanicum* Pavlov; *Tanacetum turlanicum* (Pavlov) Tzvelev.

Herbs, perennial, 25–50 cm tall; stems solitary, erect, unbranched or few branched from base, subglabrous. Basal leaves: petiole 2–10 cm; leaf blade ovate or narrowly elliptic, 4–8 × 2.5–4 cm, 2-pinnatisect, both surfaces sparsely pubescent or glabrous; primary lateral segments 5-paired; ultimate segments triangular, elliptic, or narrowly elliptic; stem leaves similar, sessile or shortly petiolate; leaves below capitula small, pinnatifid or undivided. Capitula solitary, terminal; peduncle 1–10 cm. Involucre coryliform, 7–17 mm in diam.; phyllaries in 4 rows, abaxially glabrous or sparsely pubescent, scarious margin brown, outer phyllaries lanceolate, ca. 3.5 mm, middle and inner ones narrowly elliptic or linear-oblanceolate, ca. 5 mm, abaxially glabrous. Ray florets red; lamina narrowly elliptic, ca. 1.6 cm, apex 2- or 3-denticulate. Achenes ca. 2.5 mm. Corona 0.1–0.2 mm, margin entire or minutely denticulate. Fl. and fr. Jun–Aug.

Thickets; 500–2100 m. Xinjiang (Altay Shan) [Kazakhstan, Russia].

5. Tanacetum santolina C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 11: 375. 1891.

散头菊蒿 san tou ju hao

Chrysanthemum santolina (C. Winkler) B. Fedtschenko; *Pyrethrum kasakhstanicum* Krascheninnikov.

Herbs, perennial, 20–30 cm tall; stems solitary or fascicled, erect, upper parts corymbosely branched. Basal leaves: petiole 6–8 cm; leaf blade linear or broadly linear, 6–8 × 2–3 cm, 2-pinnatisect, both surfaces gray-green, pilose with T-shaped and simple hairs; primary lateral segments 10–12-paired; ultimate segments elliptic to elliptic-ovate. Stem leaves

few, similar to basal leaves, sessile. Synflorescence an irregular flat-topped panicle. Capitula 5–12; peduncle 6–8 cm, not thickened. Involucre campanulate, 4–7 mm in diam.; phyllaries in 4 rows, scarious margin narrow, outer phyllaries lanceolate, ca. 1.5 mm, inner ones narrowly linear-elliptic, 3–5 mm. Ray florets yellow. Achenes ca. 2 mm. Corona 0.2–0.4 mm, lobed or serrate. Fl. and fr. Jun–Aug.

Rocky slopes, moist places on mountain slopes; 1100–2100 m. Xinjiang [Kazakhstan, Russia].

6. Tanacetum scopulorum (Krascheninnikov) Tzvelev in Schischkin & Bobrov, Fl. URSS 26: 342. 1961.

岩菊蒿 yan ju hao

Pyrethrum scopulorum Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 164. 1946; *Lepidolopsis scopulorum* (Krascheninnikov) Poljakov.

Herbs, perennial, to 35 cm tall, with branched rhizomes; stems solitary or clustered, upper parts shortly corymbosely branched, densely or sparsely pilose with T-shaped and simple hairs. Basal leaves: petioles to 2 cm; leaf blade narrowly elliptic or elliptic, 4–8 × 1–2 cm, inconspicuously 3-pinnatisect, both surfaces green or pale gray-green, pilose; primary lateral segments 8–10-paired; ultimate segments ovate-lanceolate or obliquely triangular. Stem leaves few, sessile. Synflorescence a flat-topped cyme. Capitula 3–6; peduncle 1–8 cm. Involucre campanulate, 7–10 mm in diam.; phyllaries in 4 rows, abaxially villous or pubescent, outer phyllaries lanceolate, ca. 2.5 mm, apex white scarious-ampliate, middle and inner ones elliptic to linear-elliptic, 3–5 mm. Ray florets yellow, apex 3- or 4-denticulate. Achenes 2–2.3 mm. Corona 0.2–0.3 mm, margin serrate. Fl. and fr. Jul–Aug.

Mountain slopes; ca. 700 m. Xinjiang (Altay Shan) [Kazakhstan].

7. Tanacetum cinerariifolium (Treviranus) Schultz Bipontinus, Tanaceteen, 58. 1844.

除虫菊 chu chong ju

Pyrethrum cinerariifolium Treviranus, Index Sem. Hort. Bot. Wratislav. App. 2: 2. 1820; *Chrysanthemum cinerariifolium* (Treviranus) Visiani.

Herbs, perennial; stems 17–60 cm tall, solitary or fascicled, unbranched or branched from base, pubescent with appressed T-shaped or furcate hairs. Basal leaves: petiole 10–20 cm; leaf blade ovate or elliptic, 1.5–4 × 1–2 cm, both surfaces silvery grayish, appressed pubescent with T-shaped and furcate hairs, 2-pinnatisect; primary segments 3–5-paired; ultimate segments linear or oblong-ovate, margin entire or few dentate. Lower and middle leaves similar, large, shortly petiolate. Capitula apically solitary or 3–10 in apical lax corymb. Involucre cup-shaped, 1.2–1.5 cm in diam.; phyllaries in 4 rows, abaxially pubescent especially in outer ones, outer ones lanceolate, ca. 4 mm, middle and inner ones lanceolate to broadly linear, 5–6 mm, margin narrowly white scarious. Ray florets white; lamina 1.2–1.5 cm, apex truncate or emarginate. Achenes 2.5–3.5 mm. Corona 0.8–1.5 mm, margin shallowly lobed. Fl. and fr. May–Aug. $2n = 18^*, 24, 27, 29, 31, 34, 36$.

Widely cultivated. Anhui, Guizhou, Hebei, Liaoning, Zhejiang [native to SE Europe; now widely cultivated].

Tanacetum cinerariifolium is widely cultivated, mainly in tropical upland regions, as a source of pyrethrins, which are extracted from the dried capitula and used as insecticides. Pyrethroids are important insecticides obtained by the chemical modification of pyrethrins.

8. Tanacetum coccineum (Willdenow) Grierson, Notes Roy. Bot. Gard. Edinburgh 33: 262. 1974.

红花除虫菊 hong hua chu chong ju

Chrysanthemum coccineum Willdenow, Sp. Pl. 3: 2144. 1803; *C. marschallii* Ascherson; *Pyrethrum coccineum* (Willdenow) Voroschilov.

Herbs, perennial; stems 25–50 cm tall, erect, solitary, unbranched or few branched from base, subglabrous. Basal leaves: petiole 2–10 cm; leaf blade ovate or narrowly elliptic, 4–8 × 2.5–4 cm, 2-pinnatisect, both surfaces sparsely pubescent or glabrous; primary lateral segments 5-paired; ultimate segments triangular, elliptic, or narrowly elliptic. Stem leaves similar, sessile or shortly petiolate; leaves below capitula small, pinnatifid or entire. Capitula solitary, terminal. Involucre cup-shaped, 1–1.5 cm in diam.; phyllaries in 4 rows, scarious margin brown, outer phyllaries lanceolate, ca. 3.5 mm, abaxially glabrous or sparsely pubescent, middle and inner ones narrowly elliptic or linear-oblanceolate, ca. 5 mm, abaxially glabrous. Ray florets red; lamina narrowly elliptic, ca. 1.6 cm, apex 2- or 3-denticulate. Achenes ca. 2.5 mm. Corona 0.1–0.2 mm, margin shallowly obtusely lobed. Fl. and fr. May–Oct. $2n = 36$.

Cultivated. Anhui, Hebei [native to SW Asia (Caucasus)].

Tanacetum coccineum is used as an insecticide in the same way as *T. cinerariifolium* and is also grown as an ornamental.

9. Tanacetum petraeum (C. Shih) K. Bremer & Humphries, Bull. Nat. Hist. Mus. London, Bot. 23: 103. 1993 [*"petrareum"*].

岩匹菊 yan pi ju

Pyrethrum petraeum C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 10. 1980 [*"petrareum"*].

Subshrubs, ca. 35 cm tall; old branches gray; young branches turning purple-red, sparsely pubescent or glabrous. Lower leaves: petiole ca. 1.5 cm; leaf blade ovate, obovate, or oblanceolate, 2–4 × 1.4–2.5 cm, 2-pinnatipartite, both surfaces glabrous; primary lateral lobes 2- or 3-paired; ultimate lateral lobes 1-paired, obliquely triangular. Distal leaves pinnatifid, small. Synflorescence an irregular flat-topped cyme with 1–3 capitula. Involucre coryliform, 15–20 mm in diam.; phyllaries in 4 rows, abaxially densely pubescent to glabrescent or glabrous, scarious margin dark brown or brown, outer phyllaries narrowly oblanceolate-elliptic, ca. 6 mm, middle and inner ones lanceolate-triangular or elliptic, 7–8 mm, middle ones glabrescent, inner ones glabrous. Ray florets pink; lamina narrowly elliptic, ca. 2 cm, apex 2-denticulate. Achenes ca. 2 mm. Corona 0.1–0.2 mm, divided 1/2 length or to base. Fl. and fr. Aug.

• On rocks of mountain slopes; 1800–2600 m. Xinjiang (Fuyun).

10. Tanacetum tatsienense (Bureau & Franchet) K. Bremer & Humphries, Bull. Nat. Hist. Mus. London, Bot. 23: 103. 1993.

川西小黄菊 chuan xi xiao huang ju

Herbs, perennial, 7–25 cm tall; stems solitary or clustered, unbranched, villous with long simple white hairs, especially in upper part and near capitula. Basal leaves: petiole 1–3 cm; leaf blade elliptic or narrowly elliptic, 1.5–7 × 1–1.5 cm, 2-pinnatisect, both surfaces green, sparsely villous or glabrous; primary lateral segments 5–15-paired; ultimate segments linear. Stem leaves similar, sessile. Capitula solitary, terminal. Involucre coryliform, 10–20 mm in diam.; phyllaries in 4 rows, scarious margin dark brown or brown, outer phyllaries linear-lanceolate, ca. 6 mm, middle and inner ones narrowly lanceolate or broadly linear, 7–8 mm, outer and middle ones abaxially sparsely villous, inner ones abaxially glabrous. Ray florets orange-red or absent; lamina when present linear or broadly linear, ca. 2 cm, apex 3-denticulate. Achenes ca. 3 mm. Corona ca. 0.1 mm, divided to base. Fl. and fr. Jul–Sep.

Alpine meadows, thickets, gravelly places on mountain slopes; 3500–5200 m. Qinghai, Sichuan, Xizang, Yunnan [N Bhutan].

1a. Capitula with ray florets ..... 10a. var. *tatsienense*
1b. Capitula without ray florets ..... 10b. var. *tanacetopsis*

10a. Tanacetum tatsienense var. **tatsienense**

川西小黄菊(原变种) chuan xi xiao huang ju (yuan bian zhong)

Chrysanthemum tatsienense Bureau & Franchet, J. Bot. (Morot) 5: 72. 1891; *C. jugorum* W. W. Smith; *Pyrethrum tatsienense* (Bureau & Franchet) Y. Ling ex C. Shih.

Capitula heterogamous. Ray florets present; lamina orange-red or orange abaxially, yellow adaxially, linear or narrowly oblong, ca. 2 cm.

Alpine meadows, thickets, gravelly places on mountain slopes; 3500–5200 m. Qinghai, Sichuan, Xizang, Yunnan [N Bhutan].

The entire plant is used medicinally for promoting blood circulation.

10b. Tanacetum tatsienense var. **tanacetopsis** (W. W. Smith) Grierson, Edinburgh J. Bot. 57: 410. 2000.

无舌小黄菊 wu she xiao huang ju

Chrysanthemum jugorum var. *tanacetopsis* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 10: 173. 1918; *C. pullum* Handel-Mazzetti; *C. tatsienense* var. *tanacetopsis* (W. W. Smith) C. Marquand; *Pyrethrum tatsienense* var. *tanacetopsis* (W. W. Smith) Y. Ling & C. Shih.

Capitula homogamous. All florets tubular, bisexual.

• Alpine meadows, thickets; 3500–5000 m. Xizang, Yunnan.

11. Tanacetum atkinsonii (C. B. Clarke) Kitamura in H. Hara et al., Enum. Fl. Pl. Nepal 3: 45. 1982.

藏匹菊 zang pi ju

Chrysanthemum atkinsonii C. B. Clarke, Compos. Ind. 147. 1876; *Pyrethrum atkinsonii* (C. B. Clarke) Y. Ling & C. Shih.

Herbs, perennial, 12–30 cm tall; stems solitary or clustered, villous with long curved simple hairs especially in upper part and below capitula. Basal leaves: petiole ca. 2.4 cm; leaf blade oblanceolate or narrowly elliptic, 4–10 × 1.5–3 cm, 3-pinnatisect, both surfaces pale green, sparsely villous; primary lateral segments 7–12-paired; ultimate segments obliquely triangular, lanceolate, or linear. Stem leaves similar, usually 2-pinnatisect, sessile. Capitula solitary, terminal. Involucre coryliform, 10–25 mm in diam.; phyllaries in 4 rows, abaxially subglabrous, scarious margin broad, dark brown, outer phyllaries lanceolate, ca. 6 mm, middle and inner ones narrowly elliptic or oblanceolate, 7–9 mm, abaxially glabrous. Ray florets yellow; lamina narrowly elliptic, ca. 1 cm, apex 3-denticulate. Corona shorter than 0.1 mm. Fl. Jul.

Thickets on mountain slopes; 1800–2600 m. Xizang (Yadong) [Bhutan, India (Sikkim), Nepal].

12. Tanacetum alatavicum Herder, Bull. Soc. Imp. Naturalistes Moscou 40(3–4): 129. 1867.

新疆匹菊 xin jiang pi ju

Chrysanthemum alatavicum (Herder) Schultz Bipontinus; *Pyrethrum alatavicum* (Herder) O. Fedtschenko & B. Fedtschenko.

Herbs, perennial, 25–100 cm tall; stems solitary and erect or clustered and ascending, upper parts branched, rarely unbranched. Basal leaves: petiole 4–7 cm; leaf blade narrowly elliptic or oblanceolate, 10–18 × 3–4 cm, 2-pinnatisect, both surfaces green, glabrous or sparsely villous, primary lateral segments 5–14-paired; ultimate segments narrowly elliptic, broadly linear, or linear-lanceolate. Middle and distal stem leaves progressively smaller, similar; leaves below capitula pinnately divided or entire. Synflorescence an irregular flat-topped cyme. Capitula (1 or)2–5; peduncle 9–19 cm. Involucre coryliform, 10–18 mm in diam.; phyllaries in 4 rows, scarious margin dark brown, outer phyllaries narrowly lanceolate or linear-lanceolate, ca. 6 mm, middle and inner ones narrowly elliptic or oblanceolate. Ray florets white; lamina 1.4–1.6 cm, apex entire. Achenes ca. 2.5 mm. Corona 0.5–1 mm, divided from 1/2 to whole of length. Fl. and fr. Jul–Aug.

Mountain slopes; 1800–?2500 m. Xinjiang [Kazakhstan, Mongolia, Russia].

13. Tanacetum krylovianum (Krascheninnikov) K. Bremer & Humphries, Bull. Nat. Hist. Mus. London, Bot. 23: 102. 1993.

黑苞匹菊 hei bao pi ju

Pyrethrum krylovianum Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 155. 1946; *P. alatavicum* (Herder) O. Fedtschenko & B. Fedtschenko subsp. *krylovianum* (Krascheninnikov) Boldyreva.

Herbs, perennial, 30–70 cm tall; stems solitary or clustered, erect, few branched or not, very sparsely pilose. Basal and lower stem leaves petiolate; leaf blade narrowly elliptic, 5–20 × 2–5 cm, 2-pinnatisect, both surfaces green, very sparsely

pilose or glabrous; primary lateral segments 7–12-paired; ultimate segments obliquely triangular, lanceolate, broadly linear, or linear. Middle and upper stem leaves similar, small, sessile. Synflorescence a ± flat-topped terminal cyme. Capitula 1–3. Involucre coryliform, ca. 16 mm in diam.; phyllaries in 4 rows, scarious margin broad, brown, outer phyllaries ovate, ca. 3 mm, middle and inner ones elliptic or broadly linear, 4–7 mm. Ray florets white; lamina narrowly elliptic, 1.4–2.5 cm, apex 2- or 3-denticulate. Achenes ca. 2.5 mm. Corona 0.4–0.7 mm, lobed for ca. 1/2 length. Fl. and fr. Aug–Sep.

Forest understories, alkaline soils; 2500–3200 m. Xinjiang [Kazakhstan, Mongolia, Russia].

14. Tanacetum abrotanoides K. Bremer & Humphries, Bull. Nat. Hist. Mus. London, Bot. 23: 101. 1993.

丝叶匹菊 si ye pi ju

Pyrethrum abrotanifolium Bunge ex Ledebour, Fl. Ross. 2: 549. 1845; *Chrysanthemum abrotanifolium* (Bunge ex Ledebour) Krylov.

Herbs, perennial, 30–60 cm tall, with thick rhizomes; stems solitary, erect, upper parts branched, very sparsely pilose or glabrous. Basal and lower stem leaves: petiole 3–5 cm; leaf blade narrowly elliptic or linear-elliptic, ca. 14 × 2–4 cm, 2-pinnatisect, both surfaces green, sparsely villous with glandular and long, curved, simple hairs; primary lateral segments 7–15-paired; ultimate segments filiform. Middle and upper stem leaves similar, gradually smaller, sessile. Synflorescence an irregular flat-topped panicle. Capitula 3–7, pedunculate. Involucre coryliform, 9–11 mm in diam.; phyllaries in 4 rows, scarious margin brown or dark brown, outer phyllaries lanceolate, ca. 3.5 mm, abaxially sparsely pilose, middle and inner ones narrowly elliptic to linear-elliptic, 4–5 mm, abaxially glabrous. Ray florets white; lamina narrowly elliptic, 8–12 mm. Achenes ca. 2.2 mm. Corona 0.3–0.5 mm, lobed or divided to 1/2 length. Fl. and fr. Jul–Aug.

Mountain slopes; above 2000 m. Xinjiang [Kazakhstan, Mongolia, Russia].

15. Tanacetum pulchrum (Ledebour) Schultz Bipontinus, Tanaceteen, 49. 1844.

美丽匹菊 mei li pi ju

Pyrethrum pulchrum Ledebour, Icon. Pl. 1: 20. 1829; *Chrysanthemum pulchrum* (Ledebour) C. Winkler; *Tripleurospermum pulchrum* (Ledebour) Ruprecht.

Herbs, perennial, 15–35 cm tall, rhizomatous; stems solitary or clustered, unbranched, villous with long, curved, simple hairs, especially in upper part and near capitula. Basal leaves: petiole to 4 cm; leaf blade linear or linear-oblong, 2–10 × 1–2 cm, 2-pinnatisect, both surfaces green, glabrous or somewhat villous; primary lateral segments 6–12-paired; ultimate segments linear or linear-lanceolate. Stem leaves similar, gradually smaller, sessile. Capitulum solitary, terminal; peduncle villous with rather dense and fluffy curved hairs. Involucre coryliform, 15–25 mm in diam.; phyllaries in 5 rows, scarious margin broad, dark brown, outer phyllaries ovate or broadly ovate, 5–6 mm, middle and inner ones elliptic or broadly linear, 8–10 mm, outer and middle ones abaxially villous with long simple hairs, inner ones abaxially glabrous. Ray florets white; lamina linear, 1.5–3 cm, apex entire. Achenes 2.5–3 mm. Corona 1–1.2 mm, divided to base. Fl. and fr. Aug.

Kobresia meadows, rocky slopes; ca. 2600 m. Xinjiang (Altay Shan) [Kazakhstan, Mongolia, Russia].

16. Tanacetum richterioides (C. Winkler) K. Bremer & Humphries, Bull. Nat. Hist. Mus. London, Bot. 23: 103. 1993.

单头匹菊 dan tou pi ju

Chrysanthemum richterioides C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 10: 86. 1887; *C. merzbacheri* B. Fedtschenko ex Merzbacher; *Pyrethrum karelinii* Krascheninnikov; *P. richterioides* (C. Winkler) Krasnov.

Herbs, perennial, 6–35 cm tall, rhizomatous; stems solitary or clustered, erect or ascending, villous especially in upper part and below capitula, hairs long, curved, and simple. Basal and lower stem leaves: petiole to 4 cm; leaf blade narrowly elliptic, 2.5–6 × 1.5–2 cm, 2-pinnatisect, both surfaces green or pale green, sparsely villous; primary lateral segments 4–10-paired; ultimate segments narrowly elliptic. Middle and upper stem leaves similar, gradually smaller. Capitula solitary, terminal, long or shortly pedunculate. Involucre coryliform, 15–20 mm in diam.; phyllaries in 4 rows, scarious margin broad, dark brown, outer phyllaries lanceolate, 5–6 mm, abaxially sparsely villous, middle and inner ones narrowly elliptic or oblanceolate, 5–6.5 mm, abaxially glabrous. Ray florets red or purple-red; lamina broadly linear, 1.4–2 cm, apex minutely 3-denticulate. Corona 0.3–0.5 mm, divided for 1/2 length. Fl. Aug–Sep.

Mountain slopes, meadows, alluvial places; 2000–3100 m. Xinjiang (Junggar Pendi, Tian Shan) [Kazakhstan].

17. Tanacetum kaschgarianum K. Bremer & Humphries, Bull. Nat. Hist. Mus. London, Bot. 23: 102. 1993.

托毛匹菊 tuo mao pi ju

Pyrethrum kaschgharicum Krascheninnikov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 9: 158. 1946, not *Tanacetum kaschgaricum* Krascheninnikov (1933).

Herbs, perennial, 15–30 cm tall, with branched rhizomes; stems solitary or clustered, erect or ascending, simple, sparsely villous, hairs long, curved, and simple. Basal and lower stem leaves: petiole to 5.5 cm; leaf blade narrowly elliptic, 3–7 × 1.5–2.5 cm, 2-pinnatisect, both surfaces gray-white, densely hairy; primary lateral segments 4–9-paired; ultimate segments narrowly elliptic or narrowly linear-elliptic. Middle and upper stem leaves similar, sessile; leaves below capitulum pinnatifid. Capitula solitary, terminal. Involucre coryliform, 10–15 mm in diam.; phyllaries in 3 rows, scarious margin broad, dark brown, outer phyllaries triangular-lanceolate, ca. 5 mm, middle and inner ones elliptic or narrowly oblanceolate, ca. 6 mm, outer and middle ones abaxially villous, inner ones abaxially glabrous. Receptacle pilose with easily shed hairs. Ray florets white or red; lamina elliptic, 6–10 mm, apex 2- or 3-denticulate. Achenes 2.5–3 mm. Corona ca. 0.8 mm, divided to base. Fl. and fr. Jun–Aug.

• Mountain slopes; 2000–2200(–2600) m. Xinjiang.

18. Tanacetum artemisioides Schultz Bipontinus ex J. D. Hooker, Fl. Brit. India 3: 318. 1881.

艾状菊蒿 ai zhuang ju hao

Herbs, perennial, to 60 cm tall, from woody rootstock; stems several, adpressed hairy, glabrescent. Basal and lower stem leaves petiolate. Middle stem leaves subsessile to sessile; leaf blade oblong, 1–2.5(–3) × 0.8–1.5(–2) cm, ± palmately 1- or 2-pinnatisect; ultimate segments oblong, 2–3 mm, obtuse. Synflorescence a ± lax flat-topped cyme. Capitula 3–10; peduncle short to moderately long. Involucre ± cupuliform, ca. 5 mm in diam.; phyllaries in 3 rows, pubescent, margin membranous; outer phyllaries lanceolate, ca. 3 mm, apex acute; middle and inner ones oblanceolate to narrowly obovate, 4–5 mm, apex obtuse. Receptacle convex, glabrous. All florets yellow; corolla tubular, 3–4 mm, 5-toothed. Achenes light brown.

2400–2700 m. W Xizang [?India, Pakistan].

The type gatherings of this and the following species, *Tanacetum falconeri*, were both collected from the border area between Xizang and Pakistan. The two species are therefore likely to be found within China. The generic position of these species with homogamous capitula needs more detailed investigation.

19. Tanacetum falconeri J. D. Hooker, Fl. Brit. India 3: 320. 1881.

西藏菊蒿 xi zang ju hao

Herbs, perennial or rarely annual, 40–60(–70) cm tall, from woody rootstock; stems sulcate. Basal and lower stem leaves petiolate; leaf blade linear-oblong, 1–9(–13) cm including petiole, 2-pinnatisect, both surfaces silky tomentose; ultimate segments linear, acute. Synflorescence a flat-topped cyme. Capitula 6–10(–12), homogamous, discoid; peduncle 1.5–3 cm. Involucre 2–3(–4) mm; phyllaries in 4 rows, abaxially softly tomentose, lanate, or pubescent, margin membranous. Receptacle convex, rarely flat. All florets yellow; corolla tubular, 2–4 mm, 5-toothed. Achenes light brown, 1–1.5(–3) mm. Corona glandular, entire.

Rocky talus, around lakes, grassy ridges, valley plains; 2000–4000 m. W Xizang [N India (Himachal Pradesh), Pakistan].

170. TRIPLEUROSPERMUM Schultz Bipontinus, Tanaceteen, 31. 1844.

三肋果属 san lei guo shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Chamaemelum Visiani (1845), not Miller (1754); *Dibothrospermum* Knaf; *Rhytidospermum* Schultz Bipontinus.

Herbs, annual or perennial; indumentum absent or of simple, basifixed hairs. Leaves 2- or 3-pinnatisect. Synflorescences cymose; capitula solitary or in ± flat-topped panicles, pedunculate, heterogamous or homogamous, radiate or discoid. Involucres hemispheric; phyllaries in 2–4 rows, scarious margins often narrow, white or pale to dark brown. Receptacle convex to conical, epaleate. Marginal florets in 1 row, female, lamina white or rarely pale pink. Disk florets bisexual; corolla tubular, apex 5-lobed; lobes each usually with resin sac. Anther bases obtuse, apical appendage ovate-triangular or oblong. Style branches with apex truncate. Achenes 3-angled, often wrinkled or tuberculate, with 1 adaxial and 2 lateral, and sometimes 1 or 2 abaxial, white ribs, abaxially and apically with (1 or)2(–5) distinct resin sacs. Corona present, sometimes forming an auricle, or with a few scales, sometimes absent.

Thirty-eight species: Europe and temperate Asia, a few species in N Africa and North America; five species (one endemic) in China.

1a. Plants perennial, with rhizome; phyllaries with dark brown scarious margins.
2a. Capitula heterogamous, radiate ..... 1. *T. ambiguum*
2b. Capitula homogamous, discoid ..... 2. *T. homogamum*
1b. Plants annual or biennial, without rhizome; phyllaries with white or paler brown scarious margins.
3a. Phyllaries with narrow pale brown scarious margin; achenes tuberculate ..... 3. *T. tetragonospermum*
3b. Phyllaries with white or pale brown scarious margin; achenes wrinkled.
4a. Ray floret lamina ca. 10 × 3.5 mm; corona subentire; leaf blade 2–4 × 1–2.5 cm ..... 4. *T. inodorum*
4b. Ray floret lamina ca. 4 × 1.5 mm; corona 3-toothed; leaf blade 5.5–9.5 × 2.5–3 cm ..... 5. *T. limosum*

1. Tripleurospermum ambiguum (Ledebour) Franchet & Savatier, Enum. Pl. Jap. 1: 236. 1875.

褐苞三肋果 he bao san lei guo

Pyrethrum ambiguum Ledebour, Fl. Altaic. 4: 118. 1833; *Chamaemelum ambiguum* (Ledebour) Boissier; *Matricaria ambigua* (Ledebour) Krylov.

Herbs, perennial, 15–50 cm tall, rhizomatous; stems erect, unbranched, striate, scattered pilose below capitula. Basal leaves with petiole base dilated; leaf blade lanceolate-oblong or oblong, 3–7(–10) × 1–2 cm, 2-pinnatisect, both surfaces glabrous; primary lateral segments many paired; ultimate segments linear, sessile, small. Capitula solitary, terminal, 3–4 cm in diam. Involucre hemispheric, 1–1.5 cm in diam.; phyllaries in 3 rows, abaxially glabrous, scarious margin narrow, dark brown, outer phyllaries lanceolate, 6–6.5 mm, middle ones oblong, inner ones oblanceolate. Ray florets white; lamina ca. 2 × 4.5 mm. Disk florets yellow, 5-lobed; lobes each with red apical resin sac. Achenes deep brown, ca. 2 mm, tuberculate, with 1 adaxial

and 2 lateral thick whitish ribs, sometimes also 1 or 2 thin abaxial ribs, abaxially and apically with 2 distinct resin sacs. Corona with broad obtuse teeth. Fl. and fr. Jun–Aug.

Sunny mountain slopes, grasslands of river valleys; 700–2600 m. Heilongjiang, Xinjiang (Altay Shan, Tian Shan) [Kazakhstan, Mongolia, Russia; SW Asia].

2. Tripleurospermum homogamum G. X. Fu ex Y. Ling & C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 6: 9. 1980.

无舌三肋果 wu she san lei guo

Herbs, perennial, ca. 40 cm tall, with short rhizomes; stems unbranched, striate, conspicuously pubescent below capitula. Basal leaves: petiole short, dilated basally; leaf blade oblanceolate-oblong, 4–6 × 0.8–1.5 cm, pinnatisect to 2-pinnatisect, both surfaces glabrous or very sparsely pubescent; ultimate segments linear, sessile. Distal stem leaves linear, entire. Capitula solitary, terminal, homogamous, discoid; peduncle to 10 cm. Involucres hemispheric, ca. 1 cm in diam.; phyllaries in 4 rows, abaxially glabrous or sparsely pubescent, scarious margin dark brown, outer and middle phyllaries lanceolate to oblong-lanceolate, ca. 4 mm, inner ones spatulate-oblanceolate, ca. 3.5 mm. Ray florets absent. Disk florets yellow, 5-lobed, lobes each with a resin sac. Achenes pale brown, 3-angled, ca. 2 mm, smooth, with 1 adaxial and 2 lateral thick whitish ribs, sometimes 1 or 2 thin abaxial ribs, abaxially and apically with 2 distinct resin sacs. Corona ca. 0.2 mm, 3-lobed.

• Alpine forest margins; ca. 2500 m. N Xinjiang (Burqin).

3. Tripleurospermum tetragonospermum (F. Schmidt) Pobedimova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 346. 1961.

东北三肋果 dong bei san lei guo

Chamaemelum tetragonospermum F. Schmidt, Reis. Amur-Land., Bot. 148. 1868; *Matricaria tetragonosperma* (F. Schmidt) H. Hara & Kitamura.

Herbs, annual, 40–50 cm tall; stems usually branched from base, striate, upper parts sparsely pubescent, lower part glabrous. Lower and middle stem leaves sessile; leaf blade oblanceolate-oblong or oblong, 5–15 × 2–5 cm, 2- or 3-pinnatisect, both surfaces glabrous; ultimate segments linear-filiform. Distal stem leaves similar, smaller. Capitula solitary, terminal, several per plant, 2–2.5 cm in diam. Involucres hemispheric, 1.2–1.5 cm in diam.; phyllaries in 4 rows, abaxially glabrous, scarious margin narrow, brown, outer ones ovate-oblong, apex obtuse, middle ones narrowly oblong, apex rounded, inner ones lanceolate-oblong, apex obtuse. Ray florets white; lamina ca. 6.5 mm. Disk florets yellow, 5-lobed. Achenes brownish, triquetrous, ca. 1.5 mm, tuberculate, with 1 adaxial and 2 lateral thick ribs, abaxially and apically with 2 distinct resin sacs. Corona ca. 0.2 mm, entire. Fl. and fr. Jun–Aug.

Roadsides, sandy places by rivers; ca. 300 m. Heilongjiang, Liaoning [Japan, Russia].

4. Tripleurospermum inodorum (Linnaeus) Schultz Bipontinus, Tanaceteen, 32. 1844.

新疆三肋果 xin jiang san lei guo

Matricaria inodora Linnaeus, Fl. Suec., ed. 2, 297. 1755; *Chamaemelum inodorum* (Linnaeus) Visiani; *Chamomilla inodora* (Linnaeus) K. Koch; *Chrysanthemum inodorum* (Linnaeus) Linnaeus; *C. maritimum* (Linnaeus) Cavanilles var. *inodorum* (Linnaeus) Becherer; *Dibothrospermum agreste* Knaf, nom. illeg. superfl.; *M. maritima* Linnaeus subsp. *inodora* (Linnaeus) Soó; *M. maritima* var. *inodora* (Linnaeus) Soó; *Pyrethrum inodorum* (Linnaeus) Moench; *Rhytidospermum inodorum* (Linnaeus) Schultz Bipontinus; *Tripleurospermum maritimum* (Linnaeus) W. D. J. Koch subsp. *inodorum* (Linnaeus) Applequist.

Herbs, annual or biennial; stems 30–70 cm tall, erect, striate, glabrous, corymbosely branched in upper 1/2. Middle stem leaves sessile; leaf blade ovate-oblong or oblong, 2–4 × 1–2.5 cm, both surfaces glabrous, 2-pinnatisect; ultimate segments narrowly linear. Distal stem leaves similar, gradually smaller. Capitula several to many, in an apical corymb, 2–3 cm in diam., pedunculate. Involucres hemispheric, 7–10 mm in diam.; phyllaries in 3 or 4 rows, margin narrowly white scarious, outer ones lanceolate, middle and inner ones oblong to oblanceolate. Ray florets white; lamina ca. 1 cm. Disk florets yellow, 5-lobed; lobes each with a resin sac. Achenes brown, triquetrous, ca. 2 mm, wrinkled, with 1 adaxial and 2 lateral thick whitish ribs, abaxially and apically with 2 distinct resin sacs. Corona short, subentire. Fl. and fr. Sep. $2n = 36$.

River valleys; ca. 1100 m. Jiangsu, Jilin, Liaoning, N Xinjiang (Tacheng) [Kazakhstan, Russia, Uzbekistan; Europe].

5. Tripleurospermum limosum (Maximowicz) Pobedimova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 21: 352. 1961.

三肋果 san lei guo

Chamaemelum limosum Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 156. 1859; *Matricaria limosa* (Maximowicz) Kudô; *M. maritima* Linnaeus subsp. *limosa* (Maximowicz) Kitamura.

Herbs, annual or biennial; stems 10–35 cm tall, striate, glabrous, unbranched or branched from base. Basal leaves withered by anthesis. Lower and middle stem leaves sessile; leaf blade oblanceolate-oblong or oblong, 5.5–9.5 × 2.5–3 cm, both surfaces glabrous, tripinnatisect; ultimate segments filiform. Distal stem leaves gradually smaller, similar to proximal and middle leaves. Capitula few to many, in an apical corymb, 1–1.5 cm in diam., pedunculate. Involucres hemispheric; phyllaries in 2 or 3 rows, margin white or brownish scarious, outer ones broadly lanceolate, inner ones oblong. Ray florets white; lamina 4(–6) mm. Disk florets yellow, 5-lobed; lobes each with a resin sac. Achenes brown, triquetrous, ca. 2.5 mm, wrinkled, with 1 adaxial and 2 lateral whitish ribs, apically and abaxially with 2 distinct resin sacs. Corona ca. 0.5 mm, 3-lobed. Fl. and fr. Jun–Aug.

Sandy places by rivers and lakes, meadows, dry sandy mountain slopes. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Kazakhstan, Korea, Mongolia, Russia, Uzbekistan].

171. MATRICARIA Linnaeus, Sp. Pl. 2: 890. 1753, nom. cons.

母菊属 mu ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Akylopsis Lehmann; *Chamomilla* Gray; *Lepidanthus* Nuttall (1841), not Nees (1830), nor Nuttall (1835); *Lepidotheca* Nuttall.

Herbs, annual, usually fragrant; indumentum absent or of simple, basifixed hairs. Leaves 1- or 2-pinnatisect. Synflorescences cymose, usually ± flat-topped, sometimes reduced to solitary capitulum. Capitula heterogamous or homogamous, radiate or discoid. Involucres coryliform; phyllaries in 2 or 3 rows. Receptacle conical to subulate, epaleate. Marginal florets when present in 1 row, female, fertile; lamina white. Disk florets yellow or pale green, bisexual; corolla tubular, apex 4- or 5-lobed. Anther bases obtuse; apical appendage triangular. Style branches linear, apex truncate. Achenes small, terete, slightly dorsiventrally compressed, adaxially with 3–5 thin ribs. Corona small or absent or sometimes represented by an adaxial auricle particulariy in ray achenes.

About seven species: N Africa, SW and temperate Asia, Europe, North America; two species in China.

1a. Capitula heterogamous, with both marginal ray florets and central disk florets; ray florets white, disk florets yellow; achenes with 5 thin adaxial ribs; corona absent ..... 1. *M. chamomilla*
1b. Capitula homogamous, florets all bisexual, tubular, pale yellow-green; achenes with 2 or 3 thin adaxial ribs; corona present, white ..... 2. *M. matricarioides*

1. Matricaria chamomilla Linnaeus, Sp. Pl. 2: 891. 1753.

母菊 mu ju

Chamaemelum chamomilla (Linnaeus) E. H. L. Krause; *Chamomilla recutita* (Linnaeus) Rauschert; *C. vulgaris* Gray; *Chrysanthemum chamomilla* (Linnaeus) Bernhardi; *C. suaveolens* (Linnaeus) Cavanilles; *Matricaria chamomilla* var. *recutita* (Linnaeus) Fiori; *M. chamomilla* f. *suaveolens* (Linnaeus) Fiori & Paoletti; *M. recutita* Linnaeus; *M. suaveolens* Linnaeus.

Herbs, annual or short-lived perennial, glabrous. Stems (10–)30–40 cm tall, erect, striate, much branched in upper part. Proximal stem leaves sessile; leaf blade oblong or oblanceolate, (1.5–)3–4(–6) × (0.5–)1.5–2 cm, 2-pinnatisect; ultimate segments linear, apex mucronulate. Distal stem leaves similar to proximal leaves, ovate or long ovate. Capitula heterogamous, 1–1.5 cm in diam., apically corymbose, pedunculate; peduncle 3–6 cm. Involucres cup-shaped; phyllaries in 2 rows, margin broadly white scarious, apex obtuse. Ray florets white; lamina ca. 6 mm. Disk florets many, yellow, tubular. Achenes 0.8–1 mm, with 5 mainly adaxial thin ribs. Corona absent. Fl. and fr. May–Jul. $2n = 18$.

Near fields, forests, above valleys; 1800–3300 m. Anhui, Hebei, Jiangsu, Liaoning, Shaanxi, Shandong, Sichuan, Xinjiang [Kazakhstan, Mongolia, Russia, Uzbekistan; Europe, North America].

Matricaria chamomilla is cultivated as an ornamental in Beijing and Shanghai. Capitula of this species are used medicinally to induce sweat and relieve muscular spasms. The entire plant contains large amounts of Vitamins A and C.

2. Matricaria matricarioides (Lessing) Porter ex Britton, Mem. Torrey Bot. Club 5: 341. 1894.

同花母菊 tong hua mu ju

Artemisia matricarioides Lessing, Linnaea 6: 210. 1831; *Matricaria discoidea* Candolle.

Herbs, annual. Stems 5–30 cm tall, erect or ascending, branched in upper part or from base, glabrous or sparsely pubescent below capitula. Stem leaves sessile; leaf blade oblong or oblanceolate, 2–3 × 0.8–1 cm, 2-pinnatisect; ultimate segments shortly linear, both surfaces glabrous. Capitula homogamous, irregularly corymbose or solitary at apex of branches, pedunculate; peduncle 0.5–1 cm. Involucres cup-shaped; phyllaries in 3 rows, equal, oblong, abaxially glabrous, scarious margin hyaline, apex obtuse. All florets bisexual, pale yellow-green, tubular, 5-lobed. Achenes oblong, somewhat curved, ca. 1.5 mm, apex obliquely truncate, with 2 or 3 adaxial thin white ribs and 1 red thin stripe on each side. Pappus represented by a white corona. Fl. and fr. Jul. $2n = 18$.

Forests, roadsides, near houses. Jilin (Baicheng, Hunchun), Liaoning, Nei Mongol [Bhutan, Japan, Kazakhstan, Korea, Russia; N Asia, Europe, North America].

172. GLEBIONIS Cassini in F. Cuvier, Dict. Sci. Nat. 41: 41. 1826.

茼蒿属 tong hao shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Ismelia Cassini; *Xantophtalmum* Schultz Bipontinus.

Herbs, annual; indumentum absent or of simple, basifixed hairs. Leaves alternate, pinnatifid or margin dentate. Synflorescences cymose, lax ± flat-topped or reduced to solitary terminal capitulum. Capitula pedunculate, heterogamous, radiate. Involucre cup-shaped; phyllaries in 4 rows, rigidly herbaceous. Receptacle convex, epaleate. Marginal florets in 1 row, female, fertile; lamina yellow or yellow and white. Disk florets yellow, bisexual; corolla tubular, apex 5-lobed. Anther bases obtuse; apical appendage ovate-elliptic. Style branches linear, apex truncate. Ray achenes 3-angled, laterally winged, adaxially narrowly winged or ribbed; corona absent. Disk achenes prismatic with a narrow adaxial wing or terete; corona absent.

Three species: Mediterranean region, introduced elsewhere as weeds or cultivated as an ornamental or as vegetables; three species (all introduced) in China.

1a. Ray achenes narrowly 2-winged; leaves irregularly dentate or rarely pinnatilobed ..... 3. *G. segetum*
1b. Ray achenes widely 3-winged; leaves bipinnately divided.
2a. Adaxial wings of ray achenes projected into an apical rostrum ..... 1. *G. carinata*
2b. Wings of ray achenes not projected into rostrum ..... 2. *G. coronaria*

1. Glebionis carinata (Schousboe) Tzvelev, Bot. Zhurn. 84(7): 117. 1999.

蒿子杆 hao zi gan

Chrysanthemum carinatum Schousboe, Iagttag. Vextrig. Marokko, 198. 1800; *Ismelia carinata* (Schousboe) Schultz Bipontinus; *I. versicolor* Cassini, nom. illeg. superfl.

Herbs, annual, 20–70 cm tall, glabrous or nearly so; stems erect, usually branched above middle. Basal leaves withered by anthesis; lower and middle stem leaves sessile; leaf blade obovate or narrowly elliptic, 8–10 × 3–4 cm, 2-pinnatipartite; primary lateral lobes 3–8-paired; ultimate lobes lanceolate, obliquely triangular or linear. Synflorescence a terminal cyme. Capitula (1 or)2–8, long pedunculate. Involucres cupular, 1.5–2.5 cm in diam.; phyllaries in 4 rows, inner ones ca. 1 cm. Ray achenes broadly 3-winged, wings adaxially projected into an apical rostrum. Disk achenes with 2 elevated ribs. Corona absent.

Cultivated as a vegetable; 500–2200 m. Anhui, Guizhou, Hainan, Hebei, Heilongjiang, Hubei, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shandong, Xinjiang, Yunnan, Zhejiang [native to NW Africa (Morocco); introduced elsewhere].

2. Glebionis coronaria (Linnaeus) Cassini ex Spach, Hist. Nat. Vég. 10: 181. 1841.

茼蒿 tong hao

Chrysanthemum coronarium Linnaeus, Sp. Pl. 2: 890. 1753, nom. cons.; *C. roxburghii* Desfontaines; *Glebionis roxburghii* (Desfontaines) Tzvelev; *Matricaria coronaria* (Linnaeus) Desrousseaux; *Pinardia coronaria* (Linnaeus) Lessing; *Pyrethrum indicum* Sims (1813), not (Linnaeus) Cassini (1826); *Xantophtalmum coronarium* (Linnaeus) P. D. Sell.

Herbs, annual, glabrous or almost so; stems erect, 70 cm tall, unbranched or few branched above middle. Basal leaves withered by anthesis; lower and middle stem leaves sessile; leaf blade narrowly elliptic or elliptic-lanceolate in outline, 8–10 × 3–4 cm, 1 or 2(or 3)-pinnatisect or pinnatifid, primary segments 2–4-paired, ultimate lobes ovate or linear; upper stem leaves gradually smaller. Capitula terminal, solitary or few, not forming conspicuous panicle; peduncle 15–20 cm. Involucres cup-shaped, 1.5–3 cm in diam.; phyllaries in 4 rows, inner ca. 1 cm, apex widened, scarious. Ray achenes narrowly 3-winged. Disk achenes 1- or 2-ribbed. Fl. and fr. Sep. $2n = 18$*

Widely cultivated as a vegetable. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Hunan, Jilin, Shandong, Zhejiang [native to the Mediterranean region].

Glebionis coronaria is grown both for its bright yellow florets and the edible young shoots. Various authors include *Chrysanthemum coronarium* var. *spatiosum* within this species, but it is better placed within the following species, *G. segetum*.

3. Glebionis segetum (Linnaeus) Fourreau, Ann. Soc. Linn. Lyon, sér. 2, 17: 90. 1869.

南茼蒿 nan tong hao

Chrysanthemum segetum Linnaeus, Sp. Pl. 2: 889. 1753; *C. coronarium* Linnaeus f. *spatiosum* (L. H. Bailey) Kitamura; *C. coronarium* var. *spatiosum* L. H. Bailey; *C. spatiosum* (L. H. Bailey) L. H. Bailey; *C. umbrosum* Willdenow; *Matricaria segetum* (Linnaeus) Schrenk; *Pyrethrum segetum* (Linnaeus) Moench; *P. umbrosum* (Willdenow) Boissier; *Xantophtalmum segetum* (Linnaeus) Schultz Bipontinus.

Herbs, annual, 20–60 cm tall, glabrous or nearly so; stems erect, fleshy. Basal and lower stem leaves sessile; leaf blade elliptic, obovate-lanceolate, or ovate-elliptic, margin irregularly largely dentate, rarely pinnatilobed. Upper stem leaves gradually smaller. Synflorescence ill-defined, not obviously flat-topped; capitula solitary or few at apices of branches; peduncle ca. 5 cm. Involucres cupular, 1–2 cm in diam.; phyllaries in 4 rows, inner ones scarious, apex enlarged. Ray achenes narrowly 2-winged. Disk achenes with 10 ribs.

Cultivated as a vegetable. Anhui, Beijing, Fujian, Guangdong, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Jiangxi, Yunnan, Zhejiang [native to the Mediterranean region].

173. LEUCANTHEMUM Miller, Gard. Dict. Abr., ed. 4, [769]. 1754.

滨菊属 bin ju shu

Shi Zhu (石铸 Shih Chu); Christopher J. Humphries, Michael G. Gilbert

Herbs, perennial; indumentum absent or of simple basifixed hairs. Leaves alternate, margin entire, serrate, or pinnatifid. Synflorescences cymose, lax, ± flat-topped, sometimes reduced to single capitulum. Capitula pedunculate, heterogamous, radiate. Involucres coryliform; phyllaries in 3 or 4 rows, scarious margins white or brown. Receptacle convex, sometimes conical, epaleate. Marginal florets in 1 row, female, fertile; lamina white or pink, rarely yellow. Disk florets many, yellow, bisexual; corolla tubular, apex 5-lobed. Anther bases obtuse; apical appendage ovate-lanceolate. Style branches linear, apex truncate. Achenes 10-ribbed, ribs projected or not to apical rim. Corona or adaxial auricle present or not.

Thirty-three species: Europe; one species (introduced) in China.

Leucanthemum maximum (Ramond) Candolle (Prodr. 6: 46. 1838; *Chrysanthemum maximum* Ramond, Bull. Sci. Soc. Philom. Paris 2: 140. 1800; 大滨菊 da bin ju), native to SW Europe, is grown in China as an ornamental garden plant. It is closely related to *L. vulgare* but is a larger plant with more acutely toothed leaf margins and wider scarious phyllary margins.

1. Leucanthemum vulgare Lamarck, Fl. Franç. 2: 137. 1779.

滨菊 bin ju

Chrysanthemum leucanthemum Linnaeus, Sp. Pl. 2: 888. 1753; *Chamaemelum leucanthemum* (Linnaeus) E. H. L. Krause; *Chrysanthemum vulgare* (Lamarck) Gaterau (1789), not (Linnaeus) Bernhardi (1800); *Leucanthemum ircutianum* Candolle; *Matricaria leucanthemum* (Linnaeus) Desrousseaux; *Pyrethrum leucanthemum* (Linnaeus) Franchet (1885), not Wenderoth (1831); *Tanacetum leucanthemum* (Linnaeus) Schultz Biponˆtinus.

Herbs, perennial, 15–80 cm tall; stems erect, usually unbranched, tomentose, floccose, or glabrous. Basal leaves: petiole longer than blade; leaf blade narrowly elliptic, oblanceolate, obovate, or ovate, 3–8 × 1.5–2.5 cm, base cuneate-attenuate. Middle and lower stem leaves sessile; leaf blade narrowly elliptic to linear-elliptic, both surfaces glabrous, sometimes pinnatilobed below middle or near base, attenuate toward base, base auriculate- or subauriculate-semiamplexicaul. Distal stem leaves gradually smaller, sometimes pinnatisect. Synflorescence a lax flat-topped cyme; capitula 1–5. Involucre coryliform, 1–2 cm in diam.; phyllaries in 3 or 4 rows, abaxially glabrous, scarious margin white or brown. Ray florets white; lamina 1–2.5 cm. Achenes 2–3 mm, 10-ribbed, ribs projected into an apical rim. Pappus absent. Fl. and fr. May–Oct. $2n = 18$, 36, 36+1B, 54, 72.

Widely cultivated as an ornamental, naturalized in grasslands. Fujian, Gansu, Hebei, Henan, Jiangsu, Jiangxi [native to Europe; introduced and naturalized elsewhere].

10. Tribe **GNAPHALIEAE**

鼠麴草族 shu qu cao zu

Chen Yousheng (陈又生), Zhu Shixin (朱世新); Randall J. Bayer

Herbs, subshrubs, or shrubs. Stems generally with fibers in phloem, without resin canals. Leaves alternate, rarely opposite, usually entire and tomentose at least abaxially. Capitula heterogamous disciform or homogamous discoid, rarely heterogamous radiate, solitary or variously grouped. Phyllaries generally papery, generally brightly colored or hyaline and with a thickened, cartilaginous basal portion (stereome) composed of compact sclerenchyma. Receptacles generally epaleate or paleate. Female outer florets generally filiform or often absent. Central florets generally bisexual, sometimes functionally male. Anthers ecalcarate, with tails; endothecial tissue almost always polarized. Pollen with 2-layered ektexine comprising an outer columellate layer and an irregularly interlaced basal layer. Style branches with hairs apically, rarely dorsally; stigmatic rows generally separated. Achenes small, oblong to obovoid, usually hairy; pericarp generally with 2, 3, or 5 vascular bundles. Pappus generally of plumose or barbellate to scabrid capillary bristles, occasionally of bristles and scales, only scales, or absent.

About 185 genera and 1,240 species: nearly worldwide, with centers of concentration in S Africa and Australia; 12 genera (one endemic, one introduced) and 121 species (63 endemic, four introduced) in China.

1a. Receptacle with paleae; outer florets invaginated by paleae ..... 174. *Filago*
1b. Receptacle without paleae.
2a. Pappus bristles connate into a ring.
3a. Pappus monomorphic.
4a. Leaf margins revolute ..... 175. *Phagnalon*
4b. Leaf margins flat ..... 176. *Gamochaeta*
3b. Pappus dimorphic.
5a. Capitula subtended by bracteal leaves ..... 177. *Leontopodium*
5b. Capitula not subtended by bracteal leaves.
6a. Plants pulvinate; stolons absent; leaves small, ericoid ..... 178. *Sinoleontopodium*
6b. Plants caespitose; stolons present; leaves larger, non-ericoid ..... 179. *Antennaria*
2b. Pappus bristles free or coherent by patent cilia.
7a. Phyllaries brown or hyaline, inconspicuous.
8a. Stereome divided ..... 180. *Gnomophalium*
8b. Stereome undivided ..... 181. *Gnaphalium*
7b. Phyllaries white, yellow, pink, or reddish, conspicuous.
9a. Pappus dimorphic ..... 182. *Anaphalis*
9b. Pappus monomorphic.
10a. Outer female florets greater in number than central disk florets ..... 183. *Pseudognaphalium*
10b. Outer female florets fewer in number than central disk florets.
11a. Capitula 2–5 cm in diam., solitary; phyllaries broader, inner ones broadly lanceolate, acuminate at apex, nitid, yellow, white, red, or purple ..... 184. *Xerochrysum*
11b. Capitula 4–6 mm in diam., in corymbs or compound corymbs; phyllaries narrower, acute or rounded at apex, yellow or white ..... 185. *Helichrysum*

174. **FILAGO** Linnaeus, Sp. Pl. 2: 927, 1199, [add. post indicem]. 1753, nom. cons.

絮菊属 xu ju shu

Chen Yousheng (陈又生); Randall J. Bayer

Herbs, annual. Stems with fibers in phloem, without resin canals, without pericyclic cambium. Leaves alternate, sessile, tomentose, eglandular. Capitula heterogamous, disciform, few together, surrounded by a ray of leaves. Phyllaries few seriate, cartilaginous or apically minutely papery, monomorphic, monochromous, brownish, transparent, not enclosing florets; stereome entire. Receptacles filiform, fragile; paleae subtending outer female florets, 3–5-seriate, imbricate, scarious. Female florets purple, filiform, outnumbering disk florets. Disk florets bisexual, or functionally male; corolla purple; corolla lobes 4, erect; veins ending below lobes. Anthers ecalcarate, with short tails; endothecial tissue polarized; apical appendage flat, as wide as thecae. Achenes brown, monomorphic, terete to compressed, cylindric to obovoid, with 2 vascular bundles, sparsely hairy with short, clavate, myxogenic twin hairs; epidermis smooth. Pappus monomorphic, of free scabrid capillary bristles in 1 row, basally with patent cilia; apical cells acute. $x = 9, 13, 14$.

About 46 species: N Africa, SW Asia, Atlantic islands, Europe; two species in China.

1a. Capitula 2–3 mm, few in dense corymbs; phyllaries 2- or 3-seriate; bracteal leaves slightly longer than synflorescence ..... 1. *F. arvensis*
1b. Capitula ca. 5 mm, numerous in globose corymbs; phyllaries 3–5-seriate; bracteal leaves shorter than synflorescence ..... 2. *F. spathulata*

1. Filago arvensis Linnaeus, Sp. Pl. 2: 856, [1230]. 1753.

絮菊 xu ju

Gnaphalium arvense (Linnaeus) Willdenow; *Logfia arvensis* (Linnaeus) Holub.

Herbs, annual. Stems 5–35 cm tall, erect, paniculately branching, more rarely simple, sometimes forkedly branching in upper portion, with dense whitish or grayish lanate pubescence. Leaves lanceolate or linear-lanceolate, 5–15 × ca. 1.3 mm, with soft lanate pubescence, apex acute. Capitula 2–3 mm, ovate or pyramidal, gathered in 2s–10s into numerous corymbs, arranged at apices of stems and ramuscules and forming paniculate, racemose, more rarely spiciform synflorescences; floral leaves as long as or shorter than capitula. Involucre 2- or 3-seriate; phyllaries stellate-patent after ripening of achenes; outer phyllaries 5–10, closely surrounding female florets, green, in middle scarious, white transparent at margin, linear or lanceolate, cymbiform, 2–3 mm, ecarinate, abaxially with thick continuous gray lanate pubescence, glabrous at apex, slightly acuminate; inner phyllaries 5, becoming green in middle, broadly lanceolate, slightly concave, indistinctly pubescent or glabrous at margin abaxially, acuminate or obtuse. Achenes light brown, oblong-ovate, slightly flattened, 0.8–1 × ca. 0.3 mm, with sparse papillose hairs, larger than in other species of genus. Pappus of female and bisexual florets with 12–15 finely crenate bristles. $2n = 28$.

Dry slopes, dunes; ca. 1000 m. Xinjiang, Xizang [Kazakhstan, Mongolia, Russia; Europe].

2. Filago spathulata C. Presl, Delic. Prag. 99. 1822.

匙叶絮菊 shi ye xu ju

Herbs, annual. Stems 5–80 cm tall, generally branching from base, with erect or ascending branches, often slightly sinuate, forkedly branching at apex, gray appressed pubescent. Leaves thin, oblong-spatulate, 1.5–2 cm × 4–6 mm, pubescent with long appressed gray tomentum sparsely on both sides, narrowed to base, apex obtuse or shortly acuminate. Capitula ovate, ca. 5 mm, gathered in 10s–15s into dense ± globose corymbs, 6–12 mm in diam., arranged in bifurcations of stems and at apices of branches; floral leaves slightly exceeding capitula in length. Involucre 3–5-seriate; outer phyllaries lanceolate, cymbiform, 5–5.5 × ca. 1 mm, abaxially with distinct light gray long lanate pubescence, apex straight or slightly unbent, thin, with subulate acumen; inner phyllaries broadly lanceolate, flat, 4–4.5 mm, scarious, becoming green in middle, transparent white at margin, long acuminate at apex; innermost phyllaries lanceolate, shortly acuminate, or oblong-ovate, obtuse, flat, transparent white, glabrous. Bisexual florets 5–7. Achenes oblong-obovate, 0.5–0.8 × 0.2–0.4 mm, finely papillate, outer achenes epappose, inner ones bearing a few bristles. Pappus of bisexual florets with 12–14 bristles.

Dry slopes, dunes. Xinjiang, Xizang [Kazakhstan, Russia; SW Asia (Iran), Europe].

175. PHAGNALON Cassini, Bull. Sci. Soc. Philom. Paris 1819: 174. 1819.

绵毛菊属 mian mao ju shu

Chen Yousheng (陈又生); Randall J. Bayer

Herbs or sometimes subshrubs, perennial. Stem with fibers in phloem, without pericyclic cambium and resin canals. Leaves generally sessile, sparsely hairy, margin often dentate, revolute. Capitula solitary or few together, heterogamous, disciform. Phyllaries generally cartilaginous but often with a papery apical portion, in several rows, outnumbering disk florets. Disk florets bisexual; corolla yellow; corolla lobes erect; veins reaching apex of lobes. Anthers ecalcarate, without tails; endothecial tissue polarized; apical appendages flat, as wide as thecae. Style branches obtuse, dorsally with obtuse sweeping hairs not reaching furcation; stigmatic surface basally separated but apically confluent. Achenes with 2 or 3 vascular bundles, sparsely hairy with elongated, not myxogenic twin hairs; epidermis smooth. Pappus of basally connate, barbellate, capillary bristles in 1 row; apical cells acute.

About 43 species: N Africa, C and SW Asia, Europe, Macaronesia; one species in China.

1. Phagnalon niveum Edgeworth, Trans. Linn. Soc. London 20: 68. 1846.

绵毛菊 mian mao ju

Phagnalon denticulatum Decaisne ex C. B. Clarke.

Subshrubs, with erect or decumbent stem, (5–)10–30(–40) cm tall, few to profusely branched, branches and stem densely covered with snow-white cottony wool. Branches densely foliate. Leaves variable in shape and size, lanceolate, oblanceolate, linear-oblong, or spatulate, 8–35(–40) × (2–)4–8 mm, densely white cottony abaxially, less so or ± glabrous adaxially, sometimes much narrowed into a sessile base, margin entire, undulate, dentate, or shallowly lobed, apex obtuse or subobtuse. Peduncles erect, 20–70(–80) mm, covered with white cottony wool, bearing a single capitulum. Capitula 8–12(–14) mm in diam., multiflorous. Phyllaries many seriate, densely floccose-lanate; outer phyllaries subulate to narrowly lanceolate, 2–2.5 × ca. 0.5 mm; middle phyllaries subulate to narrowly lanceolate, 3–3.5 × ca. 0.5 mm, gradually narrowed into an acicular point with entire margin, apex ± opaque; inner phyllaries subulate, 6–7 × ca. 0.5 mm, long acuminate. Bisexual florets tubular, 5–6

mm, tube ± glabrous, lobes small, ± rounded, ± hairy at tips. Anthers included to subexserted, not at all caudate at base. Style included to subincluded, bifid, stigmas rounded, papillose. Achenes compressed, ca. 1 mm, sparsely hairy. Pappus setae 5, 4–5 mm, barbellate almost to base. Fl. May–Aug. $2n = 18$.

Valleys; 1800–2700 m. W Xizang [Afghanistan, India, Kashmir, Nepal, Pakistan].

176. GAMOCHAETA Weddell, Chlor. Andina. 1: 151. 1856.

合冠鼠麴草属 he guan shu qu cao shu

Chen Yousheng (陈又生); Randall J. Bayer

Herbs, annual or perennial. Leaves alternate, flat, tomentose on both surfaces, with entire margins. Capitula disciform, usually in glomerules borne in continuous or interrupted spiciform, sometimes paniculiform, arrays. Phyllaries brownish, papery; stereome undivided. Receptacle flat, epaleate. Outer florets purple, filiform. Central florets bisexual, purple. Anthers with flat appendages. Style branches truncate, with hairs apically. Achenes oblong, with globose twin hairs. Pappus bristles capillary, barbellate, connate into a ring.

About 53 species: Caribbean, Central, North, and South America, some species adventive and naturalized in Asia, Australia, Europe, and elsewhere; seven species (one endemic, three introduced) in China.

1a. Plants usually branched; basal leaves usually withered at anthesis; upper leaves similar to lower leaves.
2a. Blade of basal and proximal cauline leaves 2–6 mm wide; bracts among capitula linear, oblanceolate, or oblong-oblanceolate, surpassing glomerules or not ..... 1. *G. calviceps*
2b. Blade of basal and proximal cauline leaves 4–18 mm wide; bracts among capitula spatulate to oblanceolate, at least proximal ones surpassing glomerules ..... 2. *G. pensylvanica*
1b. Plants usually unbranched; basal leaves usually persistent; upper leaves gradually smaller than lower leaves.
3a. Bracteal leaves short, spatulate to oblong; leaves spatulate-oblong, apex obtuse.
4a. Leaves adaxially glabrous or glabrate; involucre 2.5–3 mm, base glabrous; outer phyllaries elliptic-obovate to broadly ovate-elliptic, apices rounded to obtuse; bisexual florets 2 or 3 ..... 3. *G. coarctata*
4b. Leaves adaxially sparsely arachnoid (hairs persistent, evident); involucre 3–4.5(–5) mm, base (imbedded in tomentum) often sparsely arachnoid on proximal 1/5–1/2; outer phyllaries ovate, ovate-triangular, or ovate-lanceolate, apices acute to acuminate; bisexual florets 3 or 4 ..... 4. *G. purpurea*
3b. Bracteal leaves distinct, linear; leaves linear, filiform, or linear-lanceolate, apex acute to acuminate.
5a. Leaves usually 3-veined ..... 5. *G. norvegica*
5b. Leaves 1-veined.
6a. Leaves linear or linear-lanceolate, 5–8 mm wide; spikes long and loose; involucre 3–5 mm in diam. ..... 6. *G. sylvatica*
6b. Leaves linear or filiform, 1–3 mm wide; spikes short and dense; involucre 2–3 mm in diam. ..... 7. *G. nanchuanensis*

1. Gamochaeta calviceps (Fernald) Cabrera, Bol. Soc. Argent. Bot. 9: 368. 1961.

直茎合冠鼠麴草 zhi jing he guan shu qu cao

Gnaphalium calviceps Fernald, Rhodora 37: 449. 1935 [*"calvescens"*].

Herbs, annual, erect. Stems branched from base, 2–10(–40) cm tall, gray or dull gray-green villous. Basal leaves short lived, withering at anthesis; cauline leaves dull gray-green silky on both surfaces, linear to narrowly elliptic, 1.5–7 × 0.2–0.4 cm, margin entire or wavy, villous. Capitula initially in continuous or interrupted spiciform arrays 2–4 cm × 8–12 mm, later in loose paniculiform arrays 4–18 cm, lanate at base only; subtending leaves 1–3, 1–6 cm. Outer phyllaries ovate, 2–3 × ca. 1 mm, apex shortly acute to acuminate; inner ones brownish, sometimes tinged purplish, lanceolate, 3–3.2 × ca. 0.8 mm, scarious toward margin, apex obtuse to acute, mucronate. Outer florets many, filiform; corolla 2.1–2.3 mm. Central florets 2 or 3; corolla 1.6–1.7 mm. Achenes elliptic, ca. 0.5 mm. Pappus ca. 2.5 mm, connate at base into a ring. Fl. May–Jul.

Seasides, sandy beaches and waste fields. Introduced in Taiwan [native to South America].

2. Gamochaeta pensylvanica (Willdenow) Cabrera, Bol. Soc. Argent. Bot. 9: 375. 1961.

匙叶合冠鼠麴草 shi ye he guan shu qu cao

Gnaphalium pensylvanicum Willdenow, Enum. Pl. 2: 867. 1809, based on *G. spathulatum* Lamarck, Encycl. 2: 758. 1788, not N. L. Burman (1768); *G. chinense* Gandoger (1918), not *G. sinense* (Hemsley) Franchet (1892); *G. purpureum* Linnaeus subsp. *pensylvanicum* (Willdenow) O. Bolòs & Vigo; *G. purpureum* var. *spathulatum* Baker.

Herbs, annual. Stems erect, simple or more often branching from base, 10–50 cm tall, grayish tomentose. Basal leaves withering at anthesis; cauline leaves remote, scarcely diminishing in size upward, sessile, oblanceolate to spatulate, 2.5–8 × 0.4–1.8 cm, abaxially gray-green and lanate, adaxially greenish and loosely arachnoid, margin entire or slightly wavy, apex rounded to obtuse. Capitula numerous in axillary clusters, forming ± interrupted leafy (leaves 1.5–5.5 cm) spicate panicles, ca. 3 × 1–1.5 mm when dry, densely lanate to 2/3 from base; lower branches usually stalked. Outer phyllaries ovate-lanceolate or lanceolate, 2–2.5 mm, apex long acute; inner ones

linear-oblong, ca. 3 mm, apex rounded to shortly acute. Outer florets ca. 100; corolla ca. 2.25 mm. Central florets 2 or 3; corolla ca. 2.25 mm. Achenes brown, elliptic, ca. 0.5 mm, minutely glandular. Pappus white, ca. 2.3 mm, connate at base into a ring. Fl. Jan–May. $2n = 28$.

Waste fields, roadsides; below 1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Africa, Asia, Australia, Central and South America, Europe, North America (Mexico)].

3. Gamochaeta coarctata (Willdenow) Kerguélen, Lejeunia 120: 104. 1987.

里白合冠鼠麴草 li bai he guan shu qu cao

Gnaphalium coarctatum Willdenow, Sp. Pl. 3: 1886. 1803, based on *G. spicatum* Lamarck, Encycl. 2: 757. 1788, not Miller (1768); *Gamochaeta spicata* Cabrera; *Gnaphalium liui* S. S. Ying.

Herbs, winter annual or biennial, 15–35(–50) cm tall, fibrous rooted. Stems ascending, white pannose. Leaves basal and cauline, basal leaves in rosettes, present at anthesis, blades bicolored on both surfaces, spatulate to oblanceolate-obovate, (1.5–)3–8(–12) cm × 6–15(–22) mm, abaxially closely white pannose, adaxially glabrous or glabrate; leaves distally gradually smaller, slightly succulent, margin often crenulate on drying. Capitula initially usually in dense, continuous, pressed spiciform arrays 2–20 cm × 10–14 mm, later branched, interrupted. Involucre cylindric-campanulate, 2.5–3 mm, base glabrous; phyllaries 4- or 5-seriate; outer ones purplish or rosy, elliptic-obovate to broadly ovate-elliptic, 1/4–1/3 as long as inner ones, apices rounded to obtuse; inner ones oblong, laminae brown hyaline, apices rounded to obtuse or blunt, apiculate. Bisexual florets 2 or 3. Corollas of all florets usually purplish distally. Achenes oblong-elliptic, 0.5–0.6 mm. Pappus white, ca. 2.5 mm, connate at base into a ring, deciduous. Fl. Apr–Jun. $2n = 28$.

Waste fields, roadsides, ditches; 400–1400 m. Naturalized in Guizhou and Taiwan [native to South America; widely introduced in Asia, Caribbean, Europe, North America, Oceania, Pacific islands].

The present report of this species is its first record in mainland China.

4. Gamochaeta purpurea (Linnaeus) Cabrera, Bol. Soc. Argent. Bot. 9: 377. 1961.

合冠鼠麴草 he guan shu qu cao

Gnaphalium purpureum Linnaeus, Sp. Pl. 2: 854. 1753, nom. cons.; *Gamochaeta rosacea* (I. M. Johnston) Anderberg; *Gnaphalium rosaceum* I. M. Johnston.

Herbs, annual or biennial. Stems erect to decumbent-ascending, unbranched or 1 or 2 branched from base, 10–40 cm tall, densely but loosely pannose or pannose-tomentose. Leaves basal and cauline, basal and proximal cauline in rosettes, withered but persistent at anthesis; blades oblanceolate to spatulate, 1–6 cm × 5–14 mm, upper ones smaller, both surfaces usually bicolored, abaxially closely white pannose, adaxially usually sparsely arachnoid (basal cells of hairs persistent, expanded, glassy), sometimes glabrescent. Capitula initially in continuous spiciform arrays 1–4(–5) cm × (5–)10–15 mm, later interrupted, glomerules widely separated, bracteate, proximal often on relatively long peduncles. Involucre turbinate-cylindric, 3–4.5 mm, base sparsely arachnoid; phyllaries 4- or 5-seriate, outer ovate-triangular, length 1/3–2/3 of inner, apices acute-acuminate; inner triangular-lanceolate (usually striate), laminae purplish (in bud) to whitish or silvery (in fruit), apices acute (not apiculate). Bisexual florets 3 or 4. Corollas of all florets usually purplish distally. Achenes oblong, 0.6–0.7 mm. Pappus connate into a ring, ca. 2.5 mm. Fl. Apr–May. $2n = 14, 28$.

Waste fields at low elevations. Introduced in Taiwan [native to North America; introduced in Asia, Europe, and South America].

5. Gamochaeta norvegica (Gunnerus) Y. S. Chen & R. J. Bayer, **comb. nov.**

挪威合冠鼠麴草 nuo wei he guan shu qu cao

Basionym: *Gnaphalium norvegicum* Gunnerus, Fl. Norveg. 2: 105. 1772; *Omalotheca norvegica* (Gunnerus) Schultz Bipontinus & F. W. Schultz; *Synchaeta norvegica* (Gunnerus) Kirpicznikov.

Herbs, perennial, 10–40 cm tall. Rhizome cylindric, thin, mainly 2–3 mm in diam. Stems solitary, very rarely 2 or several, erect, gray tomentose pubescent, relatively sparsely foliate. Leaves lanceolate, upper ones sessile or subsessile, middle ones with attenuate base, to a long petiole; blade greenish and not densely arachnoid tomentose adaxially, gray-green or more often gray and rather dense arachnoid tomentose or floccose-tomentose abaxially, at least in lower leaves, in which broadest part of lamina usually reaches 8–12 mm in width, 3 veins clearly distinct. Capitula narrowly campanulate, 5–8 × 4–7 mm, aggregated at stem apex to form a dense compact spiciform synflorescence, with apical leaves usually prominent. Phyllaries 20–25, mostly 3-seriate; outer ones ovate, shorter than inner ones; inner ones lanceolate or oblong, abaxially green below, in upper part and at margin brown or fuscous, membranous (scarious). Florets usually 35–45 per capitulum, of which bisexual ones are few (usually 4 or 5). Achenes brown, cylindric, ca. 1.5 mm, distinctly costate, with short white (transparent) hairs. Pappus very thin, basally united into a ring, silky white with slightly crenate hairs, approximately as long as corolla. Fl. Jul–Sep. $2n = 56$.

Alpine meadows. Xinjiang [Russia; Europe, North America].

6. Gamochaeta sylvatica (Linnaeus) Fourreau, Ann. Soc. Linn. Lyon, sér. 2, 17: 93. 1869.

林地合冠鼠麴草 lin di he guan shu qu cao

Gnaphalium sylvaticum Linnaeus, Sp. Pl. 2: 856. 1753; *Omalotheca sylvatica* (Linnaeus) Schultz Bipontinus & F. W. Schultz; *Synchaeta sylvatica* (Linnaeus) Kirpicznikov.

Herbs, perennial. Rhizome short. Stems 20–60 cm tall, mainly solitary or a few, whitish or gray tomentose or pubescent. Leaves green or rarely gray-green, linear or linear-lanceolate, 5–8 mm wide, subglabrous or ± appressed pilose adaxially, vein 1. Capitula cylindric or campanulate, 5–7 × 3–5 mm, arranged in axils of leaves and aggregated at apex in compound spiciform synflorescences; upper leaves usually inconspicuous

in uppermost of spiciform synflorescences. Phyllaries 20–25, fuscous or straw-colored, sometimes greenish, distinctly brown spotted on striate upper part; outer phyllaries oval, shorter than inner ones, pubescent. Achenes brownish, oblong-prismatic. Pappus of 25–35 thin, white, crenate hairs, as long as corolla and basally united into a ring. Fl. Jun–Sep. $2n = 56$.

Open woods, boggy woods, rocky slopes, clearings, fields, borders of woods, muddy banks, disturbed sites; below 2000 m. N Xinjiang [Kazakhstan, Mongolia, Russia (Siberia); SW Asia (Caucasus, Iran, Turkey), Europe].

7. Gamochaeta nanchuanensis (Y. Ling & Y. Q. Tseng) Y. S. Chen & R. J. Bayer, **comb. nov.**

南川合冠鼠麴草 nan chuan he guan shu qu cao

Basionym: *Gnaphalium nanchuanense* Y. Ling & Y. Q. Tseng, Acta Phytotax. Sin. 16(3): 85. 1978; *Omalotheca nanchuanensis* (Y. Ling & Y. Q. Tseng) Holub [*"nanchuensis"*].

Herbs, perennial, 30–40 cm tall. Stems solitary, gray tomentose pubescent, densely foliate. Basal leaves caespitose, withering before anthesis; cauline leaves linear, 4–6 cm × 2–3 mm, abaxially white lanate, adaxially green and sparsely pubescent, vein 1, base narrow, apex acute. Capitula 2–3 mm in diam., aggregated at apex to form a dense compact spiciform synflorescence 3–5(–8) cm; apical leaves prominent. Involucre ca. 5 × 2–3 mm; phyllaries 3- or 4-seriate, yellowish brown, herbaceous, apex toothed; outer ones ovate, ca. 2 mm, apex brown; inner ones oblong, 3–5 mm, apex brown striped, membranous. Florets usually ca. 65 per capitulum. Female florets ca. 60; corolla filiform, 3–4 mm, apex 2- or 3-toothed, glabrous. Bisexual florets ca. 5; corolla tubular, 3–4 mm, limbs 5-toothed. Achenes cylindric, ca. 1 mm, sparsely white pubescent. Pappus white, ca. 3 mm, basally united into a ring, silky white with slightly crenate hairs. Fl. Jul–Sep.

• Grassy slopes; 1800–2200 m. Chongqing, W Hubei.

177. LEONTOPODIUM R. Brown ex Cassini, Bull. Sci. Soc. Philom. Paris 1819: 144. 1819.

火绒草属 huo rong cao shu

Chen Yousheng (陈又生); Randall J. Bayer

Herbs, rarely subshrubs, perennial. Stem with fibers in phloem, without resin canals, without pericyclic cambium. Leaves alternate, sessile, tomentose to villous, eglandular, margin flat, entire. Capitula heterogamous, disciform, in flat-topped terminal corymbs, surrounded by a whorl of prominent, white lanate leaves. Receptacle flat, epaleate. Phyllaries papery, monomorphic, monochromous, brownish, transparent; stereome undivided. Female florets yellow, filiform, outnumbering disk florets. Disk florets functionally male; corolla yellow; corolla lobes erect, veins reaching apex of lobes. Anthers ecalcarate, with short tails; endothecial tissue polarized; apical appendage flat, as wide as thecae. Pollen gnaphalioid. Style bifid; style branches truncate with obtuse sweeping hairs dorsally, not reaching furcation; stigmatic surface separated. Achene in disk and female florets small, oblong, with 5 vascular bundles, sparsely hairy with short, clavate, not myxogenic, twin hairs; epidermis smooth. Pappus dimorphic, of basally connate, barbellate, capillary bristles in 1 row; apical cells clavate in disk florets, acute in female. $x = 7$.

About 58 species: Asia, Europe; 37 species (17 endemic) in China.

Handel-Mazzetti recorded several putative natural hybrids in *Leontopodium* from China, including *L.* ×*albogriseum* Handel-Mazzetti (Verh. Zool.-Bot. Ges. Wien 74–75: 28. 1926), described from Yunnan, *L.* ×*gracile* (Acta Horti Gothob. 1: 121. 1924), described from W Sichuan, and several others indicated by hybrid formulae (Acta Horti Gothob. 12: 231–237. 1938). It is somewhat difficult to distinguish them according to our present knowledge.

1a. Pappus not white.
2a. Pappus purplish brown; corolla purplish brown at least in upper part; bracteal leaves linear-lanceolate or linear.
3a. Leaves linear-lanceolate or linear-oblanceolate, 3–10 mm wide; pappus purplish brown, but yellow in lower part; corolla purplish brown at upper part; achenes ca. 1.8 mm ..... 1. *L. giraldii*
3b. Leaves linear or linear-lanceolate, 2–4 mm wide; pappus deep purplish brown throughout; corolla purplish brown above; achenes less than 1 mm ..... 2. *L. villosum*
2b. Pappus yellowish brown; corolla yellow or purplish red; bracteal leaves oblong-lanceolate or absent.
4a. Sparse erect herbs; bracteal leaves oblong-lanceolate ..... 3. *L. forrestianum*
4b. Compact pulvinate herbs; bracteal leaves absent ..... 4. *L. aurantiacum*
1b. Pappus white or rarely red.
5a. Compact pulvinate herbs; bracteal leaves absent ..... 5. *L. haastioides*
5b. Erect herbs or subpulvinate herbs; bracteal leaves present.
6a. Pappus and corolla red above ..... 6. *L. roseum*
6b. Pappus white; corolla yellow or white.
7a. Stems and leaves adaxially densely yellow or brown glandular hairy, or leaves with arachnoid pubescence.
8a. Leaf blade linear-lanceolate, basally gradually narrowed, both surfaces with grayish or greenish arachnoid pubescence ..... 7. *L. haplophylloides*
8b. Leaf blade base cordate, auriculate, or narrower, abaxially densely white arachnoid tomentose.
9a. Leaf blade linear or spatulate-lanceolate, veinlets indistinct.

10a. Perennial herbs; stems not branched; leaves 10–35 × 1–3 mm ..... 8. *L. franchetii*
10b. Subshrubs; stems many branched; leaves 3–10 × 0.5–1.5 mm ..... 9. *L. suffruticosum*
9b. Leaf blade ovate-lanceolate or lanceolate, margin even or undulate, veinlets distinct.
11a. Stems herbaceous or subwoody at base; leaf blade base cordate; bracteal leaves ovate-lanceolate ... 10. *L. stracheyi*
11b. Stems woody; leaf blade base narrowed or slightly auriculate; bracteal leaves lanceolate or long lanceolate ..... 11. *L. artemisiifolium*
7b. Stems and leaves white, gray, or yellowish arachnoid pubescent, without glandular hairs.
12a. Leaf base ampliate and cordate, sagittate, or truncate ..... 12. *L. dedekensii*
12b. Leaf base narrowed or not, or rarely auriculate.
13a. Subshrubs; stems woody, usually branched ..... 13. *L. sinense*
13b. Perennial herbs; stems herbaceous or woody at lower part, usually not branched.
14a. Cauline leaves not sheathing at base.
15a. Rhizome shortly branched, usually without relicts of old leaves; stems branched or not branched; synflorescence usually in compound corymbs ..... 14. *L. japonicum*
15b. Rhizome long branched, densely covered with relicts of old leaves above; stems not branched; synflorescence usually solitary.
16a. Rhizome and suckers sparsely arranged; bracteal leaves subequal but usually broader than cauline leaves.
17a. Flowering stems 12–42 cm tall; achenes glabrous ..... 15. *L. wilsonii*
17b. Flowering stems 5–10(–18) cm tall; achenes papillose ..... 16. *L. omeiense*
16b. Rhizome and suckers densely arranged and tufted; bracteal leaves distinctly broader than cauline leaves.
18a. Leaves linear or subulate, 8–30 × 0.8–1.4 mm, margin reflexed, adaxially usually green and glabrescent ..... 17. *L. andersonii*
18b. Leaves oblanceolate, 7–12 × 1.5–2 mm, margin not reflexed, densely whitish lanate on both surfaces ..... 18. *L. microphyllum*
14b. Cauline leaves or some of them sheathing at base.
19a. Bracteal leaves larger than cauline leaves; capitula solitary ..... 19. *L. monocephalum*
19b. Bracteal leaves subequal to cauline leaves, or slightly wider; capitula usually numerous, very rarely solitary.
20a. Plants pulvinate; leaves linear-lanceolate, 6–10 × 0.5–1 mm ..... 20. *L. muscoides*
20b. Plants caespitose with long stems, or pulvinate, or stem solitary; leaves linear-lanceolate, linear-spatulate, or spatulate, usually longer and wider.
21a. Plants caespitose or pulvinate; rhizome stout, with numerous suckers, without sterile rosette stems, or if sterile rosette stems present then leaves spatulate.
22a. Leaves lanceolate or linear-lanceolate, rarely elliptic; capitula 4–5 mm in diam.; bracteal leaves distinct and forming a star.
23a. Sheaths as wide as leaf ..... 21. *L. delavayanum*
23b. Sheath narrower than leaf.
24a. Leaves oblanceolate-oblong or oblanceolate, 7–15 × 2–6 mm; flowering stems 1–7 cm tall ..... 22. *L. fangingense*
24b. Leaves linear-lanceolate or lanceolate, 6–25 × 1–3 mm; flowering stems 6–28 cm tall.
25a. Plants stoloniferous, stolons slender, elongate, usually branched, terminated by a loose rosette of leaves; achenes pubescent ..... 23. *L. jacotianum*
25b. Plants not stoloniferous; stems erect, caespitose, usually not branched; achenes glabrous ..... 24. *L. caespitosum*
22b. Leaves spatulate; capitula 4–13 mm in diam.; bracteal leaves indistinct.
26a. Bracteal leaves numerous, large, forming an irregular star.
27a. Stem 1–5 cm; capitula (1–)3–7 ..... 25. *L. pusillum*
27b. Stem 6–10 cm; capitula 3–5 ..... 26. *L. brachyactis*
26b. Bracteal leaves few, smaller, not forming a star.
28a. Plants pulvinate; capitula 6–15 mm in diam. ..... 27. *L. nanum*
28b. Plants caespitose; capitula ca. 4 mm in diam. ..... 28. *L. stoloniferum*
21b. Plants caespitose or stem solitary; rhizome slender, usually with sterile rosette stems.
29a. Upper cauline leaves base broadened, usually surrounding stem.
30a. Cauline leaves linear or lingulate-linear, 1–4 cm; bracteal leaves 9–14, 10–20 × 1.5–3 mm, forming a star of 2–3 cm in diam. ..... 29. *L. souliei*

30b. Cauline leaves lanceolate or linear-lanceolate, 5–15 cm; bracteal leaves 10–18, 20–45 × 3–6 mm, forming a multiradiate star of 5–8 cm in diam. ..... 30. *L. calocephalum*
29b. Upper cauline leaves base narrowed or not, not surrounding stem.
31a. Bracteal leaves lingulate, usually broader at base, apex acute to acuminate ..... 31. *L. himalayanum*
31b. Bracteal leaves lanceolate or ovate, rarely linear, apex acute or obtuse.
32a. Leaves adaxially usually green and glabrescent ..... 32. *L. junpeianum*
32b. Leaves grayish arachnoid tomentose on both surfaces.
33a. Plants usually 5–10 cm tall, usually with dense sterile rosettes; leaves oblong, lingulate, lanceolate, or linear-lanceolate ..... 33. *L. ochroleucum*
33b. Plants usually 15–35 cm tall, not forming dense clusters; leaves lanceolate, linear-lanceolate, or oblanceolate.
34a. Bracteal leaves ovate-lanceolate, broadened at base, abaxially light green ..... 34. *L. conglobatum*
34b. Bracteal leaves oblong or linear, base not broadened, abaxially gray or whitish.
35a. Bracteal leaves linear with acuminate apex, forming a distinct star; phyllaries ca. 4 mm ..... 35. *L. campestre*
35b. Bracteal leaves oblong, linear-lanceolate, or rarely linear, not forming a regular star; phyllaries 4.5–6 mm.
36a. Bracteal leaves few, not forming a star ..... 36. *L. leontopodioides*
36b. Bracteal leaves forming an irregular star ..... 37. *L. smithianum*

1. Leontopodium giraldii Diels, Bot. Jahrb. Syst. 36(Beibl. 82): 103. 1905.

秦岭火绒草 qin ling huo rong cao

Herbs, perennial. Rhizome stout and branched, densely covered with black-brown relicts of leaves, forms rather caespitose of several stems and sterile leaf rosettes. Stems erect and firm, 10–28 cm tall, ash-colored arachnoid lanate. Leaves discolored on both sides, abaxially densely white arachnoid lanate, adaxially greenish glabrate; cauline leaves linear-lanceolate or oblong-lanceolate, 30–90 × 3–10 mm, base narrowed, apex obtuse or acute, basal ones usually larger than upper ones; radical rosette leaves oblong-spatulate or narrowly oblong, 20–50 × 5–8 mm, narrowed in sheath. Capitula 5–9, heterogamous, in sparse corymbs, 6–8 mm in diam.; peduncles ca. 1 cm, connate with base of bracteal leaves; bracteal leaves similar to upper cauline leaves in shape, size, and indumentum, but slightly narrower, forming an irregular star of 6–8 cm in diam. Phyllaries 3- or 4-seriate, oblong, ca. 4 mm, abaxially densely white tomentose, apex purplish brown, obtuse or lacerate, glabrous. Corolla ca. 3 mm, purplish brown above. Achenes ca. 1.8 mm, glabrous. Pappus purplish brown, 2–3 mm, serrulate. Fl. May–Aug, fr. Jul–Sep.

• Subalpine stony scree slopes, grasslands; 2000–3200 m. Shaanxi (Taibai Shan).

This is a distinct and very rare species endemic to China.

2. Leontopodium villosum Handel-Mazzetti, Oesterr. Bot. Z. 89: 58. 1940.

柔毛火绒草 rou mao huo rong cao

Herbs, perennial. Rhizome short, with dense rosette leaves in upper part and a flowering stem. Stems erect, 20–32 cm tall, grayish arachnoid pubescent. Basal leaves oblong-lanceolate to linear-lanceolate, 1.7–4 × 3–4 mm, abaxially densely grayish arachnoid tomentose, adaxially sparsely grayish arachnoid pubescent; upper leaves longer, linear, 3–45 × 2–4 mm, abaxially densely grayish arachnoid tomentose, adaxially green and sparsely grayish arachnoid pubescent or glabrescent, margin reflexed. Capitula 5–10, densely congested, 4–5 mm in diam.; bracteal leaves 12–15, similar to upper leaves in shape, size, and indumentum. Involucre 4–5 mm, outer side densely grayish arachnoid pubescent; phyllaries 3-seriate, apex red-brown, obtuse and lacerate, glabrous. Corolla ca. 3 mm, upper part purplish brown. Achenes less than 1 mm, glabrous. Pappus purplish brown, ca. 4 mm, serrulate. Fl. Aug.

• Alpine meadows; ca. 4000 m. Sichuan (Baoxing).

This is a very rare and distinct species. It is similar to *Leontopodium giraldii* in its purplish brown florets and pappus but differs in its leaves narrower and longer, pappus purplish brown in all parts, and achenes smaller.

3. Leontopodium forrestianum Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 112. 1924.

鼠麴火绒草 shu qu huo rong cao

Herbs, perennial. Rhizome slender, with numerous flowering and sterile stems. Stems slender, erect, 2–10 cm tall, simple or branching at base, entire plant gray silky or ash-colored lanate and equally leafy. Leaves linear or oblong to oblanceolate, 8–11 × 1.5–2.5 mm, abaxially white or ash-colored lanuginous, adaxially yellowish green and arachnoid, base narrowed, apex obtuse or acute. Capitula 2 or 3(–7), 5–7 mm in diam., in dense corymbs, or solitary; bracteal leaves numerous, as large as upper leaves or broader, abaxially densely white tomentose, adaxially sordid yellow tomentose. Involucre 3-seriate, abaxially yellowish pilose; phyllaries lanceolate, ca. 4 mm, apex brown and acute. Marginal florets female; corolla capillary. Disk florets male; corolla subtubular, ca. 3.5 mm. Achenes papillose. Pappus of capillary bristles, yellowish. Fl. Jul–Sep, fr. Sep–Oct.

Alpine grasslands, gravelly slopes, thickets; 3500–3800 m. NW Yunnan [Myanmar].

This is a very rare and distinct species related to the genus *Gnaphalium*.

4. Leontopodium aurantiacum Handel-Mazzetti, Beih. Bot. Centralbl., Abt. 2, 44: 83. 1927.

黄毛火绒草 huang mao huo rong cao

Herbs, perennial, pulvinate, ca. 2 cm tall. Rhizome slender, short and many branched. Stems numerous, usually shortly branched, with several leaves in middle and rosette leaves at apex, forming a mat of 12–60 cm in diam., entire plant densely brownish yellow tomentose. Leaves obovate or spatulate-ovate, 4–5 × 2–2.5 mm, both surfaces densely brownish yellow tomentose, base narrowed, apex acute. Capitula solitary, heterogamous or dioecious, ca. 5 mm in diam.; bracteal leaves 8–12, obovate, similar to cauline leaves in shape and size but densely covered with distinct brownish yellow tomentum, surrounded by rosette of several cauline leaves, apex acute. Phyllaries lanceolate, 4–4.5 × ca. 1.5 mm, abaxially brownish tomentose, with acute, often lacerate apex of dark brown color. Corolla orange-yellow, ca. 3 mm. Achenes ca. 0.5 mm, shortly pilose. Pappus yellow to brownish yellow, 3–4 mm. Fl. Jun–Jul.

Alpine stony meadows, gravelly slopes, cliffs; 3600–4000 m. NW Yunnan [N Myanmar].

This is a very rare and distinct species.

5. Leontopodium haastioides Handel-Mazzetti, Beih. Bot. Centralbl., Abt. 2, 44: 84. 1927.

密垫火绒草 mi dian huo rong cao

Leontopodium jacotianum Beauverd var. *haastioides* (Handel-Mazzetti) R. C. Srivastava.

Herbs, perennial, forming dense cushions up to 10 cm in diam. Rhizome slender and many branched. Shoots numerous, 1.5–3 cm tall, shortly columnar, with closely imbricate leaves. Leaves spatulate or oblong, 2–6 × 1–2 mm, basal part appressed, thin, scarious, abaxially sparsely arachnoid, distal part spreading, thickened, herbaceous, thickly grayish tomentose, apex rounded. Capitula solitary, dioecious or predominantly female, 3–4 mm in diam., ebracteate, immersed among leaves. Phyllaries lanceolate to oblanceolate, 4–6 × 0.6–2 mm, apex acute or obtuse, tips scarious, brownish. Corolla 3–4 mm. Achenes ca. 1.2 mm, papillose or glabrous; male ovary glabrous or sparsely pubescent. Pappus white, ca. 4 mm. Fl. Jul–Aug.

Alpine meadows, stony slopes, snow lines; 4300–5300 m. Sichuan (Muli), Xizang [Bhutan, India (Sikkim), Nepal].

6. Leontopodium roseum Handel-Mazzetti, Acta Horti Gothob. 1: 112. 1924.

红花火绒草 hong hua huo rong cao

Herbs, perennial, similar to *Antennaria* in habit. Rhizome stout, densely covered with brown decayed leaves with dense radical rosettes of sterile leaves and flowering stems. Stems usually single, erect, 8–35 cm tall, densely white lanuginous. Leaves spatulate to spatulate-lanceolate, 20–50 × 3–12 mm, both surfaces densely white tomentose, apex rounded. Capitula 3–10, heterogamous, in 1 or rarely 2–5 dense corymbs, 5–6 mm in diam.; bracteal leaves 5–8, linear-spatulate, similar to upper cauline leaves, forming a star of 2–5 cm in diam. or rarely compound stars. Involucre ca. 4 mm, white lanate; phyllaries 2- or 3-seriate, inner ones lanceolate, apex light brown or red, acute or obtuse, glabrous. Corolla 3–3.5 mm, upper part usually light red, scurfy pilosulose; corolla of male florets narrowly funnel-shaped in upper part, with narrowly triangular lobes; corolla of female florets filiform. Achenes ca. 1 mm, hairy. Pappus light red or red, longer than corolla, serrulate. Fl. Jun–Aug, fr. Aug–Sep.

• Grassy slopes, thickets, dry riverbeds; 1200–3700 m. W Sichuan.

7. Leontopodium haplophylloides Handel-Mazzetti, Acta Horti Gothob. 1: 120. 1924.

香芸火绒草 xiang yun huo rong cao

Herbs, perennial. Rhizome short and densely branched, with numerous flowering stems and sterile stems. Stems erect, not branched, 15–30 cm tall, woody in lower part, ash-colored arachnoid pubescent, equally densely leafy, lower leaves usually withering during anthesis; internodes 5–8 mm. Leaves lanceolate to linear-lanceolate, 10–40 × 1–3.5 mm, both surfaces grayish arachnoid pubescent, basally narrowed, apex acuminate or acute. Capitula 5–7, in dense corymbs, ca. 5 mm in diam.; bracteal leaves numerous, lanceolate, forming a star of 2–5 cm in diam., abaxially concolorous with cauline leaves, adaxially densely white tomentose. Involucre ca. 5 mm, densely grayish arachnoid tomentose; phyllaries 3- or 4-seriate, apex dark brown, acute, glabrous. Corolla ca. 3.5 mm. Achenes papillose. Pappus white, 3–4 mm, serrulate. Fl. Aug–Sep, fr. Sep–Oct.

• Alpine meadows, gravelly slopes, thickets, conifer forest margins; 2400–4000 m. Gansu, Qinghai, W Sichuan.

8. Leontopodium franchetii Beauverd, Bull. Soc. Bot. Genève 3: 258. 1911.

坚杆火绒草 jian gan huo rong cao

Herbs, perennial. Rhizome slender, densely with numerous flowering and sterile stems. Stems woody in lower part, yellow glandular hairy and upper part with arachnoid pubescence; internodes 3–5 mm. Leaves densely arranged, linear, 10–35 × 1–3 mm, abaxially with sparse glandular hairs and densely lanate, adaxially densely covered with glandular hairs. Capitula 10–30, 3–5 mm in diam., in dense corymbs; bracteal leaves numerous, linear, 5–10 × 1–2 mm, both surfaces densely lanate. Involucre 2- or 3-seriate, abaxially brown; phyllaries lanceolate, ca. 3 mm, apex brown and acute. Marginal florets female; corolla capillary, 2–3 mm. Disk florets male; corolla light yellow, subtubular, ca. 3.5 mm. Achenes papillose. Pappus of capillary bristles, white. Fl. Jul–Sep, fr. Sep–Oct.

• Dry grasslands, scree slopes, sandy riverbanks; 3000–4000 m. W Sichuan, NW Yunnan.

9. Leontopodium suffruticosum Y. L. Chen, Acta Phytotax. Sin. 19: 90. 1981.

亚灌木火绒草 ya guan mu huo rong cao

Subshrubs. Bark yellowish brown, scaly. Stems light brown, woody, erect, 20–30 cm tall, several branched from base and middle, white arachnoid pubescent or sometimes glabres-

cent. Leaves linear-spatulate or linear, 3–10 × 0.5–1.5 mm, both surfaces white arachnoid tomentose and glandular, apex obtuse or acute. Capitula 3–5(–7), heterogamous or dioecious, densely congested; bracteal leaves few, linear, 5–8 mm, forming a star of ca. 1.5 cm in diam. Involucre hemispheric, ca. 3 mm, glandular or sparsely arachnoid tomentose; phyllaries 2- or 3-seriate, apex light brown or dark brown, acute or obtuse, glabrous. Corolla yellow, 2–3 mm. Achenes sparsely pubescent. Pappus white, slightly longer than corollas. Fl. Jun, fr. Aug.

• Dry riverbeds; ca. 3200 m. E Xizang.

This species is similar to *Leontopodium franchetii* but differs by its subshrubby habit; branchlets numerous, old branches woody, covered with white to grayish white tomentose pubescence and remains of withered leaves; leaves and bracteal leaves much shorter, 5–7 mm; and bracteal leaves and capitula fewer.

10. Leontopodium stracheyi (J. D. Hooker) C. B. Clarke ex Hemsley, J. Linn. Soc., Bot. 30: 136. 1894.

毛香火绒草 mao xiang huo rong cao

Leontopodium alpinum Cassini var. *stracheyi* J. D. Hooker, Fl. Brit. India 3: 279. 1881; *L. stracheyi* var. *tenuicaule* Beauverd.

Herbs, perennial. Rhizome stout, branched, with numerous flowering and sterile stems. Stems subwoody, erect, usually not branched, (5–)12–60 cm tall, glandular and sometimes arachnoid pubescent; internodes (3–)5–10 mm. Leaves narrowly oblong to oblong-lanceolate, 20–50 × 3–12 mm, abaxially densely white tomentose, adaxially green, glandular and sometimes arachnoid pubescent, base almost auriculate, apex acute or acuminate. Capitula 3–11, usually dioecious, crowded; bracteal leaves 7–12, similar to upper leaves in shape and size, forming a star of 2–6 cm in diam. or compound stars, both surfaces white arachnoid tomentose, more densely so above. Involucre 4–5 mm, pilose; phyllaries 2- or 3-seriate, ovate to oblanceolate, 4–4.5 × 1–2 mm, with dark brown scarious margin. Corollas 3.5–4 mm. Achenes 0.75–1 mm, pubescent; male ovary pubescent. Pappus white. Fl. Jul–Sep, fr. Sep–Oct.

Grasslands, thickets, sparse forests, gravelly slopes; 2000–4700 m. Qinghai, Sichuan, Xizang, NW Yunnan [Bhutan, N India, Nepal].

11. Leontopodium artemisiifolium (H. Léveillé) Beauverd, Bull. Soc. Bot. Genève 5: 142. Apr 1913.

艾叶火绒草 ai ye huo rong cao

Gnaphalium artemisiifolium H. Léveillé, Repert. Spec. Nov. Regni Veg. 11: 492. Jan 1913.

Herbs, perennial. Stems several, woody, erect, not branched, 25–60(–100) cm tall, sparsely covered with brown decayed leaves in lower part, entire stem glandular pilose, upper part usually covered with arachnoid hairs. Cauline leaves 19–35, oblong-lanceolate, 20–50 × 5–8 mm, abaxially pale white and densely tomentose, adaxially green and covered with sparse short glandular hairs, base narrowed, apex acute with a short mucro. Capitula usually 6–12 mm in diam., in dense corymbs at ends of stems or in sparsely compound corymbs; bracteal leaves 11–13, lanceolate, 10–30 × 2.5–6 mm, densely white tomentose. Involucre subglobose, 4–6 mm wide; phyllaries 3-seriate, abaxially densely tomentose, apex acute, glabrous and naked. Marginal florets female; corolla capillary, 3–4 mm; achenes ca. 1 mm, ± papillose. Disk florets bisexual; corolla subtubular, 3–4 mm, sterile. Pappus white, ca. 3 mm, serrulate. Fl. Aug–Sep, fr. Sep–Oct.

• Grasslands, forest margins, riverbanks; 2100–3200 m. Sichuan, N Yunnan.

12. Leontopodium dedekensii (Bureau & Franchet) Beauverd, Bull. Soc. Bot. Genève 1: 193. 1909.

戟叶火绒草 ji ye huo rong cao

Gnaphalium dedekensii Bureau & Franchet, J. Bot. (Morot) 5: 70. 1891; *G. leontopodium* Linnaeus var. *foliosa* Franchet; *Leontopodium dedekensii* var. *microcalathinum* Y. Ling; *L. foliosum* Beauverd; *L. futtereri* Diels; *L. hastatum* Beauverd; *L. micranthum* Y. Ling.

Herbs, perennial. Rhizome short and stout, with several to numerous stems. Stems 10–45 cm tall, not branched or rarely slightly branched, entire plant densely grayish arachnoid pubescent, equally and densely leafy. Leaves: lower ones usually larger than upper ones; blade linear-lanceolate, 10–40 × 1.3–6.5 mm, both surfaces densely grayish arachnoid pubescent, base cordate, sagittate, or truncate, apex obtuse. Capitula 5–30, heterogamous or dioecious, closely aggregated, 4–5 mm in diam.; bracteal leaves 14–20, 5–30 × 2–4 mm, forming a star of 2–5 cm in diam., densely whitish to yellowish arachnoid pubescent. Involucre 3–4 mm; phyllaries 3-seriate, spatulate-oblong, 3–4 mm, apex acute or rounded, glabrous, dry membranous. Corolla ca. 3 mm. Achenes papillose. Pappus white, 3–4 mm, serrulate. Fl. Jun–Jul, fr. Jul–Sep.

Grasslands, thickets, conifer forests; 1400–4100 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan [Myanmar].

13. Leontopodium sinense Hemsley, J. Linn. Soc., Bot. 23: 424. 1888.

华火绒草 hua huo rong cao

Gnaphalium nobile Bureau & Franchet; *G. sinense* (Hemsley) Franchet (1892), not *G. chinense* Gandoger (1918); *Leontopodium arbusculum* Beauverd; *L. niveum* Handel-Mazzetti; *L. nobile* (Bureau & Franchet) Beauverd; *L. rosmarinoides* Handel-Mazzetti; *L. stoechas* Handel-Mazzetti; *L. stoechas* var. *minus* Y. Ling.

Subshrubs. Rhizome stout, woody. Stems woody, numerous, 30–70 cm tall, usually branched, densely white tomentose. Leaves oblong, (7–)15–65 × 2–7 mm, both surfaces densely yellowish tomentose, base sheathed, apex acute. Capitula 7–20, heterogamous, in 1 or usually 2–5 corymbs, 3–8 mm in diam.; bracteal leaves 5–9, similar to cauline leaves but usually much larger, sparsely arranged, forming an irregular star of 2.5–7.5 cm in diam. or usually in compound stars. Involucre 3–4 mm, white lanate; phyllaries 3-seriate, inner ones oblong, apex light brown, obtuse, glabrous. Corolla 2.5–3 mm. Achenes ca. 1 mm, papillose. Pappus white, longer than corolla, serrulate. Fl. Jul–Sep, fr. Sep–Nov.

• Grassy slopes, thickets, riverbeds, dry mountain slopes; (700–)1300–3600 m. Guizhou, W Hubei, Sichuan, SE Xizang, Yunnan.

14. Leontopodium japonicum Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 178. 1866 [*"iaponicum"*].

薄雪火绒草 bao xue huo rong cao

Herbs, perennial, from tufted rhizomes. Stems slender to rather stout, leafy throughout or only at apex, erect, 10–55 cm tall, 1–3 mm in diam.; internodes 4–20(–40) mm. Leaves (10–)20–30, mainly cauline; middle leaves ovate to linear, 15–80 × 3–15 mm, abaxially whitish lanate, adaxially green and glabrous or thinly lanate, base abruptly narrowed, apex acute to acuminate. Capitula several, arranged in dense or sparse terminal corymbs, 3–4.5 mm in diam.; bracteal leaves 5–8, loosely arranged, ovate to oblong-lanceolate, 10–30 × 3–8 mm, smaller than upper leaves, adaxially sordid yellow tomentose. Involucre subglobose, 4–5 × 3.5–4.5 mm; phyllaries 3-seriate, densely hairy abaxially, apex acute or acuminate. Marginal florets female; corolla capillary, ca. 2 mm; achenes ca. 1 mm, ± papillose. Disk florets bisexual; corolla subtubular, ca. 3 mm, sterile. Pappus white, ca. 3.5 mm. Fl. Jun–Sep, fr. Sep–Oct.

Forests, thickets, grassy, pebbly, or dry slopes, gravelly areas, open rocks; 700–2300 m. Anhui, Gansu, Henan, Hubei, Jiangsu, Shaanxi, Shanxi, Sichuan, Zhejiang [Japan].

1a. Leaves ovate to oblong-ovate; bracteal leaves ovate; internodes 4–8 mm ..... 14c. var. *saxatile*
1b. Leaves obovate-lanceolate to lanceolate to linear; bracteal leaves oblong-lanceolate; internodes 5–20(–40) mm.
2a. Stems stout, 2–3 mm in diam., usually densely leafy only at apex; leaves obovate-lanceolate to lanceolate, 4–15 mm wide, apex acute; capitula arranged in sparse corymbs, 3.5–4.5 mm in diam. ..... 14a. var. *japonicum*
2b. Stems slender, ca. 1 mm in diam., densely leafy throughout; leaves linear-lanceolate to linear, 3–4 mm wide, apex acuminate; capitula arranged in dense corymbs, ca. 3 mm in diam. ..... 14b. var. *microcephalum*

14a. Leontopodium japonicum var. **japonicum**

薄雪火绒草(原变种) bao xue huo rong cao (yuan bian zhong)

Leontopodium japonicum var. *xerogenes* Handel-Mazzetti.

Stems rather stout, 2–3 mm in diam., usually densely leafy only at apex; internodes 10–20(–40) mm. Leaves obovate-lanceolate to lanceolate, 25–80 × 4–15 mm, apex acute. Capitula arranged in sparse corymbs, 3.5–4.5 mm in diam.; bracteal leaves oblong-lanceolate, 10–30 × 3–8 mm. Fl. Jun–Sep, fr. Sep–Oct.

Forests, thickets, grassy or pebbly slopes; 700–2300 m. Anhui, Gansu, Henan, Hubei, Jiangsu, Shaanxi, Shanxi, Sichuan, Zhejiang [Japan].

14b. Leontopodium japonicum var. **microcephalum** Handel-Mazzetti, Beih. Bot. Centralbl., Abt. 2, 44: 67. 1927.

小头薄雪火绒草 xiao tou bao xue huo rong cao

Leontopodium microcephalum (Handel-Mazzetti) Y. Ling.

Stems slender, ca. 1 mm in diam., densely leafy throughout; internodes 5–15 mm. Leaves linear-lanceolate to linear, 15–45 × 3–4 mm, apex acuminate. Capitula arranged in dense corymbs, ca. 3 mm in diam.; bracteal leaves oblong-lanceolate, 13–25 × 3–6 mm. Fl. Jun–Aug, fr. Sep–Oct.

• Dry slopes, gravelly areas; 800–1700 m. Henan, Shaanxi, Shanxi.

14c. Leontopodium japonicum var. **saxatile** Y. S. Chen, **var. nov.**

岩生薄雪火绒草 yan sheng bao xue huo rong cao

Haec varietas a Leontopodio japonico *var.* japonico *caulibus subgracilibus 1–2 mm in diametro omnino dense foliatis, internodiis 4–8 mm longis, foliis ovatis usque oblongo-ovatis 20–30 mm longis 6–11 mm latis, capitulis in corymbos densos dispositis atque foliis bractealibus ovatis 10–12 mm longis 5–7 mm latis differt.*

Type: China. Zhejiang: Lin'an Xian, Changhua, Longtang Shan, Qingliang Feng, on rocks, alt. 1750 m, 8 Sep 1959, *Zhejiang Plant Resources Expedition 29803* (holotype, PE).

Paratypes: Anhui: Huang Shan, on rocks, *Anonymous s.n.* (PE-00503277). Zhejiang: Lin'an Xian, Changhua, Longtang Shan, *Zhejiang Plant Resources Expedition 29703* (PE); Tiantai Xian, Tiantai Shan, 5 Oct 1921, *K. K. Tsoong 3940* (PE).

Stems somewhat slender, 1–2 mm in diam., densely leafy throughout; internodes 4–8 mm. Leaves ovate to oblong-ovate, 20–30 × 6–11 mm, apex acute. Capitula arranged in dense corymbs, 3.5–4.5 mm in diam.; bracteal leaves ovate, 10–12 × 5–7 mm. Fl. Aug–Sep, fr. Sep–Oct.

• Open rocks; 1000–1800 m. S Anhui (Huang Shan), Zhejiang (Lin'an, Tiantai).

15. Leontopodium wilsonii Beauverd, Bull. Soc. Bot. Genève 4: 28. 1912.

川西火绒草 chuan xi huo rong cao

Leontopodium chui Handel-Mazzetti; *L. wilsonii* var. *majus* Beauverd.

Herbs, perennial. Stems woody, erect, not branched, 12–42 cm tall, entire plant light gray tomentose, densely arranged with leaves in upper part, densely covered with brown decayed leaves in lower part. Leaves linear-lanceolate, 24–35 × 2–2.8 mm, abaxially densely covered with light gray tomentum, adaxially green, light gray pilose, lateral veins indistinct, base narrowed, apex acute. Capitula 7–11, dioecious or heterogamous, 4–5 cm in diam.; bracteal leaves 15–20, densely arranged, oblong, larger than upper leaves, forming a star of 4–5.5 cm in diam., both surfaces densely grayish white tomentose, apex acute. Phyllaries 2- or 3-seriate, ovate, ca. 4 mm, apex obtuse, abaxially white tomentose, black-brown adaxially. Corolla ca. 3 mm. Achenes oblong, ca. 1 mm, glabrous. Pappus white, ca. 3 mm, serrulate. Fl. Jun–Aug, fr. Sep–Oct.

• Grasslands, thickets, rocks; 2000–2500 m. S Gansu, Sichuan.

Specimens from Gansu identified as *Leontopodium jacotianum* var. *minus* (Beauverd) Handel-Mazzetti are referable to this species.

16. Leontopodium omeiense Y. Ling, Acta Phytotax. Sin. 10: 172. 1965.

峨眉火绒草 e mei huo rong cao

Herbs, perennial. Rhizome slender and usually branched, subwoody, erect or procumbent, densely covered with brown decayed leaves with dense radical rosettes of sterile leaves and numerous filiform radicals. Stems solitary or 3 or 4, usually 5–10(–18) cm tall, not branched, with 5–15(–30) leaves, entire plant light gray tomentose, but subglabrous on abaxial surface of leaves; stems sometimes not developed and plant forming sessile heads, not exceeding ca. 3 cm in height. Leaves lanceolate, lanceolate-oblong, or oblong-spatulate, 20–25 × 2.5–4.5 mm, abaxially white and densely covered with light gray tomentum, adaxially covered with sparse light gray tomentum and appearing greenish, lateral veins indistinct, base narrowed, apex obtuse or acute. Capitula 5–9, unisexual, dioecious, or heterogamous, 4.5–5.5 mm in diam.; bracteal leaves 9–12, densely arranged, oblong, larger than upper leaves, forming a star of 3–5.5 cm in diam., both surfaces densely grayish white tomentose, apex acute or obtuse. Phyllaries ca. 3-seriate, ovate, ca. 4 mm, apex obtuse, abaxially often green, brown to almost black adaxially. Corolla ca. 3 mm; corolla of male floret funnelform; corolla of female floret filiform. Achenes papillose. Pappus white, longer than corolla, serrulate. Fl. May–Jun, fr. Jun–Aug.

• Moist rocks; 1800–2800 m. SE Gansu, W Sichuan.

17. Leontopodium andersonii C. B. Clarke, Compos. Ind. 100. 1876.

松毛火绒草 song mao huo rong cao

Gnaphalium andersonii (C. B. Clarke) Franchet; *G. subulatum* Franchet; *Leontopodium bonatii* Beauverd; *L. subulatum* (Franchet) Beauverd; *L. subulatum* var. *bonatii* (Beauverd) Handel-Mazzetti.

Herbs, perennial. Rhizome short and stout, branched, densely covered with black-brown relicts of leaves. Stems 5–30 cm tall, erect, 1–3 mm in diam., usually not branched, white sericeous, with leaves densely arranged; leaves much denser in sterile young stems. Leaves linear to subulate-linear, 8–30 × 0.8–1.4 mm, abaxially densely white tomentose, adaxially green and sparsely arachnoid or subglabrous, margin reflexed, apex acute or obtuse. Capitula 10–40, 3–4 mm in diam., in dense corymbs; bracteal leaves numerous, equal to or longer than cauline leaves, oblong-lanceolate to lanceolate, both surfaces densely covered with white to yellowish tomentum, apex acute. Involucre 3–4 mm, abaxially densely tomentose; phyllaries 3-seriate, abaxially yellowish tomentose. Marginal florets female; corolla capillary. Disk florets male; corolla subtubular, 2.5–3 mm. Achenes papillose. Pappus of capillary bristles, white. Fl. Aug–Sep, fr. Sep–Oct.

Dry grasslands, sparse forests, gravelly slopes, waste fields; 1000–3600 m. Guizhou, Sichuan, Yunnan [Laos, Myanmar].

18. Leontopodium microphyllum Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 127. 1908.

小叶火绒草 xiao ye huo rong cao

Herbs, perennial. Stems slender, slightly woody, branched; branches procumbent at base, densely lanate. Cauline leaves oblanceolate, 7–12 × 1.5–2 mm, both surfaces densely whitish lanate, base abruptly narrowed, apex acute. Capitula 4–9; bracteal leaves 7–10, radiate, generally unequal, linear-lanceolate, 6–12 × 1.5–2 mm, densely white lanate. Involucre hemispheric, ca. 3 × 4 mm; phyllaries 3-seriate, subequal, oblong, apex acute to obtuse. Corolla of outer florets ca. 2.5 mm; corolla of central florets tubular, ca. 2.5 mm. Achenes oblong, ca. 1 mm, glabrous or papillose. Pappus bristles white, ca. 2.5 mm. Fl. Jul–Sep.

• Rocky slopes; 3200–3800 m. Taiwan.

19. Leontopodium monocephalum Edgeworth, Trans. Linn. Soc. London 20: 73. 1846.

单头火绒草 dan tou huo rong cao

Leontopodium evax Beauverd var. *fimbrilligerum* (J. R. Drummond) Beauverd; *L. fimbrilligerum* J. R. Drummond.

Plants stoloniferous, forming mats, 4–10 cm; stolons slender, with scattered recurved scales or small nonsheathing leaves, ± prostrate, terminated by a loose rosette of leaves. Leaves spatulate to oblong-oblanceolate, 7–18 × 2–3.3 mm, yellowish, rarely grayish, tomentose, base dilated, apex obtuse, rarely brown apiculate. Flowering stems 0.5–6 cm. Capitula 1–10, dioecious (in our specimens), central one 5–7 mm wide; bracteal leaves oblanceolate or spatulate, to 14 × 3(–4) mm, grayish yellow to brown villous (or sericeous) adaxially, sometimes with concealed apiculum. Phyllaries oblanceolate, rarely ovate-oblanceolate, 4–6.2 × 1–2 mm, with blackish, scarious, deeply lacerate margin. Corollas 3.3–4.2 mm. Achenes pubescent; male ovary sparsely pubescent.

Alpine gravelly slopes, meadows; 4000–5000 m. Xizang [Bhutan, India, Nepal, Pakistan].

20. Leontopodium muscoides Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 59: 252. 1922.

藓状火绒草 xian zhuang huo rong cao

Herbs, perennial, subpulvinate. Rhizome slender, many branched, covered with withered petioles. Suckers numerous, erect, somewhat rigid and densely covered with withered leaves at base, or with dense leaves forming rosette at apex. Stems slender, 1–8 cm tall, with 4–8 cauline leaves, entire plant grayish or yellowish lanuginous. Leaves linear-lanceolate, 6–10 × 0.5–1 mm, both surfaces grayish or yellowish lanuginous, base forming a sheath, apex acute or obtuse. Capitula (1–)3–6, ca. 4 mm, densely congested; bracteal leaves 6–10, similar to cauline leaves, forming a star of 1.7–2.5 cm in diam. Involucre subglobose, 4–5 mm, abaxially lanate; phyllaries 2- or 3-seriate, apex dark brown, acute, naked. Corolla 3–4 mm. Achenes oblong, ca. 1 mm, glabrous. Pappus white, 4–5 mm. Fl. Jul–Aug, fr. Sep.

• Alpine meadows, thickets, *Abies* forests, rocky places; 4000–4200 m. SE Xizang, NW Yunnan.

This is a very rare species in China.

21. Leontopodium delavayanum Handel-Mazzetti, Beih. Bot. Centralbl., Abt. 2, 44: 85. 1927.

云岭火绒草 yun ling huo rong cao

Herbs, perennial, pulvinate. Rhizome stout, prostrate, usually many branched, densely covered with brown relicts of leaves. Stems numerous, erect, not branched, 6–13 cm tall, equally leafy, whitish arachnoid pubescent. Leaves lanceolate or oblong-lanceolate, 20–45 × 3–6 mm, both surfaces whitish arachnoid pubescent, more sparse adaxially, with 2 distinct lateral veins subparallel to midvein, base forming sparse sheaths surrounding stem, apex acute. Capitula 6–20, heterogamous or diclinous, closely aggregated, ca. 5 mm in diam.; bracteal leaves 11–16, linear-oblong, 10–25 × 3–7.5 mm, forming a multiradiate star of 4–6.5 cm in diam., both surfaces densely white or yellowish tomentose, base broad, apex acuminate. Involucre ca. 4 mm, white tomentose; phyllaries 3-seriate, margin membranous, apex dark brown, acute or lacerate, glabrous. Corolla ca. 3 mm. Achenes sparsely pilose. Pappus white, ca. 4 mm, serrulate. Fl. Jul–Aug, fr. Sep–Oct.

Alpine gravelly slopes, rocky places; 3400–4000 m. W Yunnan [Myanmar].

22. Leontopodium fangingense Y. Ling, Acta Phytotax. Sin. 10: 175. 1965.

梵净火绒草 fan jing huo rong cao

Herbs, perennial, subpulvinate. Rhizome slender, prostrate, usually many branched, densely covered with brown relicts of leaves. Stems numerous, erect, usually not branched, 1–7 cm tall, equally leafy, whitish arachnoid pubescent. Leaves oblanceolate-oblong or oblanceolate, 7–15 × 2–6 mm, abaxially whitish arachnoid tomentose, adaxially whitish arachnoid pubescent or subglabrescent, base narrowed, apex acute. Capitula (1–)3–7, heterogamous or dioecious, closely aggregated, 4–5 mm in diam.; bracteal leaves 6–8, similar to cauline leaves in shape and size, forming a multiradiate star of 2.5–3.5 cm in diam., both surfaces densely white or yellowish tomentose. Involucre subglobose, ca. 4 mm, white tomentose; phyllaries 3-seriate, margin membranous, apex dark brown, acute, glabrous. Corolla ca. 3.5 mm. Achenes glabrous. Pappus white, ca. 4 mm, serrulate. Fl. May–Jul, fr. Jul–Aug.

• Moist rocky places on mountain peaks; 2100–2300 m. Guizhou (Fanjing Shan).

23. Leontopodium jacotianum Beauverd, Bull. Soc. Bot. Genève 1: 190. 1909.

雅谷火绒草 ya gu huo rong cao

Leontopodium jacotianum var. *paradoxum* (J. R. Drummond) Beauverd; *L. paradoxum* J. R. Drummond.

Herbs, perennial, stoloniferous, forming mats, 6–28 cm, grayish tomentose; stolons slender, elongate, usually branched, terminated by a loose rosette of leaves. Leaves lanceolate or oblong-lanceolate, 6–25 × 1–2 mm, apex acute to acuminate, usually brown apiculate; rosette leaves linear, lingulate-spatulate, or oblanceolate, 1–3 mm wide; cauline leaves lanceolate to lingulate or linear with margin recurved, 1–3 mm wide. Flowering stems 2–25 cm. Capitula 4–9(–18), all female or predominantly male or female, usually densely crowded; bracteal leaves lanceolate to oblong-elliptic, 8–25 × 2.2–7 mm, more densely whitish (rarely yellowish, brownish, or grayish) tomentose than cauline leaves, apex often long acuminate. Phyllaries lanceolate to oblanceolate, 3–5 mm, brown scarious adaxially. Corolla 3–3.5 mm. Achenes pubescent; male ovaries pubescent or subglabrous, ca. 1 mm. Pappus white, plumose. Fl. Jul–Aug, fr. Aug–Oct.

Alpine meadows, gravelly slopes; 2200–4400 m. S Xizang [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan].

24. Leontopodium caespitosum Diels, Notes Roy. Bot. Gard. Edinburgh 5: 189. 1912.

丛生火绒草 cong sheng huo rong cao

Leontopodium jacotianum Beauverd var. *caespitosum* (Diels) Handel-Mazzetti; *L. jacotianum* var. *minus* (Beauverd) Handel-Mazzetti; *L. wilsonii* Beauverd var. *minus* Beauverd.

Herbs, perennial. Rhizome stout, long, usually branched, with numerous flowering stems and sterile stems. Stems woody, erect, branched or not branched, 12–25 cm, entire plant light gray arachnoid pubescent, densely arranged with leaves in upper part, densely covered with brown decayed leaves in lower part. Leaves lanceolate, 10–25 × 1.5–3 mm, abaxially densely covered with light gray tomentum, adaxially green and glabrous, lateral veins indistinct, base narrowed, apex acute. Capitula 6–10, 4–5 cm in diam.; bracteal leaves 6–10, oblong, 14–30 × 2–4.5 mm, forming a star of 3–4.5 cm in diam., both surfaces densely grayish white tomentose, apex acute. Phyllaries 2- or 3-seriate, lanceolate, ca. 4 mm, apex black-brown and obtuse, abaxially white tomentose. Corolla ca. 3 mm. Achenes oblong, ca. 1 mm, glabrous. Pappus white, ca. 3.5 mm, serrulate. Fl. Jul–Aug, fr. Sep–Oct.

Moist grasslands, alpine meadows, gravelly places; 3300–3600 m. SW Sichuan, NW Yunnan [Myanmar].

25. Leontopodium pusillum (Beauverd) Handel-Mazzetti, Beih. Bot. Centralbl., Abt. 2, 44: 97. 1927.

弱小火绒草 ruo xiao huo rong cao

Leontopodium alpinum Cassini var. *pusillum* Beauverd, Bull. Soc. Bot. Genève 2: 251. 1910; *L. alpinum* var. *frigidum* Beauverd.

Herbs, perennial, subpulvinate. Rhizome slender and many branched, with dense radical rosettes of sterile leaves and numerous flowering stems. Stems 2–7 cm tall, densely leafy, densely white tomentose. Leaves spatulate to oblong-spatulate; radical leaves 10–25 × 2–4 mm, cauline leaves 10–20 × 2–3 mm, both surfaces densely white tomentose, base narrowed, apex obtuse. Capitula (1–)3–7, densely congested, 5–6 mm in diam.; bracteal leaves numerous, similar to cauline leaves, congested, forming star of 1.5–2.5 cm in diam. Involucre 3–4 mm, abaxially white lanate; phyllaries 3-seriate, apex usually dark brown, acute, glabrous. Corolla 2.5–3 mm. Achenes glabrous or slightly papillose. Pappus white, serrulate. Fl. Jul–Aug, fr. Aug–Sep.

Alpine grasslands, rocky screes, gravelly slopes, salt lake banks and shores; 3500–5600 m. Qinghai, W Sichuan, Xinjiang, Xizang [India (Sikkim), Kashmir].

26. Leontopodium brachyactis Gandoger, Bull. Soc. Bot. France 46: 420. 1900.

短星火绒草 duan xing huo rong cao

Herbs, perennial, stoloniferous, tomentose or somewhat glabrous; stolons ca. 10 mm, covered with dense brown scaly leaves. Stems many. Basal leaves in dense rosettes, spatulate, 30–40 × 3–5 mm, usually thickish, apex obtuse to subacute; cauline leaves (20–)30–40 × 3–4 mm, usually densely lanate-tomentose, 1-veined, apex shortly mucronate. Capitula 3–5, laxly arranged, 6–8 mm in diam., subtended by bracteal leaves similar to cauline leaves in color and pubescence, but forming a distinct star, obtusely lanceolate. Phyllaries dark brownish, ca. 5 × 1.5–1.7 mm, scarious with a lower greenish part, long pilose hairy, apex acuminate. Achenes of female florets larger than sterile ones of bisexual florets, ca. 1.5 mm, papillose. Pappus setae 4.5–5 mm, barbellate, deciduous as a unit. Fl. Jun–Aug.

Among rocks, open stony ground; 2200–4100 m. W Xizang [India, Kashmir, Nepal, Pakistan].

This is a relatively rare species in China; it is recorded as fairly common in Kashmir.

27. Leontopodium nanum (J. D. Hooker & Thomson ex C. B. Clarke) Handel-Mazzetti, Beih. Bot. Centralbl., Abt. 2, 44: 111. 1927.

矮火绒草 ai huo rong cao

Antennaria nana J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 100. 1876.

Herbs, perennial, pulvinate, forming small clusters. Rhizome short, to 2 cm, densely covered with brown decayed leaves with dense radical rosettes of sterile leaves and numerous filiform radicals, rhizome emitting 1–5 creeping and branching brown scaly stolons up to 10 cm. Stems solitary, more rarely 2 or 3, usually to 5 cm tall, rarely higher, with 3–7 leaves, entire plant covered with light gray lax tomentum and violet below; stems often not developed at all and plant forming sessile heads, not exceeding 1.5–2 cm in height. Leaves long spatulate to spatulate-oblong; radical leaves to 20 × ca. 5 mm; cauline leaves erect, to 1.5 cm and narrower, equally pubescent on both sides. Capitula (1–)3–5, dioecious or heterogamous, very compact, 6–15 mm in diam.; bracteal leaves not different from cauline ones, erect, not exceeding capitulum, but more often shorter, not forming a star. Phyllaries lanceolate, ca. 6 mm, thinly acute and scarious at apex, brown to almost black, abaxially often green. Male florets with corolla ca. 4 mm, pappus ca. 6 mm; female florets with corolla ca. 6 mm, pappus 8–9 mm. Pappus white, slightly exceeding corollas and phyllaries and forming a prominent compact white cap. Fl. May–Jun, fr. Jun–Aug.

Alpine meadows, thickets, marshes; 2100–5000 m. Gansu, Shaanxi, Sichuan, Xinjiang, Xizang [Afghanistan, India, Kashmir, Kazakhstan, Nepal, Pakistan].

28. Leontopodium stoloniferum Handel-Mazzetti, Acta Horti Gothob. 12: 235. 1938.

匍枝火绒草 pu zhi huo rong cao

Herbs, perennial, caespitose. Rhizome branched, with stolons up to 7 cm, with rosette suckers and flowering stems. Stems erect, 3–14 cm tall, usually solitary and not branched, white tomentose; internodes 3–10 mm. Leaves on suckers spatulate-lanceolate, 10–20(–30) × 2.5–4.5 mm, both surfaces with dense white tomentum, apex obtuse; cauline leaves spatulate or spatulate-linear, 10–20 × 2–5 mm, both surfaces with dense white tomentum, apex obtuse. Capitula 3–6, densely congested, ca. 4 mm in diam.; bracteal leaves 6–10, similar to upper cauline leaves in shape, size, and indumentum, forming a star of 1.2–2.5 cm in diam. Involucre 4–5 mm, densely white arachnoid tomentose; phyllaries 2- or 3-seriate, obovate-lanceolate, apex dark brown, obtuse or lacerate, glabrous. Corolla ca. 3 mm. Achenes pubescent. Pappus white. Fl. Sep, fr. Oct.

• Moist streamsides; 2900–3600 m. W Sichuan (Dawu).

29. Leontopodium souliei Beauverd, Bull. Soc. Bot. Genève 1: 191. 1909.

银叶火绒草 yin ye huo rong cao

Herbs, perennial. Rhizome prostrate, with 1 to several flowering stems and several sterile rosette suckers. Flowering stems slender, 6–25 cm tall, not branched, white arachnoid pubescent. Leaves on rosette suckers linear-lanceolate, usually larger than cauline ones, 15–40 × 1–3 mm, abaxially white arachnoid pubescent, adaxially green and glabrescent, apex acute; cauline leaves linear or lingulate-lanceolate, 10–40 × 1–3 mm, both surfaces white arachnoid pubescent, apex acute. Capitula 4–15(–20), 5–7 mm in diam.; bracteal leaves 9–14, oblong to oblong-lanceolate, 10–20 × 1.5–3 mm, both surfaces densely white arachnoid tomentose, forming a star of 2–3 cm in diam. Phyllaries 3-seriate, 3.5–4 mm, abaxially densely yellowish lanate, apex dark brown, obtuse, glabrous. Corolla 3–4 mm. Achenes pubescent or glabrous. Pappus white, ca. 4 mm, serrulate. Fl. Jul–Aug, fr. Sep.

• Grasslands, thickets, sparse forests; 2700–4500 m. Sichuan, Xizang, NW Yunnan.

30. Leontopodium calocephalum (Franchet) Beauverd, Bull. Soc. Bot. Genève 1: 189. 1909.

美头火绒草 mei tou huo rong cao

Gnaphalium leontopodium Linnaeus var. *calocephalum* Franchet, Bull. Soc. Bot. France 39: 131. 1892; *Leontopodium calocephalum* var. *depauperatum* Y. Ling; *L. calocephalum* var. *uliginosum* Beauverd.

Herbs, perennial. Rhizome slender, prostrate, usually branched. Stems erect, not branched, 10–50 cm tall, arachnoid pilose. Leaves lanceolate or linear-lanceolate, 50–150 × 2–12 mm, abaxially white tomentose, adaxially green and glabrous or sparsely pilose, lateral veins 2, distinct, subparallel to midvein, base forming sparse sheath around stem, apex acuminate. Capitula 5–20, heterogamous or diclinous-dioecious, closely aggregated, 5–10 mm in diam.; bracteal leaves 10–18, linear, 20–45 × 3–6 mm, forming a multiradiate star of 5–8 cm in diam., both surfaces densely white or yellowish tomentose, base broader, apex acuminate. Involucre 4–6 mm, white tomentose; phyllaries 4-seriate, apex dark brown, acute or rounded, gla-

brous. Corolla 3–4 mm. Achenes pilose. Pappus white, ca. 4 mm, serrulate. Fl. Jul–Sep, fr. Sep–Oct.

• Alpine meadows, grasslands, thickets, marshes, conifer forests, gravelly slopes, lake banks; 2600–4200 m. Gansu, Qinghai, Sichuan, Yunnan.

31. Leontopodium himalayanum Candolle, Prodr. 6: 276. 1838.

珠峰火绒草 zhu feng huo rong cao

Leontopodium himalayanum var. *pumilum* Y. Ling.

Plant densely tufted, (3–)7–32 cm; offsets sheathed below by many old leaf bases, terminated by loose tuft of few leaves. Offset leaves linear-spatulate, sometimes brown apiculate; cauline leaves linear to linear-lanceolate, 18–70 × 1–4 mm, grayish tomentose, apex acute or subobtuse, less often apiculate. Capitula crowded, (4–)7–12(–20), discoid or disciform; disciform capitula usually all similar, sometimes central one predominantly male and remainder predominantly or entirely female; bracteal leaves lingulate, usually dilated at or near base or sometimes linear-lanceolate, basal half at least of upper surface more densely white or yellowish gray tomentose than leaves or very rarely villous, apex acute to acuminate, outer ones 12–40 × 2–7.5 mm. Synflorescence 3–7 cm in diam. Involucre 5–7 mm in diam.; phyllaries oblong, 3.5–6 × 1–2.5 mm, with black-brown scarious margin. Corolla 3.3–4 mm. Achenes 1.5–2 mm, glabrous or sparsely pubescent; male ovaries always glabrous. Pappus white, ca. 4 mm. Fl. Jul–Aug.

Alpine gravelly slopes, meadows; 3000–5100 m. Xizang, NW Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan].

32. Leontopodium junpeianum Kitamura, Acta Phytotax. Geobot. 4: 102. 1935.

长叶火绒草 chang ye huo rong cao

Leontopodium linearifolium Handel-Mazzetti, Acta Horti Gothob. 1: 115. 1924, not (Weddell) Bentham & J. D. Hooker (1873); *L. longifolium* Y. Ling; *L. longifolium* f. *angustifolium* Y. Ling.

Herbs, perennial. Rhizome short, with flowering and sterile stems. Flowering stems erect, 2–25 cm tall, not branched, gray silky or ash-colored lanate. Leaves in lower part usually larger than those in upper part; blade linear or spatulate-linear, 20–130 × 1.5–9 mm, both surfaces densely gray silky or ash-colored lanate, sometimes adaxially subglabrous and green, base narrowed and indistinctly sheathed, apex obtuse. Capitula 3–30, aggregated in corymbs, 6–9 mm in diam.; bracteal leaves 6–10, oblong to lanceolate, 10–20 × 3–6 mm, forming a star of 3.5–5 cm in diam., both surfaces densely gray silky or ash-colored lanate, apex acute. Phyllaries ovate-lanceolate, ca. 5 mm, white lanate outside, apex usually dark brown, acute. Corolla ca. 4 mm. Achenes glabrous or papillose. Pappus white, slightly longer than corolla, serrulate. Fl. Jul–Aug, fr. Sep–Oct.

Grassy slopes, thickets, rocks; 1100–4800 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang [Kashmir].

The name *Leontopodium junpeianum* never appeared in other literature after its publication. When Kitamura published this name in 1935, he cited "*Leontopodium linearifolium* Handel-Mazzetti in Beih. Bot. Centrb. XLIV (1928) p. 100 non Bentham & J. D. Hooker (1873), pro parte ?" and noted the only difference with *L. linearifolium* Handel-Mazzetti is its cauline leaves with ± narrow base. When Y. Ling (Acta Phytotax. Sin. 10: 177. 1965) published the name *L. longifolium*, he similarly cited "*Leontopodium linearifolium* Handel-Mazzetti, Acta Horti Gothob. 1: 115. 1924, non (Wedd.) Bentham & Hook. f. (1873)." Obviously these two names represent the same species, so we use the older name here.

33. Leontopodium ochroleucum Beauverd, Bull. Soc. Bot. Genève 6: 146. 1914.

黄白火绒草 huang bai huo rong cao

Antennaria leontopodina Candolle; *Leontopodium alpinum* Cassini var. *debile* Beauverd; *L. alpinum* var. *hedinianum* Beauverd; *L. fischerianum* Beauverd; *L. leontopodinum* (Candolle) Handel-Mazzetti; *L. melanolepis* Y. Ling.

Herbs, perennial. Rhizome shortly branching, densely covered with black-brown relicts of leaves, forming tufts of numerous stems and sterile leaf rosettes, sometimes elongating into stolons up to 10 cm, often branching, and herbaceous brown scaly. Stems erect and firm, 5–15 cm tall, with 4–8 remote leaves, ash-colored arachnoid lanate or tomentose in upper half, sometimes glabrescent in lower half. Leaves concolorous, ash-colored lanate on both surfaces, sometimes greenish glabrate abaxially, without a distinct vein; cauline leaves oblong, lingulate, lanceolate, or linear-lanceolate, 10–250 × 2–4 mm, apex obtuse or acute; radical rosette leaves oblong-spatulate or narrowly oblong, 20–40 × 2–4.5 mm, narrowed to sheath. Capitula 5–7(–12), heterogamous and unisexual-dioecious, densely aggregated, 5–7 mm in diam.; bracteal leaves distinct, oblong-elliptic or lanceolate, forming rather regular multiradiate star of 1.5–2(–2.5) cm in diam., abaxially ash-colored lanate, adaxially loosely tomentose, pallid yellow, sometimes even ash- to sulfur-colored in dried plant. Phyllaries lanceolate, 4–5 mm, abaxially yellowish lanate or greenish, with prominent brown or almost black shiny apex. Corolla 3–4 mm. Achenes glabrous or papillose. Pappus dirty white, in sterile bisexual florets 3–5 mm, in female florets 4–5 mm. Fl. May–Aug, fr. Jul–Sep.

Mountain tundra, humid or dry meadows, stony fields of slopes; 2200–5000 m. Qinghai, Xinjiang, Xizang [India, Kazakhstan, Mongolia, Russia].

34. Leontopodium conglobatum (Turczaninow) Handel-Mazzetti, Acta Horti Gothob. 1: 114. 1924.

团球火绒草 tuan qiu huo rong cao

Leontopodium sibiricum Cassini var. *conglobatum* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 20: 9. 1847; *L. ochroleucum* Beauverd subsp. *conglobatum* (Turczaninow) Khanminchun; *L. ochroleucum* var. *conglobatum* (Turczaninow) Grubov.

Herbs, perennial. Rhizome short, with solitary stem or multicipital without stolons, with bundle of filiform radicals, forming small fasciculate clusters of 2 or 3 stems and sterile bundles of leaves. Stems erect and firm, (10–)15–30(–45) cm tall, ash-colored to grayish arachnoid pubescent, often subglabrous, violet or red-brown, equally and rather densely leafy.

Leaves linear-lanceolate to narrowly lanceolate and linear-spatulate; cauline leaves 2–6 cm × 2–10 mm, erect, lower ones long narrowed at base and often early marcescent; radical leaves in a rosette, green, linear, to 10 cm × 13 mm, pubescent to subglabrous. Synflorescence usually large, compact, corymbiform, often complexly branched, with a few separate capitula and more than 30 capitula closely aggregated into a group to 3 cm in diam., individual capitula homogeneous, 6–8 mm in diam.; bracteal leaves light green abaxially, more often greenish yellow to yellowish and light ash-colored adaxially, ovate-lanceolate or oblong, flat, to 3 cm × 10 mm, forming a star of to 7 cm in diam., densely tomentose. Capitula heterogamous or diclinous-dioecious. Fl. Jun–Aug, fr. Jul–Sep.

Dry meadows of riverbanks, steppes, limestone slopes of mountains, dry *Larix* forests and *Pinus* forests, forest margins; 400–1700 m. Heilongjiang, Nei Mongol [Mongolia, Russia].

35. Leontopodium campestre (Ledebour) Handel-Mazzetti in Schröter, Pfl.-Leb. Alpen, ed. 2, 2: 505. 1924.

山野火绒草 shan ye huo rong cao

Leontopodium alpinum Cassini var. *campestre* Ledebour, Fl. Ross. 2: 614. 1845; *L. fedtschenkoanum* Beauverd; *L. ochroleucum* Beauverd subsp. *campestre* (Ledebour) Khanminchun; *L. ochroleucum* var. *campestre* (Ledebour) Grubov.

Herbs, perennial. Rhizome simple, shortened, with solitary stem or multicipital, to 10 cm, densely covered with brown relicts of leaf sheaths and beset with thinly filiform radicals, usually without stolons, forming small lax fasciculate clusters of a few stems and sterile bundles of leaves. Stems (5–)15–30(–50) cm tall, erect or ascending, herbaceous, firm sometimes subflexuous ash-colored to gray arachnoid tomentose or arachnoid, violet flocculent (as well as on leaves), usually glabrescent, at least in lower half up to anthesis, equally leafy, with 5–20 leaves. Leaves oblong, linear, linear-spatulate, or linear-lanceolate; cauline leaves 2.5–4.5 cm × 2–5 mm, usually corrugated and dropping at anthesis; radical rosette leaves more often narrowly lanceolate, narrowed into a long petiole, ca. 15 cm × 9 mm, both surfaces equally or subequally ash-colored to gray arachnoid tomentose. Synflorescence usually simple, loose, but sometimes corymbiform, to 7 cm in diam., of 3–7 separate groups of capitula. Capitula 7–12(–20), heterogamous or unisexual, dioecious, closely aggregated, 4–6 mm in diam.; bracteal leaves linear or linear-lanceolate, of very unequal lengths, forming irregular multiradiate star of 4–5 cm in diam., yellowish or almost white, to pallid yellow (in dried plants), densely tomentose, margin convolute, apex acuminate. Phyllaries ca. 4 mm, apex almost transparent to almost black, somewhat prominently tomentose. Fl. May–Sep, fr. Jun–Sep.

Steppes, dry or marshy meadows, dry pebbly and stony hills, herb communities on sands, forests; (700–)1400–4500 m. Qinghai, Xinjiang [Kazakhstan, Mongolia, Russia].

36. Leontopodium leontopodioides (Willdenow) Beauverd, Bull. Soc. Bot. Genève 1: 371. 1909.

火绒草 huo rong cao

Filago leontopodioides Willdenow, Phytographia, 12. 1794; *Gnaphalium leontopodioides* (Willdenow) Willdenow; *Leontopodium sibiricum* Cassini; *L. sibiricum* var. *depauperatum* Turczaninow.

Herbs, perennial. Rhizome short, lignose, multicipital, with numerous flowering and sterile stems, but without sterile rosettes of leaves, forming a fine but dense cluster. Stems erect, firm, in lower part often somewhat ligneous, thin, sometimes subflexuous, (10–)20–25(–40) cm tall, simple, or sometimes branching in synflorescence, entire plant gray silky or ash-colored lanate, sometimes flocculent, very leafy. Leaves erect, often appressed to stem, ash-colored, greenish adaxially or almost equally colored, or yellowish abaxially, linear-lanceolate to narrowly lanceolate, 15–45 × 2–5 mm, both sides equally or more densely abaxially pubescent, with prominent vein abaxially, base rounded, solid, margin often involute, apex acute, with large hydathode. Synflorescence depauperate, of 3 or 4(–7) aggregated capitula or capitulum solitary, or in corymb; capitula dioecious, very rarely heterogamous, 6–7 × 7–10 mm, each on a separate peduncle to 2.5 cm; bracteal leaves 1–4 per capitulum, almost indistinguishable from upper leaves, linear to narrowly lanceolate, erect, not forming a star. Phyllaries lanceolate, 5–6 mm, white lanate outside, with acute, colorless or light brown apex. Florets diclinous; corolla of male florets 3.5–4.5 mm. Pappus dirty white, 4.5–6.5 mm. Fl. Jun–Sep, fr. Aug–Oct.

Steppes, dry meadows, dry stony and rocky slopes, sandy places, shrubby thickets; 100–3800 m. Gansu, Hebei, Nei Mongol, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [Japan, Korea, Mongolia, Russia].

37. Leontopodium smithianum Handel-Mazzetti, Acta Horti Gothob. 1: 115. 1924.

绢茸火绒草 juan rong huo rong cao

Herbs, perennial. Rhizome short, stout, with several sterile stems and flowering stems. Stems erect, 10–45 cm tall, densely grayish or white tomentose, densely and equally leafy; internodes 0.5–2 cm. Leaves linear-lanceolate, 20–55 × 4–8 mm, both surfaces densely grayish or white tomentose, base narrowed, apex obtuse or acute. Capitula (1–)3–25, heterogamous, 6–9 mm in diam.; bracteal leaves 3–10, oblong or linear-lanceolate, similar to upper leaves in size, shape, and indumentum, forming an irregular star or compound stars. Involucre 4–6 mm, white lanate; phyllaries 3- or 4-seriate, apex dark brown, acute, glabrous. Corolla 3–4 mm. Achenes papillose. Pappus white, ca. 4 mm, serrulate. Fl. Jun–Aug, fr. Aug–Oct.

• Subalpine meadows or dry grasslands; 1600–2900 m. Gansu, Hebei, Qinghai, Nei Mongol, Shaanxi, Shanxi.

178. SINOLEONTOPODIUM Y. L. Chen, Acta Phytotax. Sin. 23: 457. 1985.

君范菊属 jun fan ju shu

Chen Yousheng (陈又生); Randall J. Bayer

Plants perennial, compact, pulvinate, dioecious. Stem without pericyclic cambium, neither with resin canals, nor with fibers in phloem. Leaves alternate, very densely set, concave, hairy with a distal hair tuft adaxially, eglandular, margin entire. Capitula soli-

tary, sessile, unisexual. Phyllaries few seriate, with brown papery lamina; stereome undivided. Receptacle flat, epaleate. Female florets yellow, filiform, with long apical hairs. Achenes as in disk florets. Disk florets functionally male with long apical hairs. Corolla yellow; corolla lobes erect, veins reaching apex of lobes. Anthers ecalcarate, with short tails; endothecial tissue polarized; apical appendage flat, as wide as thecae. Pollen gnaphalioid. Style bifid; style branches obtuse with obtuse sweeping hairs dorsally, reaching to furcation; stigmatic surface separated. Achenes glabrous, slightly angular, with 5 vascular bundles; epidermis smooth. Pappus dimorphic, barbellate, capillary bristles in 1 row, basally without patent cilia; apical cells clavate in disk florets, acute in female.

• One species: China.

1. Sinoleontopodium lingianum Y. L. Chen, Novon 19: 24. 2009.

君范菊 jun fan ju

Plants perennial, pulvinate, 4–5 cm tall, densely white or yellowish lanate. Rhizome slender, woody, ascending or erect, with numerous flowering and sterile stems densely congested. Stems 2–3 cm tall, simple or 2- or 3(–5)-branched above. Leaves sessile, alternate and very densely set, ovate-oblong, elliptic-oblong, or oblanceolate, 2–8 × 1–2.5 mm, both surfaces white or grayish lanate with a distinct distal hair tuft adaxially, base narrowed, margin entire, apex obtuse. Capitula usually solitary, dioecious. Involucre 6–8 × 4–5 mm; phyllaries 5- or 6(or 7)-seriate, pallid brown; outer ones ovate or ovate-lanceolate, 3–5 × 1.5–2 mm, apex obtuse; middle ones oblong-lanceolate or oblanceolate, 7–8 × 2–3 mm, apex acute; inner ones linear-lanceolate or oblanceolate, 4–5 × ca. 1 mm, apex fimbriate lacerate. Florets 44–55 per capitulum; corolla yellow, ca. 3 mm, densely white villous in upper part; style slightly exserted, lobes ca. 0.3 mm; ovary ca. 0.5 mm, glabrous. Achenes ca. 1 mm, 1-veined, sparsely glandular-papillose. Pappus white, serrulate. Fl. Jul.

• Alpine glacial and gravelly slopes or rocky places; 4500–4900 m. Xizang (Mainling).

This species is characterized by the pulvinate habit, homogeneous florets, and corolla rather densely white villous in the upper part.

179. ANTENNARIA Gaertner, Fruct. Sem. Pl. 2: 410. 1791, nom. cons.

蝶须属 die xu shu

Chen Yousheng (陈又生); Randall J. Bayer

Herbs or subshrubs, perennial, dioecious. Leaves alternate, flat, with entire margins, usually tomentose on both surfaces. Capitula solitary, only a few together, or many in corymbs. Phyllaries papery or membranous, colored; stereome undivided. Receptacle flat, foveolate, epaleate. Disk florets functionally male or female; male florets white or purplish, tubular; female florets white or purplish, filiform. Anthers with flat appendages. Style branches truncate, with hairs dorsally and apically. Achenes oblong, with short clavate twin hairs. Pappus bristles capillary, barbellate, connate into a ring.

About 40 species: temperate and arctic/alpine regions, mainly in Asia, Europe, and North America, a few taxa in South America; one species in China.

1. Antennaria dioica (Linnaeus) Gaertner, Fruct. Sem. Pl. 2: 410. 1791.

蝶须 die xu

Gnaphalium dioicum Linnaeus, Sp. Pl. 2: 850. 1753; *Antennaria hyperborea* D. Don; *A. insularis* Greene.

Herbs, perennial, dioecious, 3–10 cm tall. Stolons 2–5 cm. Basal leaves spatulate or rhombic-spatulate, 3–18 × 3–6 mm, abaxially gray tomentose, adaxially green glabrous and distally pink or white, vein 1, apex mucronate; cauline leaves linear, 7–13 mm, not flagged, apex acute. Capitula 3–7 in corymbiform arrays. Involucre 5–6.5 mm in male florets, 5–7 mm in female florets; phyllaries distally dark pink to light pink or white. Corollas 3–4 mm in male florets, 4–5 mm in female florets. Achenes 0.5–1 mm, papillate. Pappus 3.5–4.5 mm in male florets, 5–6 mm in female florets. Fl. May–Aug. $2n = 28$.

Dry slopes on tundra, meadows, conifer forests; 600–2700 m. Gansu, Heilongjiang, Xinjiang [Japan, Kazakhstan, Mongolia, Russia; Europe, North America (Alaska)].

180. GNOMOPHALIUM Greuter, Willdenowia 33: 242. 2003.

垫头鼠麴草属 dian tou shu qu cao shu

Chen Yousheng (陈又生); Randall J. Bayer

Herbs, annual. Leaves alternate, flat, with entire margins, tomentose on both surfaces. Capitula many in dense clusters among a group of leaves. Phyllaries papery, hyaline; stereome divided. Receptacle flat, epaleate. Outer florets yellow, filiform. Central florets bisexual, yellow. Anthers with flat appendages. Style branches truncate, with hairs apically. Achenes oblong, with short clavate twin hairs. Pappus bristles capillary, scabrid, not united into a ring.

One species: N Africa, Asia.

1. Gnomophalium pulvinatum (Delile) Greuter, Willdenowia 33: 242. 2003.

垫头鼠麴草 dian tou shu qu cao

Gnaphalium pulvinatum Delile, Descr. Égypte, Hist. Nat. 266. 1813–1814; *Homognaphalium pulvinatum* (Delile) Fayed & Zareh.

Herbs, annual, prostrate, densely whitish to grayish lanate tomentose. Stems 5–15 cm, many from base, much branched. Leaves sessile, spatulate or obovate-spatulate, 5–15 × 1.5–4 mm, densely white lanate abaxially, hairy adaxially, 1-veined, base narrowly attenuate, apex mucronate; upper leaves densely crowded. Capitula campanulate, 3–4 mm wide, congested in terminal clusters, surrounded by terminal leaves. Phyllaries 2- or 3-seriate, greenish tinged, narrowly elliptic or linear to lanceolate, apex acute, hyaline at tip. Disk florets 4 or 5, bisexual; female florets numerous. Corolla ca. 1 mm, minutely papillose. Pappus setae white, 6 or 7 in female florets and 3 or 4 in bisexual ones, not united into a ring; apical cell subclavate. Fl. Nov–May.

A weed of arid and semiarid areas; ca. 4000 m. SE Xizang [Afghanistan, India, Nepal, Pakistan; Africa (Egypt, Sudan), SW Asia].

181. GNAPHALIUM Linnaeus, Sp. Pl. 2: 850. 1753.

鼠麴草属 shu qu cao shu

Chen Yousheng (陈又生); Randall J. Bayer

Herbs, annual or perennial. Leaves alternate, flat with entire margins, tomentose on both surfaces. Capitula solitary or only a few together. Phyllaries papery, brownish; stereome undivided. Receptacle flat, epaleate. Outer florets purple, filiform. Central florets bisexual, purple. Anthers with flat appendages. Style branches truncate, with hairs apically. Achenes oblong, with short clavate twin hairs. Pappus bristles capillary, scabrid, free.

About 80 species: cosmopolitan; six species in China.

1a. Capitula in racemes or spikes, rarely solitary.
2a. Capitula numerous, in spikes; plants 8–25 cm tall ..... 1. *G. polycaulon*
2b. Capitula in racemes, panicles, spikes, or solitary; plants usually 2–10 cm tall.
3a. Capitula in racemes; outer phyllaries obovate ..... 2. *G. stewartii*
3b. Capitula in spikes, panicles, or solitary; outer phyllaries ovate to ovate-oblong ..... 3. *G. supinum*
1b. Capitula in dense globose or glomerulate synflorescences, or compound synflorescences.
4a. Capitula pedunculate, in dense globose or glomerulate synflorescences; leaves white lanate on both surfaces; synflorescences with unequal leaves in irregular arrangement; phyllaries pale yellow, green, or yellowish brown ..... 4. *G. uliginosum*
4b. Capitula sessile, in dense compound synflorescences; leaves adaxially sparsely pubescent, abaxially densely white lanate; compound synflorescences with equal leaves in radiate or stellate arrangement; phyllaries reddish brown.
5a. Basal leaves withering before anthesis ..... 5. *G. involucratum*
5b. Basal leaves persistent at anthesis, rosette ..... 6. *G. japonicum*

1. Gnaphalium polycaulon Persoon, Syn. Pl. 2: 421. 1807.

多茎鼠麴草 duo jing shu qu cao

Gnaphalium multicaule Willdenow, Sp. Pl. 3: 1888. 1803, not Lamarck (1788); *G. strictum* Roxburgh.

Herbs, annual, dwarf, erect to decumbent, densely white lanate-tomentose, especially in upper part. Stems slender, simple or more commonly much branched, 8–25 cm tall, 0.5–1.5 mm in diam. Leaves sessile, grayish green, spatulate or oblanceolate-oblong, 1.5–4.5 cm × 3–8 mm, thinly appressed tomentose on both surfaces, margin and lower midribs sometimes flushed with purple, base narrowed, petioliform, margin wavy, apex obtuse and apiculate. Capitula 2–5, arranged in a spike to 2 cm, at tips of stems and branches, campanulate, 2.5–3 × 2–2.5 mm, densely lanate to 2/3 from base. Phyllaries 3-seriate, loosely imbricate, gradate, with pale brown apex, red-purple middle, and green base, these becoming brown when dry, elliptic-ovate or elliptic to linear-oblong, 1.6–2.2 × 0.5–0.8 mm, scarious, apex acute. Receptacle ca. 1.3 mm in diam., pitted. Outer florets many; corolla greenish yellow, filiform, ca. 1.2 mm, apex minutely 2- or 3-lobed, flushed with purple. Central florets 5 or 6, greenish yellow, tubular, ca. 1.5 × 0.5 mm, 5-toothed at apex, teeth flushed with purple. Stamens yellow, ca. 0.6 mm; anthers sagittate at base, connate into a tube around style. Style white, ca. 1.6 mm; style branches linear, flushed with orange-yellow; ovary olivaceous, cylindric, ca. 0.5 mm. Achenes pale brown, oblong-rectangular, ca. 0.5 mm, minutely punctuate. Pappus whitish, ca. 1.2 mm, bristles 5–8, distinct, falling separately. Fl. Jan–Apr. $2n = 14$.

A pantropical weed, in moist sunny places at roadsides, in grasslands, and also in and around cultivated fields. Fujian, Guangdong, Guizhou, Hainan, Taiwan, Yunnan, Zhejiang [India, Japan, Pakistan, Thailand; tropical and subtropical Africa, tropical America, Australia].

Similar to *Gamochaeta pensylvanica*, this species differs by its more compact habit, oblanceolate leaves, and free, separately deciduous pappus bristles more dilated at apex.

2. Gnaphalium stewartii C. B. Clarke ex J. D. Hooker, Fl. Brit. India 3: 289. 1881.

矮鼠麴草 ai shu qu cao

Omalotheca stewartii (C. B. Clarke ex J. D. Hooker) Holub.

Herbs. Stems erect, 5–10 cm tall, base tufted and lanate, upper part unbranched. Basal leaves tufted and in rosette, persistent at anthesis, sessile, linear, 10–30 × 1–2 mm, densely white tomentose abaxially, less so adaxially; cauline leaves few, linear, ca. 10 × 1 mm, both surfaces white lanate. Capitula few, 2–3 mm in diam., pedunculate, in racemes. Involucre ca. 6 × 5 mm; phyllaries 2- or 3-seriate, brown or only apex brown; outer ones obovate, 2–3 × ca. 2 mm, abaxially lanate, apex obtuse; inner ones linear-oblong, 5–6 × 1–1.5 mm, abaxially sparsely pubescent or glabrous, apex acute. Female florets: corolla filiform, 3–4 mm, apex 3-toothed, glabrous. Bisexual florets few; corolla tubular, ca. 4 mm, limbs 5-toothed, glabrous. Achenes cylindric, 1–2 mm, sparsely pubescent. Pappus white, ca. 4 mm, sericeous, distinct, falling separately. Fl. Jun–Sep.

Alpine meadows; 2500–4000 m. N Xinjiang, W Xizang [Afghanistan, India, Pakistan; SW Asia (Caucasus, Turkey)].

3. Gnaphalium supinum Linnaeus, Syst. Nat., ed. 12, 3: 234. 1768.

平卧鼠麴草 ping wo shu qu cao

Homalotheca supina (Linnaeus) Fourreau; *Omalotheca supina* (Linnaeus) Candolle.

Herbs, perennial. Stems 2–8(–12) cm tall. Leaves mostly basal, in persistent rosettes, both surfaces concolorous, gray-green, linear to linear-oblanceolate, 5–25 × ca. 3 mm, cauline similar, thinly lanate, 1-veined. Capitula usually 1–7, in subcapitate to loose, spiciform arrangement. Involucre campanulate, 5–6 mm; phyllaries light green to tan, oblong to lanceolate, outer obtuse, inner mostly acute, margins and tips dark brown. Achenes obovoid, strigose. Pappus bristles distinct, falling separately. Fl. Jun–Sep. $2n = 28$.

Meadows; 200–1300 m. Xinjiang [Kazakhstan, Russia; SW Asia (Caucasus, Iran), Europe, North America (Greenland)].

4. Gnaphalium uliginosum Linnaeus, Sp. Pl. 2: 856. 1753.

湿生鼠麴草 shi sheng shu qu cao

Filaginella uliginosa (Linnaeus) Opiz; *Gnaphalium baicalense* Kirpicznikov & Kuprianova; *G. kasachstanicum* Kirpicznikov & Kuprianova; *G. mandshuricum* Kirpicznikov & Kuprianova; *G. thomsonii* J. D. Hooker; *G. tranzschelii* Kirpicznikov.

Herbs, annual. Stems erect, 12–35 cm tall, usually branched from bases, sometimes simple, densely to loosely white lanate. Leaves radical and cauline, white lanate; radical and lower cauline leaves withering before anthesis; median cauline leaves numerous, linear or oblanceolate, 2–5 cm × 1.5–3(–5) mm, base attenuate, sessile, apex obtuse. Capitula glomerate in numerous clusters in axils and apex of branches, overtopped by subtending leaves. Involucre subglobose, 2–4 mm in diam., lanate at base; phyllaries brownish or green, often paler at tip; outer phyllaries obtuse. Marginal florets female; corolla filiform, ca. 1.5 mm. Disk florets ca. 1.5 mm. Achenes oblong, 0.5–0.7 mm, papillate or smooth. Pappus of distinct, capillary bristles, white, falling separately. Fl. Jul–Oct. $2n = 14$, 56.

Marshes, riversides, moist grasslands, saline soils, roadsides, *Larix* forests. N Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Xinjiang, Xizang [Japan, Kazakhstan, Korea, Mongolia, Pakistan, Russia; Europe, North America].

According to Fl. Pakistan (210: 118. 2003), *Gnaphalium thomsonii* is distributed in China. After comparing the description with *G. uliginosum*, it seems these two names represent the same species. The Russian botanist Kirpicznikov recognized many names that are closely related to *G. uliginosum*. Some of them are combined herein.

5. Gnaphalium involucratum G. Forster, Fl. Ins. Austr. 55. 1786.

星苞鼠麴草 xing mang shu qu cao

Gnaphalium involucratum var. *ramosum* Candolle; *G. lineare* Hayata (1908), not (Candolle) Schultz Bipontinus (1845); *G. morii* Hayata; *G. sphaericum* Willdenow.

Herbs, biennial or perennial, fibrous rooted; stolons usually absent [reportedly present in Australia and New Zealand]. Aerial stems ascending or erect, 30–40 cm tall, slender or rigid, simple to much branched, thinly and persistently white tomentose to densely lanate. Leaves leathery; basal leaves shortly linear, smaller than cauline ones, withering before anthesis; cauline leaves 6 to numerous, sessile, blade linear to linear-oblanceolate or linear-lanceolate, 1–10 × 0.2–0.5 cm (largest at midstem), abaxially silvery, tomentose or lanate, adaxially green, glabrate, and shiny, or sparsely lanate, 1-veined, base subclasping (not ampliate) or narrowed, margin entire, revolute, apex acute, mucronulate. Bracts subtending capitula 3–5, 10–15 mm, surpassing capitula, plus some shorter. Capitula in terminal or axillary, dense, hemispheric cymes 1–2 cm in diam. Involucre campanulate, 3–4.5 × 2.5–4 mm; phyllaries 3-seriate, tawny, rosy tinged, or brownish purple, shiny, scarious, outer ones shorter, oblong or obovate, apex rounded or obtuse, inner ones linear or oblong, apex obtuse or acute. Female florets 80–150. Bisexual florets 3–5(–7). Corolla of outer florets 2.5–3 mm; style of central florets 2.5–3.5 mm. Achenes oblong, compressed, 0.5–0.6 mm, papillose or minutely gland-dotted. Pappus white, 2.5–3.5 mm; bristles distinct or basally coherent, slender. Fl. Feb–Mar, Aug–Dec.

Slopes at middle elevations and on high mountains. Taiwan [Indonesia, Malaysia, Philippines; Australia, Pacific islands (Hawaii, New Zealand)].

6. Gnaphalium japonicum Thunberg in Murray, Syst. Veg., ed. 14, 749. 1784.

细叶鼠麴草 xi ye shu qu cao

Herbs, perennial, from creeping rhizomes; flowering stems tufted, 8–25 cm tall, simple, white lanate. Leaves chiefly radical, few cauline; radical leaves rosulate, linear-oblanceolate, 2.5–10 cm × 4–7 mm, adaxially green, thinly lanate; median cauline leaves linear, 2–2.5 cm × 2–4 mm; uppermost leaves subtending synflorescence, lanceolate. Capitula 10 to numerous, in a dense headlike corymb. Involucre campanulate, ca. 5 × 4–5 mm; phyllaries reddish brown, imbricate, 3-seriate, obtuse,

outer ones broadly elliptic, inner ones narrowly oblong. Marginal florets female; corolla filiform, ca. 3.5 mm, shorter than style. Disk florets ca. 3.5 mm, apex pinkish. Achenes oblong, ca. 1 mm. Pappus of capillary bristles, white, ca. 3 mm. Fl. May–Oct. $2n = 28$.

Grasslands, waste fields; 200–1800 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea; Oceania].

182. ANAPHALIS Candolle, Prodr. 6: 271. 1838.

香青属 xiang qing shu

Zhu Shixin (朱世新); Randall J. Bayer

Herbs, perennial, rarely annual or biennial, or subshrubs with somewhat woody rhizome. Stems erect or rosette-forming, simple or branching, densely white or ash-gray cottony tomentose. Leaves simple, alternate, rarely subopposite to opposite, sessile or petiolate or decurrent, oblong or lanceolate, entire. Capitula with many florets, 3–15 mm in diam., subglobose campanulate or subfunnelform, arranged in corymbiform or paniculate-corymbiform branched synflorescences, rarely solitary or 2 or 3 per synflorescence. Plants dioecious or heterogamous, having different types of florets: bisexual sterile florets with predominance of female florets arranged in many marginal rows and 1 to few central male florets, or many marginal rows of male florets and a few central female florets. Involucre campanulate, turbinate, or semispherical, base tomentose; phyllaries many seriate, imbricate, erect or expanding, scarious, lower parts brown, 1-veined, upper parts usually scarious, white or yellowish white or rarely pinkish. Receptacle subconvex or flat, alveolate, without squamules. Male florets: corolla tubular, 5-denticulate; stamens basally arrow-shaped with acerose tail; stigma with 2 short lobes, apex truncate. Female florets: corolla filiform, basally slightly dilated, 2–4-denticulate; style branches long, apex subrounded. Achene oblong or subrounded, with glandular hairs or mammilla or almost glabrous, in predominantly female capitula; achenes of male florets vestigial and usually absent in predominantly male capitula. Pappus in both florets consisting of 1 row of free deciduous white hairs, almost equal to corolla, scabrid, pinnate-incrassate at tip of apex in male florets, filiform and almost smooth or slightly scabrid at tip in female florets.

About 110 species: mainly in tropical and subtropical Asia, but a few species also in temperate Asia, Europe, and North America; 54 species (40 endemic) in China; one additional species (endemic, not included in the key) is of uncertain position.

1a. Involucre 8–12(–15) mm, spherical or broadly campanulate; capitula usually few, arranged in sparse to compound corymbiform synflorescences, or sometimes solitary.
2a. Leaves not decurrent on stems; involucre spherical, capitula usually lax.
3a. Rhizome thickish; cauline middle leaves linear-lanceolate, cinereous or yellowish lanate; capitula congested, densely corymbiform ..... 54. *A. acutifolia*
3b. Rhizome slender, sarmentose; cauline leaves oblong, oblanceolate, or spatulate; capitula usually lax corymbiform or solitary.
4a. Phyllaries white or yellowish white, base reddish brown; both surfaces of leaves gray lanate; Taiwan ..... 53. *A. nagasawae*
4b. Phyllaries white, base dark brown; leaves adaxially arachnoid, abaxially densely gray lanate.
5a. Stems slender, lower parts 1–2 mm in diam.; leaf base not obviously amplexicaul, 3-veined, occasionally 1-veined; capitula few (or many) or solitary ..... 51. *A. nepalensis*
5b. Stems thickish, lower parts up to 4 mm in diam.; leaves broad and large, base amplexicaul, 3- or 5-veined ..... 52. *A. triplinervis*
2b. Leaves somewhat decurrent and winglike on stems; capitula densely congested forming globose corymbs, or solitary.
6a. Perennial herbs, rhizome slender; involucre broadly campanulate or semispherical, 8–11 mm.
7a. Phyllaries yellowish white, yellow, or sulfureous, rarely reddish; leaves gray or yellowish white arachnoid tomentose on both surfaces ..... 49. *A. flavescens*
7b. Phyllaries white; leaves somewhat green, both surfaces with capitate glandular hairs and canescent arachnoid tomentum on margin ..... 50. *A. hancockii*
6b. Small or pulvinate subshrubs; involucre spherical.
8a. Stems and both surfaces of leaves grayish, tangled-cottony, felty-papery tomentose ..... 45. *A. chlamydophylla*
8b. Stems and both surfaces of leaves usually without above indumentum.
9a. Stems and both surfaces of leaves yellowish brown long lanate; phyllaries wax-yellow or dark yellow; stems 6–20 cm ..... 46. *A. pannosa*
9b. Stems and both surfaces of leaves yellowish or grayish white lanate; stems 3–8 cm or acaulescent.
10a. Both surfaces of leaves yellowish green, grayish white, or yellowish white tomentose; phyllaries white or yellowish white, base brown ..... 48. *A. viridis*
10b. Both surfaces of leaves cinereous or grayish white lanate; phyllaries white, base dark brown ..... 47. *A. cinerascens*
1b. Involucre 4–8 mm, obovate, campanulate, or semispherical; phyllaries obtuse or rounded at apex, rarely acuminate, usually expanding after flowering; capitula usually numerous, rarely few, congested to compound corymbiform or corymbiform at apex of stems or branches.

11a. Leaves not or scarcely decurrent on stems.
12a. Leaf base cordate or auriculate, semiamplexicaul, margin recurved, thin or submembranous.
13a. Plants tall, stems thickish, lower parts 2–4 mm in diam.; leaves large, 1.5–6 cm, arachnoid or glabrous adaxially ..... 8. *A. contorta*
13b. Plants short, stems slender, lower parts ca. 1 mm in diam.; leaves 0.5–1.5 cm, lanate on both surfaces ..... 9. *A. hondae*
12b. Leaf base attenuate, not obviously amplexicaul, margin flat or recurved, thick.
14a. Multibranched subshrubs, usually fastigiate; leaves narrowly linear, margin recurved, densely white tomentose on both surfaces ..... 10. *A. virgata*
14b. Perennial herbs, or stem base woody, or subshrubs, unbranched or branched but not fastigiate; leaves not linear, margin flat or recurved.
15a. Leaves gradually larger upward from middle, densely arranged to radiate under synflorescences, usually longer than compound corymb or corymb.
16a. Upper leaves elliptic, apex acuminate; phyllaries white ..... 32. *A. oxyphylla*
16b. Upper leaves oblong-lanceolate, apex acute; phyllaries purple-red or margin white ..... 33. *A. porphyrolepis*
15b. Leaves gradually smaller upward from middle, not dense under synflorescences, upper ones shorter than compound corymb or corymb.
17a. Stems gray tangled papery tomentose; leaves white cottony tomentose ..... 7. *A. contortiformis*
17b. Stems gray tomentose; leaves arachnoid or later glabrous adaxially, densely gray to rufous tomentose abaxially, or both surfaces white tomentose.
18a. Leaves densely white tomentose, 0.8–1 cm, margin recurved; middle phyllaries with longitudinal corrugation, apex rounded ..... 6. *A. plicata*
18b. Leaves arachnoid or later glabrous adaxially, densely gray to rufous tomentose abaxially, 1.5–10 cm; middle phyllaries without longitudinal corrugation.
19a. Leaves linear or linear-lanceolate, 5–10 cm, margin flat, base not decurrent on stems; phyllaries milky white, apex obtuse or rounded, rarely acuminate ..... 3. *A. margaritacea*
19b. Leaves usually linear or linear-oblong, 1.5–3.5 cm, base slightly decurrent on stems; phyllaries snow white or yellowish white.
20a. Involucre 5–7 mm, phyllaries snow white; Xizang ..... 4. *A. royleana*
20b. Involucre ca. 5 mm, phyllaries yellowish white; Taiwan ..... 5. *A. morrisonicola*
11b. Leaves decurrent to broadly or narrowly winged on stems.
21a. Stems, leaves, and involucre base with rust-colored stalked adhesive hairs; involucre obovate, phyllaries beige, membranous, translucent, not expanding ..... 1. *A. bulleyana*
21b. Stems, leaves, and involucre base gray, white, or yellowish brown lanate, with squarrose or capitate-stalked glandular hairs, or arachnoid, or somewhat glabrous; involucre campanulate or semispherical, phyllaries white or reddish, usually scarious, opaque, rarely membranous, somewhat expanding.
22a. Biennial herbs with thickish taproot ..... 2. *A. busua*
22b. Perennial herbs with rhizome, or multibranched subshrubs or small subshrubs.
23a. Both surfaces of leaves arachnoid at first, later glabrous except midvein and margin, without glandular hairs, dark green when dry; perennial herbs ..... 11. *A. delavayi*
23b. Both surfaces of leaves or only abaxially tomentose, or both surfaces or adaxially with squarrose or capitate-stalked glandular hairs, or adaxially glabrous and green when dry; subshrubs or perennial herbs.
24a. Subshrubs or small subshrubs, stems multibranched.
25a. Involucre 6–8 mm, broadly campanulate; both surfaces of leaves arachnoid tomentose or adaxially glabrous.
26a. Phyllaries dark yellow or adaxially wax-yellow; leaves spatulate or oblong-spatulate, margin flat, both surfaces tomentose ..... 34. *A. yunnanensis*
26b. Phyllaries white or pale reddish white; leaves obovate or ovate-oblong, adaxially arachnoid tomentose or glabrous, abaxially tomentose ..... 35. *A. muliensis*
25b. Involucre 4–5 mm, narrowly campanulate or campanulate, very rarely up to 6 mm in male plants; leaves tomentose or adaxially glandular or squarrose tomentose.
27a. Leaves spatulate-obovate; phyllaries white or pale red ..... 36. *A. suffruticosa*
27b. Leaves narrower, not spatulate-obovate; phyllaries white.
28a. Leaves narrowly oblong or linear-oblong, both surfaces arachnoid tomentose or abaxially densely white or yellowish white tomentose ..... 37. *A. stenocephala*
28b. Leaves linear or linear-lanceolate, adaxially arachnoid or capitate glandular or squarrose tomentose, abaxially densely gray tomentose ..... 38. *A. gracilis*
24b. Perennial herbs with rhizome, sometimes with taproot, stems unbranched or lower part woody and with developing axillary buds or short branches.
29a. Phyllary claw with glandular dots at apex; both surfaces of leaves gray or yellowish white tomentose, or only with capitate-stalked glandular hairs ..... 12. *A. latialata*

29b. Phyllary claw without glandular dots at apex.
30a. Stem slender, 1–2 mm in diam., densely many clustered; leaves narrowly linear, margin undulate recurved ..... 29. *A. tibetica*
30b. Stems slender or thickish, not densely many clustered; leaf margin flat or slightly reflexed or recurved and blade not narrowly linear.
31a. Leaves adaxially at first arachnoid, later glabrous, without glandular hairs, or with appressed thick hairs, abaxially usually white tomentose.
32a. Involucre 4–5 mm, campanulate; leaves 3-veined ..... 27. *A. corymbifera*
32b. Involucre 6–8 mm, broadly or narrowly campanulate; leaves 1- or 3-veined.
33a. Middle leaves oblong-lanceolate, 2–3 × 0.4–1 cm, margin usually reflexed or slightly recurved, obviously 3-veined ..... 15. *A. likiangensis*
33b. Leaves oblanceolate or narrowly winged, 0.4–1.3 × 0.2–0.25 cm, margin flat, 1-veined ..... 16. *A. tenuissima*
31b. Leaves adaxially with lanate or squarrose or capitate-stalked glandular hairs, not glabrous.
34a. Phyllaries scarious at upper parts or apex, white, opaque, middle and lower parts membranous, somewhat transparent, apex obtuse or slightly acuminate.
35a. Leaves oblanceolate or linear-oblong, 2.5–4.5 × 0.5–2 cm; involucre 6–7 mm ..... 14. *A. hymenolepis*
35b. Leaves linear-spatulate, 2.5–5 × 0.2–0.5 cm; involucre 4–5 mm ..... 26. *A. flaccida*
34b. Phyllaries all scarious, opaque.
36a. Stems 50–100 cm, lower parts woody, persistent, usually with developing axillary buds or branches ..... 30. *A. surculosa*
36b. Stems 3–50 cm, herbaceous, unbranched, rarely lower parts slightly woody, with developing axillary buds or branches.
37a. Both surfaces of leaves tangled to cottony-papery tomentose; phyllaries wax-yellow when dry ..... 28. *A. pachylaena*
37b. Both surfaces of leaves or abaxially white, gray, or yellowish white tomentose or arachnoid, or adaxially with squarrose or capitate-stalked glandular hairs.
38a. Plants with thickish woody roots or rhizome; stems unbranched.
39a. Both surfaces of leaves white, gray, or cinereous tomentose, without obvious capitate glandular hairs.
40a. Involucre ca. 5 mm, phyllaries white, apex obtuse or subrounded ..... 43. *A. szechuanensis*
40b. Involucre 6–8 mm, rarely only ca. 5 mm, phyllaries white, reddish, or red-purple.
41a. Phyllaries purple-red or white, usually yellowish white when dry, inner ones with apex acute; leaves cinereous tomentose; flowering and sterile stems congested to pulvinate ..... 42. *A. rhododactyla*
41b. Phyllaries milky white or somewhat red, apex obtuse or rounded; leaves densely white or gray tomentose; flowering stems and rosette leaves usually caespitose.
42a. Involucre (5–)6(–7) × 5–7 mm; capitula numerous, densely compound corymbiform ..... 39. *A. lactea*
42b. Involucre ca. 7 × 8 mm; capitula 4–8, densely corymbiform or headlike ..... 40. *A. batangensis*
39b. Both surfaces of leaves with obvious capitate glandular hairs or arachnoid, or margin and abaxially or rosette leaves tomentose.
43a. Leaves (dried) thin, yellowish green, cauline leaves with glandular hairs, only arachnoid along veins; phyllaries yellowish white, apex obtuse or rounded ..... 18. *A. virens*
43b. Leaves thick, both surfaces with arachnoid and glandular hairs; phyllaries white or sometimes pale red.
44a. Stems 3–7 cm, rarely taller; flowering stems and rosette leaves somewhat congested to pulvinate ..... 44. *A. xylorhiza*
44b. Stems 15–50 cm, rarely shorter; flowering stems and rosette leaves somewhat clustered.
45a. Lower stems woody, persistent; middle leaves elliptic or oblong-lanceolate, margin and midvein abaxially arachnoid tomentose; involucre 6–7 mm, phyllaries ivory white or somewhat reddish ..... 19. *A. elegans*
45b. Stems herbaceous; middle leaves oblanceolate-oblong or linear, both surfaces arachnoid tomentose; involucre 5–7 mm, phyllaries white ..... 41. *A. souliei*
38b. Plants with long slender rhizome.

46a. Lower stem slightly woody, with tomentose axillary buds or short branches; leaves adaxially arachnoid, later glabrous, abaxially thinly arachnoid tomentose and glandular, upper leaves usually tomentose on both surfaces ..... 17. *A. deserti*
46b. Stems unbranched, or sometimes branched from broken stems; leaves adaxially tomentose, or with squarrose or glandular hairs.
47a. Involucre 6–8 mm; both surfaces of leaves gray, yellowish white, or rarely yellowish brown tomentose or lanate.
48a. Both surfaces of leaves gray tomentose, or upper stems and leaves fulvous tomentose ..... 13. *A. bicolor*
48b. Both surfaces of leaves yellowish white lanate or arachnoid lanate, 3-veined.
49a. Leaves lingulate or linear-oblong, gradually smaller upward ..... 20. *A. chungtienensis*
49b. Leaves oblanceolate, gradually larger upward ..... 31. *A. larium*
47b. Involucre 4–5 mm or to 6 mm; both surfaces of leaves or abaxially white or gray tomentose.
50a. Both surfaces of leaves dark cinereous, densely tomentose and with capitate glandular hairs.
51a. Leaves obovate or oblanceolate-spatulate; capitula numerous, congested in compound corymb ..... 22. *A. spodiophylla*
51b. Leaves broadly elliptic or subrounded; capitula few, arranged in compound corymb ..... 23. *A. yangii*
50b. Leaves adaxially with squarrose or capitate glandular hairs, abaxially or both surfaces white or gray tomentose.
52a. Involucre semispherical; stems 10–18 cm; Taiwan ..... 24. *A. transnokoensis*
52b. Involucre campanulate or subobconic; stems 20–60 cm.
53a. Involucre 4–5 mm, phyllaries white or sometimes pale red; stems densely leafy, internode 0.5–2 cm; leaves 1- or 3-veined ..... 21. *A. sinica*
53b. Involucre 5–6 mm or more, phyllaries white or yellowish white; upper stems sparsely leafy, internode 4–10 cm; leaves 3- or 5-veined ..... 25. *A. aureopunctata*

1. Anaphalis bulleyana (Jeffrey) C. C. Chang, Sinensia 6: 549. 1935.

粘毛香青 nian mao xiang qing

Pluchea bulleyana Jeffrey, Notes Roy. Bot. Gard. Edinburgh 5: 183. 1912; *Conyza mollis* H. Léveillé (1912), not Willdenow (1803).

Herbs, annual or biennial, with thickish taproot, rosette leaves, and solitary or a few caespitose flowering stems, all arachnoid long cottony tomentose and with rusty brown adhesive stalked glandular hairs. Stems erect, 30–80 cm, channeled, usually branched, lower parts usually glabrous, upper parts densely hairy. Rosette leaves obovate, ca. 9 × 5.5 cm, long cottony tomentose, base attenuate and becoming a short winged petiole; lower leaves often caducous and withered by anthesis; middle and upper leaves oblanceolate or obovate-spatulate, 3.5–10 × 1–2.5 cm, both surfaces pilose glandular, long cottony tomentose along veins, 3-veined and with lateral veins, base decurrent on stems and becoming a cuneate broad wing, margin flat, apex acute; uppermost leaves smaller, linear-lanceolate. Capitula numerous, congested in compound corymbiform synflorescences terminal on stems and branches; peduncle ca. 6 mm. Involucre obovate, 5–6 × 4–7 mm; phyllaries 4- or 5-seriate, erect, light brown, hyaline, base light lutescent, not expanding; outer phyllaries short, ovate-oblong, apex obtuse, arachnoid hairy; middle ones narrowly spatulate, 5–6 mm; innermost ones broadly linear, with a claw ca. 2/3 of full length. Receptacle alveolate. Capitulum with many florets, with 4 or 5 or 30 central male florets and many or few rows of marginal female florets. Corolla 3–5 mm. Pappus slightly exserted from corolla; male florets pappus somewhat incrassate at tip of apex, serrulate. Achene oblong, 0.6–0.7 mm, glandular. Fl. Aug–Sep, fr. Sep–Oct.

• Subalpine wet slopes, low hill grasslands; 1100–3300 m. Guizhou, W Sichuan, N and NW Yunnan.

The species is unique in the genus for its color and structure of phyllaries.

2. Anaphalis busua (Buchanan-Hamilton ex D. Don) Candolle, Prodr. 6: 275. 1838.

蛛毛香青 zhu mao xiang qing

Gnaphalium busua Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 173. 1825; *Anaphalis araneosa* Candolle; *A. semidecurrens* (Wallich ex Candolle) Candolle; *G. semidecurrens* Wallich ex Candolle.

Herbs, ?biennial, with thickish taproots or usually adventitious roots at base of stems. Stems erect, (2–)5–6(–13) cm, with ascending or expanding branches, lower parts glabrous or later brownish glandular hairy, upper parts arachnoid tomentose; internode 0.5–2.5 cm. Lower cauline leaves often caducous and lost by anthesis; middle leaves linear or linear-lanceolate, 3–10 × 0.4–1 cm, base almost equilateral, decurrent on stems forming a cuneate attenuate long wing, margin flat or somewhat undulate, apex apiculate; upper leaves smaller, linear or subulate; all leaves thin, gray-green with yellow spot and squarrose hairy abaxially, green and squarrose hairy adaxially,

arachnoid tomentose along veins on both surfaces and/or margin arachnoid cottony tomentose abaxially, midvein exserted abaxially, lateral veins somewhat conspicuous. Capitula numerous, compound corymbiform, terminal on branches; peduncle ca. 4 mm. Involucre broadly campanulate, 4–5 × 5–7 mm; phyllaries 4- or 5-seriate, white, somewhat brownish abaxially; outer phyllaries elliptic, ca. 4 mm; middle ones oval, ca. 4.5 × 1.8–2 mm, 1.3–1.5 mm in female florets, apex arcuate; innermost ones spatulate, ca. 3.5 mm, with a claw ca. 1/3 of full length. Receptacle alveolate. Predominantly female capitula with many florets, with 4–10 or more central male florets and many rows of marginal female florets; predominantly male capitula with many florets, with few rows of marginal female florets and many rows of central male florets. Corolla ca. 2.5 mm, almost as long as pappus; male florets pappus incrassate at tip of apex, serrulate. Achene elliptic, only 0.4–0.8 mm, glandular. Fl. Sep–Oct, fr. Oct. $2n = 42$.

Low hill valleys, slopes, woodlands, grasslands; 1500–2800 m. SW Sichuan (Dechang, Miyi), S Xizang (Zhufeng), NW and W Yunnan [Bhutan, N India, Kashmir, Nepal].

3. Anaphalis margaritacea (Linnaeus) Bentham & J. D. Hooker, Gen. Pl. 2: 303. 1873.

珠光香青 zhu guang xiang qing

Herbs, perennial. Rhizome repent, woody, with short brown squamate runners. Stems solitary or a few caespitose, erect or ascending, 30–60(–100) cm, usually thickish, unbranched, rarely branching on broken or normal stems, ash-gray cottony tomentose, base woody. Lower leaves withered by anthesis, apex obtuse; middle leaves expanding, linear or linear-lanceolate, 5–10 cm × 3–12 mm, rarely wider, base attenuate or sharply narrowed, somewhat amplexicaul, margin flat, apex acuminate with small tip; upper leaves gradually smaller with long tip; all leaves slightly leathery, abaxially densely ash-gray to reddish brown lanuginous, adaxially arachnoid or later glabrous, 1-veined, or 3- or 5-veined. Capitula numerous, arranged in compound corymbiform (or corymbiform) synflorescences; peduncle 4–17 mm. Involucre broadly campanulate or semispherical, 5–8 × 8–13 mm; phyllaries 5–7-seriate, somewhat expanding, upper parts white; outer phyllaries up to 1/3 of involucre, ovate, cottony tomentose; middle ones ovate to oblong, ca. 5 × 2.5 mm, up to 3 mm wide in male plants, apex rounded or acuminate; innermost ones linear-lanceolate, ca. 0.5 mm wide, with a claw up to 3/4 of full length. Receptacle alveolate. Predominantly female capitula with many florets, with 3–20 central male florets and many rows of marginal female florets. Predominantly male capitula with many florets, with all central male florets or few rows of marginal female florets. Corolla 3–5 mm. Pappus slightly exserted from corolla, filiform in female florets, incrassate at tip of apex, serrulate in male florets. Achene oblong, ca. 0.7 mm, with glandular dots. Fl. and fr. Jul–Nov. $2n = 28^*, 42, 56^*$.

Conifer and *Betula* forests, dry soils, subalpine or low mountain grasslands or shrublands, rocky valleys and roadsides, slopes, banks; 300–3400 m. E, S, and W Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, E and W Hubei, Hunan, Jiangxi, Qinghai, S Shanxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Japan, Korea, Myanmar, Nepal, Russia (Far East), N Thailand, Vietnam; North America; widely introduced in Europe].

1a. Leaves 3- or 5-veined or with 2 veinlets between veins, oblong or linear-lanceolate, 7–12 mm wide ..... 3c. var. *cinnamomea*

1b. Leaves 1-veined or with 2 veinlets on margin, linear or linear-lanceolate, 3–8 mm wide.

2a. Leaves linear-lanceolate, 3–8 mm wide ..... 3a. var. *margaritacea*

2b. Leaves linear, 3–6 mm wide ..... 3b. var. *angustifolia*

3a. Anaphalis margaritacea var. **margaritacea**

珠光香青(原变种) zhu guang xiang qing (yuan bian zhong)

Gnaphalium margaritaceum Linnaeus, Sp. Pl. 2: 850. 1753; *Anaphalis cinnamomea* (Candolle) C. B. Clarke var. *angustior* (Miquel) Nakai; *A. margaritacea* subsp. *angustior* (Miquel) Kitamura; *A. margaritacea* var. *angustior* (Miquel) Nakai; *Antennaria cinnamomea* Candolle var. *angustior* Miquel; *A. margaritacea* (Linnaeus) R. Brown; *A. timmua* D. Don; *G. margaritaceum* var. *timmua* (D. Don) Kuntze; *G. timmua* (D. Don) Sprengel; *Helichrysum margaritaceum* (Linnaeus) Moench.

Stems 30–60 cm, sometimes to 100 cm. Leaves linear-lanceolate, 5–9 cm × 3–8 mm, abaxially densely gray or light brown lanuginous, adaxially arachnoid or later glabrous, midvein raised, always with 2 veinlets on margin, base attenuate. Involucre 6–8 × 8–13 mm. $2n = 28^*, 56^*$.

Subalpine or low mountain grasslands, rocky valleys and roadsides; 300–3400 m. S Gansu, N Guangxi, W Hubei, S Hunan, E Qinghai, S Shanxi (Qin Ling), Sichuan, Xizang, Yunnan [India, Japan, Nepal, Russia (Far East); North America; widely introduced in Europe].

This taxon is extremely variable.

3b. Anaphalis margaritacea var. **angustifolia** (Franchet & Savatier) Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 128. 1908.

线叶珠光香青 xian ye zhu guang xiang qing

Gnaphalium margaritaceum var. *angustifolium* Franchet & Savatier, Enum. Pl. Jap. 1: 242. 1875, based on *Antennaria japonica* Miquel, Ann. Mus. Bot. Lugduno-Batavi 2: 178. 1866 [*"iaponica"*], not Turczaninow (1851); *Anaphalis margaritacea* subsp. *japonica* Kitamura; *A. margaritacea* var. *japonica* Makino, nom. illeg. superfl.; *A. margaritacea* var. *tsoongiana* Y. Ling.

Stems 30–60 cm. Leaves linear, 3–10 cm × 3–6 mm, acuminate; lower leaves obtuse or rounded, abaxially densely light brown or yellowish brown lanuginous, adaxially arachnoid or glabrous. Involucre sometimes small, ca. 5 mm. Corolla ca. 3 mm.

Subalpine or low mountain grasslands, rocky valleys and roadsides; 300–3400 m. S and W Gansu, Guizhou, Henan, E Hubei, Qinghai, S Shanxi, Sichuan, Xizang (Bomi, Zayü), Yunnan [Japan, Korea].

This taxon is extremely variable in length, width of leaves, and length of internode.

3c. Anaphalis margaritacea var. **cinnamomea** (Candolle) Herder ex Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 481. 1882.

黄褐珠光香青 huang he zhu guang xiang qing

Antennaria cinnamomea Candolle, Prodr. 6: 270. 1838; *Anaphalis cinnamomea* (Candolle) C. B. Clarke.

Stems 50–100 cm. Leaves oblong or linear-lanceolate, 4–9 cm × 7–12 mm, sometimes to 25 mm, abaxially densely yellowish brown or reddish brown lanuginous, adaxially gray arachnoid lanuginous, raised 3- or 5-veined, base weakly auriculate, apex acuminate. Involucre same as var. *angustifolia*. $2n = 42$.

Low mountain or subalpine shrublands, grasslands, slopes, banks; 500–2800 m. E and S Gansu (Tianshui, Yuzhong), Guangdong, Guangxi, Guizhou, W Hubei (Enshi), Hunan, Jiangxi, S Shanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal].

4. Anaphalis royleana Candolle, Prodr. 6: 272. 1838.

须弥香青 xu mi xiang qing

Anaphalis polylepis Candolle.

Herbs or subshrubs, base ± woody, branched. Branches erect or unbranched, white tomentose. Leaves dense, sessile, somewhat adnate to stem, linear-oblong or oblong-lanceolate, 2–3 cm, 1-veined, abaxially white arachnoid tomentose or gray or reddish brown lanuginous, adaxially subglabrous, base weakly decurrent, margin entire, apex obtuse or acute, with short cusp. Capitula 7–9, densely arranged in corymbiform synflorescences; peduncle ash-gray cottony tomentose, as long as synflorescence. Involucre 5–7 mm; phyllaries snow white, glabrous, apex obtuse or acuminate; outer phyllaries ovate, shorter; middle ones ovate-oblong, longer than florets; innermost ones linear-oblong, as long as disk. $2n = 28$*.

Xizang [Bhutan, India, Kashmir, Nepal].

5. Anaphalis morrisonicola Hayata, Icon. Pl. Formosan. 8: 56. 1919.

玉山香青 yu shan xiang qing

Anaphalis buisanensis Hayata; *A. contorta* (D. Don) J. D. Hooker var. *morrisonicola* (Hayata) Yamamoto; *A. margaritacea* (Linnaeus) Bentham & J. D. Hooker f. *morrisonicola* Hayata; *A. margaritacea* subsp. *morrisonicola* (Hayata) Kitamura; *A. margaritacea* f. *nana* Hayata.

Rhizome repent, somewhat woody, usually sarmentose. Stems usually caespitose, erect or ascending, 15–40 cm, slender, much branched or unbranched, densely ash-gray cottony tomentose; internodes short. Lower leaves persistent or caducous and lost by anthesis, smaller, apex obtuse; middle leaves expanding, linear, oblong, or oblanceolate-linear, 1.5–3.5 × 0.2–0.4(–0.7) cm, base attenuate, semiamplexicaul and somewhat decurrent, margin flat, apex acute or obtuse, with small cusp; upper leaves stenophyllous; all leaves slightly leathery, abaxially densely ash-gray or fulvous cottony tomentose, adaxially glabrous or arachnoid tomentose, 1- or 3-veined. Capitula 5 or more, arranged in corymbiform synflorescence terminal on stems; peduncle 2–6 mm. Involucre broadly campanulate or semispherical, ca. 5 × 5–6 mm; phyllaries 7- or 8-seriate; outer phyllaries ovate, 1–2 mm, cottony tomentose; middle ones yellowish white, elliptic, ca. 4.3 × 1.5 mm; innermost ones narrower, spatulate, with a claw ca. 2/3 of full length. Receptacle alveolate. Predominantly female capitula with outer florets female, with 3 or 4 male florets present in center; predominantly male capitula with male florets only. Corolla ca. 3 mm. Pappus as long as corolla; male florets pappus somewhat incrassate at tip of apex, serrulate. Achene oblong, 0.5–0.7 mm, with lax glandular spots. Fl. and fr. Jul–Oct. $2n = 28$*.

Low hills, subalpine grasslands, rocks; 1600–3500 m. Taiwan [Philippines].

6. Anaphalis plicata Kitamura, Acta Phytotax. Geobot. 15: 37. 1953.

褶苞香青 zhe bao xiang qing

Herbs, perennial. Stems ca. 10 cm, woody, 1–2 mm in diam., branched; branches ascending or arcuate-ascending, densely cottony tomentose, densely leafy, bi-corymbiform branched at apex of flowering stems, compound corymbiform, 1.5–2 mm in diam. Rosette leaves at apex of sterile branches, linear-lanceolate, 8–10 mm; lower leaves small, 4–5 mm wide, both surfaces densely white cottony tomentose, margin flat, apex obtuse; middle leaves sessile, expanding, linear-lanceolate, 8–10 × 1.5–2 mm, both surfaces densely white cottony tomentose, base somewhat decurrent, margin recurved, apex obtuse, with small cusp; leaves 5–8 mm in synflorescence. Capitula 20–30, arranged in compound corymbiform synflorescences, globose, ca. 5 × 6 mm when dry; peduncle 0–2 mm. Involucre base densely cottony tomentose; phyllaries 4- or 5-seriate; outer phyllaries opaque, somewhat brownish abaxially, ovate or oblong, 2–2.5 mm, apex obtuse; middle ones expanding, middle to apex white, lower parts hyaline, oblanceolate-oblong, sometimes lanceolate, 4–4.5 mm, margin flat, apex rounded, with longitudinal corrugation. Receptacle alveolate. All florets male, sterile; corolla tubular, ca. 2.5 mm. Pappus white, ca. 3.2 mm, with hairs of apex slender and scabrid and easily deciduous. Fl. Sep. $2n = 56$*.

● E and S Xizang (Lhasa, Markam).

No specimens of this species were seen by the second author.

7. Anaphalis contortiformis Handel-Mazzetti, Acta Horti Gothob. 12: 245. 1938.

银衣香青 yin yi xiang qing

Subshrubs. Rhizome thickish. Sobols densely white cottony tomentose, usually with large leaves, caespitose with flowering stems. Stems erect, 30–60 cm, slightly slender, ash-gray silky tangled papery tomentose, virgate, base woody, usually densely leafy. Leaves expanding, 2–6 cm × 2–5 mm; lower leaves usually caducous and lost by anthesis; middle leaves linear or oblong-linear, broad or somewhat narrow at base, base decurrent on stems and becoming a short and narrow wing, apex acute or acuminate, with short cusp; upper leaves narrow and small, linear or subulate; all leaves white cottony tomentose, margin flat or somewhat recurved, midvein somewhat ex-

serted abaxially. Capitula 10 to numerous, densely arranged in compound corymbiform synflorescence; peduncle 1–2 mm; common peduncle of synflorescence ca. 2 cm. Involucre campanulate, ca. 5 × 5–6 mm; phyllaries ca. 5-seriate; outer phyllaries fulvous, ovate, ca. 3 mm, cottony tomentose; middle ones white, oblanceolate-oblong, ca. 4.3 mm, ca. 1 mm wide in female florets, ca. 1.5 mm wide in male florets; innermost ones narrowly oblong, with a claw ca. 2/3 of full length. Receptacle with fimbrillate appendage. Predominantly female capitula with many florets, with 1–5 central male florets and many rows of marginal female florets; predominantly male capitula with many florets, with all central male florets or 1–10 marginal female florets. Corolla ca. 3 mm. Pappus slightly longer than corolla; male florets pappus somewhat incrassate at tip of apex, serrulate. Achene oblong, ca. 1 mm, puberulent and glandular. Fl. Jul–Oct, fr. Sep–Dec.

● Slopes, grasslands; 1500–2800 m. Xizang, Yunnan.

8. Anaphalis contorta (D. Don) J. D. Hooker, Fl. Brit. India 3: 284. 1881.

旋叶香青 xuan ye xiang qing

Antennaria contorta D. Don, Bot. Reg. 7: t. 605. 1822; *Anaphalis contorta* var. *pellucida* (Franchet) Y. Ling; *A. falconeri* C. B. Clarke; *A. franchetiana* Diels; *A. tenella* Candolle; *Gnaphalium contortum* (D. Don) Buchanan-Hamilton; *G. pellucidum* Franchet.

Rhizome woody, with solitary or caespitose sobols and flowering stems. Stems erect or ascending, 15–80 cm, somewhat slender, woody at base, virgate, densely white cottony tomentose, lower parts sometimes glabrous or with cottony tomentose axillary buds, rather densely leafy. Lower leaves caducous and lost by anthesis; leaves expanding or explanate, linear, 1.5–6 × 0.4–0.5 cm, larger upward, base cordate and auriculate-clasping, margin revolute, apex acuminate, sometimes with black tip; uppermost leaves small and narrow; all leaves densely whitish tomentose abaxially, arachnoid hairy or glabrous adaxially, midvein somewhat exserted abaxially; leaves oblong-lanceolate or oblanceolate in sobols, long cottony tomentose. Capitula rather numerous, dense, compound corymbiform, terminal on stems and branches; peduncle ca. 3 cm or absent. Involucre campanulate, 5–6 × 4–6 mm; phyllaries 5- or 6-seriate; outer phyllaries slightly fulvous or purple-red, ovate, ca. 2.5 mm, cottony tomentose; middle ones obovate-oblong, ca. 4 mm, rounded at apex, white and ca. 1.2 mm wide in female florets, milky or rarely somewhat red and ca. 1.5 mm wide in male florets; innermost ones spatulate, with a claw ca. 2/3 of full length. Receptacle alveolate. Predominantly female capitula with many florets, with 1–4 central male florets and many rows of marginal female florets; predominantly male capitula with many florets, with all central male florets. Corolla 2.3–3 mm. Pappus almost as long as corolla; male florets pappus somewhat incrassate at tip of apex. Achene oblong, with small glands. Fl. and fr. Aug–Oct. $2n = 28$.

Slopes, grasslands; 1700–3500 m. W Guizhou (Huangcaoba), Hunan, Sichuan, Xizang, Yunnan [Afghanistan, Bhutan, India, Kashmir, Nepal].

9. Anaphalis hondae Kitamura, Acta Phytotax. Geobot. 15: 78. 1953.

多茎香青 duo jing xiang qing

Rhizome repent, woody, with dense slender roots. Flowering stems and sterile stems numerous and caespitose. Stems erect or ascending, 5–10 cm, slender, woody at base, white or ash-gray cottony tomentose, lower parts later glabrous, usually unbranched, developed axillary buds at lower parts, all plants densely leafy. Leaves expanding, lower leaves usually caducous and lost by anthesis, linear, 5–10 × ca. 1 mm, base equilateral, semiamplexicaul; middle and upper leaves lanceolate-linear, 10–15 mm, base slightly ampliate, auriculate, amplexicaul, margin recurved, apex acute, with small tip; all leaves ash-gray cottony tomentose, midvein somewhat exserted abaxially and densely white lanate. Sterile stems relatively shorter, 2–4 mm, leaves dense, upper leaves relatively broader and shorter, obovate or spatulate, margin flat. Capitula numerous, arranged in corymbiform or compound-corymbiform synflorescences, terminal on stems and branches; peduncle 1–3 mm. Involucre broadly campanulate, 4–5 × 5–6 mm, lanate at base; phyllaries ca. 4-seriate, brownish at base, apex light yellow; outer phyllaries ovate, ca. 2 mm; middle ones oblong; innermost ones oblanceolate, with a claw ca. 2/3 of full length. Receptacle alveolate. Predominantly male capitula with male florets only. Corolla 3–3.5 mm. Pappus slightly shorter than corolla, slightly incrassate at tip of apex, serrulate. Female florets unknown. Fl. Jul–Oct.

Riverside sands. Xizang (Lhasa, Yadong) [Nepal].

No specimens of this species were seen by the second author.

10. Anaphalis virgata Thomson in C. B. Clarke, Compos. Ind. 107. 1876.

帚枝香青 zhou zhi xiang qing

Herbs, perennial, or subshrubs, woody at base; rootstock thickish, woody. Stems numerous, virgate, erect or ascending, thin, densely leafy, white tomentose, floriferous, branching in upper parts, 20–40(–50) cm; sterile shoots numerous and considerably less high. Leaves sessile, linear, 1–25 cm, both surfaces pubescent, apex acute, with very short cusp (mucronulate) or without cusp. Capitula dense, corymbiform or paniculate-corymbiform, terminal, often with elongate lower branches, 3–4 mm in diam., upper capitula short, lower ones elongate pedunculate, or globose-campanulate, numerous. Involucre: outer phyllaries oblong, others lanceolate-oblong, from base to middle tomentose, brown or brownish, toward apex glabrous, whitish, and obtuse, 3–4 mm. Receptacle lacunose, glabrous. Female florets ca. 3 mm, thinly tubular; stigma exserted, bipartite; pappus of thin hairs as long as corolla. Center of capitulum with 2–4 sterile bisexual broadly tubular florets, glandular at apex; pappus of hairs shortly pinnate at apex and somewhat exceeding corolla. Male florets ca. 3.5 mm, narrowly campanulate-tubular; corolla limb 5-partite, glandular at apex; pappus of short, pinnate hairs slightly shorter than corolla. Achenes brownish, oblong, ca. 0.75 mm. Fl. Jul–Oct.

3000–4000 m. Xinjiang, W Xizang [Kashmir, Nepal, Pakistan; C Asia, SW Asia (Iran)].

No Chinese specimens of this species were seen by the present authors. The above description was based on specimens from Kashmir.

11. Anaphalis delavayi (Franchet) Diels, Notes Roy. Bot. Gard. Edinburgh 7: 337. 1912.

苍山香青 cang shan xiang qing

Gnaphalium delavayi Franchet, J. Bot. (Morot) 10: 409. 1896.

Herbs, perennial. Rhizome thickish, somewhat woody, with withered leaves and sobols or runners bearing squamiform leaves. Stems erect, 5–35 cm, somewhat thickish, lower parts glabrous, upper parts ash-gray arachnoid, all plants with sparse leaves. Rosette leaves obovate-spatulate, 1.5–3.5 × 1–1.5 cm; lower leaves usually caducous and lost by anthesis; middle leaves erect or somewhat expanding, obovate-oblong or oblong, 4–6 × 1–2 cm, base decurrent and becoming cuneate or a narrow wing, margin flat, apex obtuse or rounded, with small cusp; upper leaves narrow and small, apex acute; all leaves densely arachnoid abaxially, sparsely arachnoid hairy adaxially, later glabrous except for midvein and margin, midvein somewhat exserted abaxially, with 3 conspicuous veins or another pair of lateral veins. Capitula numerous, corymbiform, dense, terminal on stems; peduncle 2–5 mm. Involucre campanulate, ca. 7 × 5 mm; phyllaries 5-seriate; outer phyllaries red-brown or puce, ovate, ca. 4.5 mm, arachnoid tomentose, apex acute; middle ones puce abaxially, white or yellow-white adaxially, ovate-lanceolate, ca. 7 × 2 mm, apex acute; innermost ones oblong-linear, with a claw ca. 2/3 of full length. Receptacle fimbrillate. Center of capitulum with female florets and a few bisexual sterile florets; predominantly male capitula with male florets only. Corolla 3.5–4 mm. Pappus ca. 4.5 mm; male florets pappus somewhat incrassate at tip of apex, dentate. Achene oblong, ca. 1.2 mm, glabrous. Fl. May–Aug, fr. Aug–Sep.

• Alpine grasslands, forest margins; 3000–4000 m. NW Yunnan.

12. Anaphalis latialata Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 98. 1966.

宽翅香青 kuan chi xiang qing

Anaphalis alata Maximowicz var. *viridis* Handel-Mazzetti; *A. latialata* var. *viridis* (Handel-Mazzetti) Y. Ling & Y. L. Chen.

Rhizome usually woody, with short reddish brown lepidoid runners of squamiform leaves, with somewhat caespitose sterile stems and flowering stems. Stems erect, 30–50 cm, slightly slender, white arachnoid hairy and with tentacles, unbranched or with synflorescence branches at upper parts, rather densely leafy at lower parts. Lower leaves usually short and small, often caducous and lost by anthesis; middle leaves expanding, linear-lanceolate or linear-oblong, 3–5 × 0.2–0.8 cm, base equilateral, decurrent on stems and becoming a narrow or cuneiform wing, margin flat, apex acuminate, with short cusp; upper leaves small, somewhat erect, apiculate, with withered scarious long cusp; all leaves arachnoid cottony tomentose, densely lanate, or only with capitate-stalked glandular hairs, midvein exserted abaxially, lateral veins not conspicuous. Capitula numerous, compound corymbiform, dense, terminal on stems and branches; peduncle 1–3 mm; common peduncle of synflorescence ca. 2 cm. Involucre campanulate, 6–7 × 6–8 mm; phyllaries 6- or 7-seriate; outer phyllaries ovate, ca. 2.5 mm, sparsely cottony tomentose; middle ones white or lurid, oblong, ca. 6 × 2.5 mm, apex somewhat obtuse, with gland at top of claw; innermost ones oblong-linear, with a claw ca. 2/5 of full length. Receptacle with fimbrillate short hairs. Outer rows of predominantly female capitula female, with 1 or 2 male florets present in center; predominantly male capitula with male florets only. Corolla 3.2–3.5 mm. Pappus almost equaling corolla, male florets pappus incrassate at tip of apex, serrulate. Achene ca. 1 mm, with sparse glandular spots. Fl. and fr. Jul–Oct.

• Alpine and subalpine slopes or mountainous regions exposed to sun. W Gansu, E Qinghai, W Sichuan, Yunnan.

13. Anaphalis bicolor (Franchet) Diels, Notes Roy. Bot. Gard. Edinburgh 7: 337. 1912.

二色香青 er se xiang qing

Rhizome slender or thickish, somewhat woody; sobols short, with brown scales, terminal and white tomentose rosette leaves, caespitose with flowering stems. Stems erect from geniculate base, 20–45 cm, lower parts usually glabrous, upper parts white or ash-gray or whitish yellow cottony tomentose and capitate-stalked glandular hairy, rather densely leafy. Lower leaves often caducous and lost by anthesis, middle and upper leaves somewhat erect or spreading, linear or oblong-linear, 1.5–4(–7) × 0.2–0.8 cm, densely whitish yellow cottony tomentose and capitate-stalked glandular hairy, base decurrent on stems and forming a narrow wing, somewhat thickish, margin somewhat recurved or flat, sometimes undulate, apex obtuse or acuminate, with long subula; midvein exserted abaxially, lateral veins not conspicuous. Capitula numerous (rarely few to 5), compound corymbiform, dense, terminal on stems and branches; peduncle short; common peduncle of synflorescence ca. 3 cm, with subulate-linear bract. Involucre campanulate, 6–8 × 6–8 mm; phyllaries 5- or 6-seriate; outer phyllaries tomentose, ca. 2 mm; middle ones somewhat yellow or dirty white, light brownish at base, oblanceolate-elliptic, ca. 5 mm, ca. 2 mm wide in male florets, ca. 1.5 mm wide in female florets, apex obtuse or rounded; innermost ones linear-oblong, with a claw ca. 2/3 of full length. Receptacle shallowly alveolate. Outer rows of predominantly female capitula female, 1 or 2 male florets present in center; predominantly male capitula with male florets only. Corolla ca. 4 mm. Pappus almost equaling corolla, relatively thick and flat in male florets, dentate. Achene oblong, ca. 1 mm, rarely longer, almost glabrous. Fl. Jul–Oct, fr. Sep–Nov.

• Alpine to low hill grasslands, deserts, under shrubs, conifer forests; 2000–3800 m. E and W Gansu, Qinghai, SW and W Sichuan, E Xizang, N and W Yunnan.

1a. Upper parts of plants yellow or whitish yellow cottony tomentose, lower parts ash-gray cottony tomentose, capitate glandular hairs with long stalk under lanate hairs.

2a. Leaves dense, internodes usually 2–5 mm; upper leaves somewhat erect or adnate to stems, leaves 1.5–4 cm × 2–4 mm, linear or oblong-linear, apex acuminate; involucre 6–6.5 mm ..... 13a. var. *bicolor*

2b. Leaves sparse, internodes usually 5–10 mm; upper leaves somewhat expanding, 6–7 cm × 4–8 mm, oblong-linear, apex obtuse; involucre 7–8 mm ..... 13b. var. *longifolia*

1b. All plants gray or white lanate, or stems and leaves adaxially arachnoid hairy or glandular hairy.

3a. Leaves adaxially arachnoid hairy and with capitate glandular hairs with long stalk, margin usually undulate, expanding ..... 13e. var. *undulata*

3b. All plants gray or white lanate, leaf margin not undulate.

4a. Leaves dense, internodes 2–5 mm; upper leaves erect or weakly expanding, 1.5–4 cm × 2–4 mm, apex acuminate; involucre ca. 6 mm ..... 13c. var. *subconcolor*

4b. Leaves sparse, internodes 4–10 mm; upper leaves expanding, 2.5–5 cm × 3–7 mm, apex rounded or obtuse; involucre ca. 7 mm ..... 13d. var. *kokonorica*

13a. Anaphalis bicolor var. **bicolor**

二色香青(原变种) er se xiang qing (yuan bian zhong)

Gnaphalium bicolor Franchet, J. Bot. (Morot) 10: 411. 1896.

Upper parts of plants yellow or whitish yellow cottony tomentose, lower parts ash-gray cottony tomentose, capitate glandular hairs with long stalk under lanate hairs. Leaves dense; internodes usually 2–5 mm. Upper leaves somewhat erect or adnate to stems; leaves linear or oblong-linear, 1.5–4 cm × 2–4 mm, apex acuminate. Involucre 6–6.5 mm.

• 2000–3500 m. SW and W Sichuan, N and W Yunnan.

13b. Anaphalis bicolor var. **longifolia** C. C. Chang, Sinensia 6: 548. 1935.

长叶二色香青 chang ye er se xiang qing

Upper parts of plants yellow or whitish yellow cottony tomentose, lower parts ash-gray cottony tomentose, capitate glandular hairs with long stalk under lanate hairs. Leaves sparse; internodes usually 5–10 mm. Upper leaves somewhat expanding, oblong-linear, 6–7 cm × 4–8 mm, apex obtuse. Involucre 7–8 mm.

• 3400–3800 m. SW and W Sichuan, NW Yunnan (Lijiang).

13c. Anaphalis bicolor var. **subconcolor** Handel-Mazzetti, Acta Horti Gothob. 12: 245. 1938.

同色二色香青 tong se er se xiang qing

All plants gray or white lanate. Leaves dense; internodes 2–5 mm. Upper leaves erect or weakly expanding, 1.5–4 cm × 2–4 mm, apex acuminate. Involucre ca. 6 mm; phyllaries whitish yellow.

• 3100–3600 m. E Gansu (Lintan), SW and W Sichuan, E Xizang (Bagong, Qamdo).

13d. Anaphalis bicolor var. **kokonorica** Y. Ling, Acta Phytotax. Sin. 11: 99. 1966.

青海二色香青 qing hai er se xiang qing

All plants gray or white lanate. Leaves sparse; internodes 4–10 mm. Upper leaves expanding, 2.5–5 cm × 3–7 mm, apex rounded or obtuse. Involucre ca. 7 mm; phyllaries white or whitish yellow. Corolla 4–4.5 mm. Achene ca. 1.5 mm.

• 3000–3800 m. W Gansu (Xiahe), E Qinghai (Menyuan, Xinghai).

13e. Anaphalis bicolor var. **undulata** (Handel-Mazzetti) Y. Ling, Acta Phytotax. Sin. 11: 99. 1966.

波缘二色香青 bo yuan er se xiang qing

Anaphalis undulata Handel-Mazzetti, Symb. Sin. 7: 1104. 1936.

Leaves obovate-linear, 2–4 cm × 4–5 mm, adaxially arachnoid hairy and with capitate glandular hairs with long stalk, margin usually undulate, expanding.

• About 2200 m. SW Sichuan (Xiangcheng), NW Yunnan (Zhongdian).

14. Anaphalis hymenolepis Y. Ling, Acta Phytotax. Sin. 11: 99. 1966.

膜苞香青 mo bao xiang qing

Rhizome slender, somewhat woody; stolons ca. 12 cm, with brown squamiform leaves and terminal rosette leaves. Stems caespitose, erect, 15–45 cm, slender, unbranched, white or pallid arachnoid tomentose, rather sparsely leafy. Basal and lower leaves relatively small, caducous and lost by anthesis; middle leaves erect or somewhat expanding, oblanceolate-oblong or linear-oblong, 2.5–4.5 × 0.5–2 cm, base attenuate, decurrent on stem and becoming a narrow or cuneate wing, margin flat, apex obtuse or acute; upper leaves small, linear or linear-lanceolate, with small or withered cusp; all leaves thin, both surfaces tomentose or abaxially densely pallid arachnoid and mixed with tentacles, inconspicuously 3-veined. Capitula 7–10 or more, corymbiform, terminal on stems; peduncle 1–5 mm. Involucre campanulate, 6–7 × 5–6 mm; phyllaries 5- or 6-seriate, thin, base hyaline, apex white, not hyaline; outer phyllaries light brownish, ovate, ca. 3.5 mm, apex obtuse; middle ones elliptic-lanceolate, ca. 6 mm, apex acute; innermost ones lanceolate-linear, ca. 5.8 mm, with a claw ca. 1/3 or 1/2 of full length. Receptacle with fimbrillate appendage. Center of predominantly female capitula with female florets and a few male florets; pre-

dominantly male capitula with male florets only. Corolla ca. 4 mm. Pappus ca. 5 mm, male florets pappus relatively incrassate at tip of apex, dentate. Achene oblong, ca. 0.7 mm, with dense mammilla. Fl. Jul.

• Alpine hillside grasslands; 2500–2800 m. W Gansu (Qingshui, Xiahe), N Sichuan (Aba, Songpan).

No specimens of this species were seen by the second author.

15. Anaphalis likiangensis (Franchet) Y. Ling, Fl. Reipubl. Popularis Sin. 75: 168. 1979.

丽江香青 li jiang xiang qing

Gnaphalium likiangense Franchet, J. Bot. (Morot) 10: 410. 1896; *Anaphalis nervosa* Y. Ling.

Rhizome relatively thickish, woody. Sobols and stolons with dense scalelike withered leaves and terminal rosette leaves, caespitose with flowering stems. Stems erect, 15–25 cm, slender, unbranched, densely ash-gray lanate, rather densely leafy. Basal and lower leaves caducous and lost by anthesis, small, spatulate-oblong; middle leaves dense, erect or spreading, oblong-lanceolate, 2–3 × 0.4–1 cm, base acute, decurrent on stems and becoming a narrow or cuneate wing, usually semiamplexicaul, margin recurved when dry, apex acute, with small cusp; upper leaves linear-lanceolate; all leaves pallid or white lanate abaxially, dark green adaxially, appressed or arachnoid tomentose, sometimes glabrate, lustrous, midvein exserted abaxially, midvein and 3 veins flat or somewhat excavated adaxially, apical leaves 1-veined. Capitula 10–30, dense, corymbiform; peduncle 1–3 mm. Involucre campanulate, 6–8 × 5–6 mm; phyllaries 5- or 6-seriate; outer phyllaries dark brownish, oval-lanceolate, ca. 3.5 mm, arachnoid tomentose; middle ones oblong-lanceolate, 5–6 mm, ca. 2 mm wide in male florets, ca. 1.5 mm wide in female florets, white except for base (yellow when dried), apex obtuse or acute; innermost ones lingulate or lanceolate-linear, ca. 4 mm, with a claw ca. 2/3 of full length. Receptacle with fimbrillate short hairs. Center of predominantly female capitula with female florets and 1–3 male florets; predominantly male capitula with male florets only. Corolla 3.5–4 mm. Pappus longer than corolla; upper part of pappus of male florets thickish and flat, dentate. Ovary 0.8–1 mm, almost glabrous. Achene oblong, ca. 0.7 mm, with dense mammilla. Fl. Aug–Sep.

• Valleys, ditchsides, grasslands, under *Picea* forests; 3100–3400 m. NW Yunnan (Heqing, Lijiang, Zhongdian).

16. Anaphalis tenuissima C. C. Chang, Sinensia 6: 542. 1935.

细弱香青 xi ruo xiang qing

Rhizome woody. Stems erect or ascending, ca. 14 cm tall, ca. 1 mm in diam., white arachnoid tomentose, upper parts brownish pilose, unbranched, slender; internodes 7–11 mm. Leaves oblanceolate or narrowly spatulate, abaxially arachnoid tomentose, adaxially green, glabrous, almost lustrous, 1-veined, base long cuneate, decurrent along stems and becoming a narrow wing, apex obtuse to truncate; lower leaves usually caducous and lost by anthesis, 4–13 × 2–2.5 mm, base slightly larger, erect to expanding; uppermost leaves linear, apex usually brownish scarious piliform. Capitula 4–6, terminal, corymbiform, dense, ca. 2 cm in diam.; peduncle absent or to 3 mm, white arachnoid tomentose. Involucre narrowly campanulate, 7.5–8 mm; phyllaries 4-seriate, all erect, apex obtuse; outer phyllaries reddish brown, oblanceolate, 4–5 mm; middle ones ca. 7 mm, base brown and red, apex white; innermost ones linear, 5.5–7 mm. Florets in center of capitulum sterile, ca. 3; corolla ca. 4 mm; pappus ca. 3 mm, incrassate at tip of apex. Outer florets ca. 8; corolla ca. 3.5 mm; pappus white, ca. 3.5 mm. Achene oblong, ca. 0.6 mm, glabrous.

• W Sichuan.

No specimens of this species were seen by the present authors. The description is based on the protologue, as well as work by Handel-Mazzetti (Notizbl. Bot. Gart. Berlin-Dahlem 13: 631. 1937).

17. Anaphalis deserti J. R. Drummond, Bull. Misc. Inform. Kew 1910: 76. 1910.

江孜香青 jiang zi xiang qing

Rhizome slender, woody; stolons slender, with rufous lanceolate scales and terminal rosette leaves. Stems erect from geniculate base, 30–40 cm, slender, usually curved, lower parts glabrous, slightly woody, upper parts arachnoid tomentose or lanate-piliferous, with lanate axillary buds and short branches, sparsely leafy. Lower leaves caducous and lost by anthesis; middle leaves oblong-linear, 4–5 × 0.3–0.5 mm, base equilateral or slightly narrow, decurrent on stems and becoming a narrow wing, margin flat, apex acute or subrounded, with long cusp; upper leaves considerably small, ca. 1.5 × 0.3 cm; all leaves dark green, abaxially pallid thinly arachnoid tomentose and with capitate cauliferous tentacles, adaxially arachnoid tomentose, later glabrous, upper leaves pubescent on both surfaces, midvein not conspicuous. Capitula small, 5 or 15–20, congested to globose-corymbiform synflorescences not exceeding upper leaves. Involucre broadly campanulate, ca. 7 mm; phyllaries 4- or 5-seriate; outer phyllaries purple-brownish, ovate; middle ones oval-lanceolate, upper parts white or slightly yellow, apex obtuse. Predominantly male capitula with male florets only. Ovary considerably small, glandular at apex; pappus longer than achene. Fl. Jul. $2n = 56$*.

• Forests; ca. 3900 m. E and S Xizang (Baxoi, Gyangzê, Shaquantang).

No specimens of this species were seen by the second author.

18. Anaphalis virens C. C. Chang, Sinensia 6: 546. 1935.

黄绿香青 huang lü xiang qing

Rhizome thickish, woody, ascending, upper parts densely with withered leaves, with rosette leaves and densely caespitose flowering stems and sterile stems. Stems erect or ascending, 20–50 cm, lower parts woody, persistent, simple or branching at base or broken stems, with yellow capitate-stalked glandular hairs, arachnoid tomentose at lower parts, densely leafy. Rosette leaves obovate or oblong, ca. 1.5 × 0.5 cm, both surfaces ash-gray cottony tomentose. Lower cauline leaves caducous and lost by anthesis; middle leaves somewhat expanding, oblong or linear-lanceolate, 3–7 × 0.3–1 cm, base equilateral, decurrent on stems and becoming a narrow or cuneate wing, margin flat, apex acute, with conspicuous cusp; leaves becoming smaller upward, erect or somewhat expanding, lanceolate-linear, acuminate, with withered scarious long cusp; all leaves yellow-

green, thin, with stalked glandular hairs on both surfaces, 3-veined, hairs around veins considerably long. Capitula numerous, dense, compound corymbiform, terminal on stems and branches; peduncle slender. Involucre broadly campanulate, ca. 7 × 5–8 mm; phyllaries 4- or 5-seriate; outer phyllaries broadly ovate, ca. 3.5 mm, cottony tomentose; middle ones yellow-white, oblong, ca. 6 × 2.5 mm, base fulvous, apex obtuse or rounded; innermost ones oblong, ca. 5.5 mm, with a claw ca. 1/3 of full length. Receptacle with fimbrillate short hairs. Center of predominantly female capitula with female florets and 1–3 male florets; predominantly male capitula with male florets only. Corolla 4–4.5 mm. Pappus almost as long as corolla, male florets pappus incrassate at tip of apex, dentate. Achene oblong, ca. 1 mm, sparsely papillate. Fl. Jul–Sep.

• Subalpine or low hill grasslands, between rocks; 1800–3600 m. SW Sichuan (Chawalong, Jiulong, Muli), NW Yunnan.

19. Anaphalis elegans Y. Ling, Acta Phytotax. Sin. 11: 101. 1966.

雅致香青 ya zhi xiang qing

Rhizome thickish, woody, ascending, upper parts densely with withered leaves, with rosette leaves and caespitose flowering stems and sterile stems. Stems erect or ascending, 20–50 cm, lower parts woody, persistent, slightly slender, usually simple, with capitate-stalked glandular hairs and sparsely arachnoid hairy, densely hairy in upper parts, whole stems or lower parts densely leafy. Rosette leaves obovate or spatulate-elliptic, 0.7–1.5 × 0.3–0.5 cm, apex obtuse. Lower leaves caducous and lost by anthesis, oblong-spatulate, base attenuate and forming long-winged stalk, or base sheathlike; middle leaves elliptic or oblong-lanceolate, 3–5 × ca. 1 cm, base somewhat narrow or subrounded, decurrent on stems and becoming a narrow wing, margin flat, apex acute or obtuse, with small cusp; upper leaves slightly erect, linear-lanceolate, with withered long cusp; all leaves with capitate-stalked glandular hairs on both surfaces, white arachnoid tomentose at margin and abaxially, 3-veined, midvein thickish. Capitula numerous, dense, compound corymbiform, terminal on branches; peduncle 0.3–1 cm. Involucre broadly campanulate, 6–7 mm; phyllaries 4- or 5-seriate; outer phyllaries light brownish, ovate, ca. 3 mm, lanate; middle ones ivory white or somewhat reddish, obovate-oblong, 5–6 × 2–3 mm, apex rounded; innermost ones spatulate-oblong, ca. 5 mm, with a claw ca. 1/2 of full length. Receptacle with fimbrillate short hairs. Center of predominantly female capitula with female florets and 4–6 male florets. Corolla 4–4.2 mm. Pappus almost equal to corolla; upper parts of male florets pappus considerably incrassate at tip of apex, serrulate. Achene oblong, ca. 1.2 mm, papillate. Fl. Jul–Aug.

• Sunny hillside gravel slopes; 3100–3200 m. W Sichuan (Dêgê), NW Yunnan (Zhongdian).

No specimens of this species were seen by the second author.

20. Anaphalis chungtienensis F. H. Chen, Acta Phytotax. Sin. 11: 102. 1966.

中甸香青 zhong dian xiang qing

Rhizome thickish or somewhat slender, woody, surrounded by withered leaves. Flowering stems and sterile stems laxly caespitose. Stems erect or ascending, 15–30 cm, unbranched, somewhat slender, light fulvous arachnoid lanate or white arachnoid lanate, laxly leafy. Rosette leaves spatulate-oblong, ca. 9 × 1 cm, base attenuate and forming winged stalk. Basal leaves caducous and lost by anthesis; lower and middle leaves lingulate or linear-oblong, rarely oblong-lanceolate, 3.5–7 × 0.2–1 cm, base usually equilateral, semiamplexicaul, decurrent on stems and becoming a broadly or narrowly cuneate wing, margin flat, apex rounded or obtuse; upper leaves linear, gradually acute, with withered long cusp; all leaves light fulvous arachnoid lanate on both surfaces and mixed with capitate cauliferous tentacles, inconspicuously 3-veined. Capitula numerous, dense, compound corymbiform or paniculate-corymbiform; peduncle densely lanate. Involucre broadly campanulate, 7–8 × ca. 7 mm; phyllaries 5- or 6-seriate; outer phyllaries light brownish, elliptic, lanate; middle ones white, oblong or elliptic, ca. 7 × 2 mm, apex acute in female florets and rounded or obtuse in male florets; innermost ones linear-oblong, ca. 4.5 mm, with a claw ca. 2/3 of full length. Receptacle with fimbrillate appendage. Center of predominantly female capitula with female florets and 1–3 male florets; predominantly male capitula with male florets only. Corolla 3.2–3.5 mm. Pappus longer than corolla, incrassate at tip of apex in male florets, dentate. Achene terete, ca. 0.7 mm, almost glabrous. Fl. and fr. Jul–Aug.

• Hillside grasslands; 3100–3800 m. NW Yunnan (Dêqên, Zhongdian).

No specimens of this species were seen by the second author.

21. Anaphalis sinica Hance, J. Bot. 12: 261. 1874.

香青 xiang qing

Rhizome slender or thickish, woody, runners ca. 8 cm. Stems laxly or densely caespitose, erect, 20–50 cm, slender or thickish, usually simple or branching after efflorescence or on broken branches, white or ash-gray cottony tomentose, densely leafy. Rosette leaves densely lanate, apex obtuse or rounded. Lower leaves caducous and lost by anthesis; middle leaves oblong, oblanceolate-oblong, or linear, 2.5–9 × 0.2–1.5 cm, base attenuate, decurrent on stem and becoming a narrow or slightly broad wing, margin flat, apex acute, with short and small cusp; upper leaves smaller, lanceolate-linear or linear; all leaves arachnoid lanate, or densely white or yellow-white lanate abaxially or on both surfaces, mixed with glandular hairs, 1- or 3-veined with lateral veins vanishing. Capitula numerous, dense compound corymbiform or polycyclic corymbiform; peduncle slender. Involucre campanulate or almost obconical, 4–5(–6) × 4–6 mm; phyllaries 6- or 7-seriate; outer phyllaries light brownish, oval, ca. 2 mm, arachnoid tomentose; middle ones milky white or dirty white, lingulate-oblong, ca. 3.5 × 1–1.2 mm, apex obtuse or rounded; innermost ones narrower, narrowly elliptic, with a claw ca. 2/3 of full length; phyllaries in male florets usually obtuse. Center of predominantly female capitula with female florets and 1–4 male florets. Corolla 2.8–3 mm. Pappus slightly longer than corolla, incrassate at tip of apex in male florets, serrate. Achene 0.7–1 mm, with small gland. Fl. Jul–Sep, fr. Aug–Oct.

Low hill or subalpine shrub forests, grasslands, hillsides, slopes, banks, riversides; 400–2100 m. S Anhui, Fujian, Gansu, Guangxi, Gui-

zhou, Hebei, W Henan, W Hubei, E and S Hunan, S Jiangsu, W Jiangxi, Shaanxi, Shandong, Shanxi, NE Sichuan, Yunnan, Zhejiang [Japan, Korea, ?Nepal].

This is a widespread, extremely variable species. It is similar to *Anaphalis aureopunctata* but differs in being usually taller and more robust and having leaves denser, involucre smaller, and phyllaries more layered with base beige or gray-brown.

1a. Stems laxly caespitose, 20–50 cm, internodes 5–20 mm; synflorescence dense or expanding; phyllaries white, rarely red.
  2a. Leaves oblong or oblanceolate-oblong; internodes 5–10 mm ..... 21a. var. *sinica*
  2b. Leaves lanceolate, linear-oblong, or linear; internodes 10–20 mm, longer on upper stems ..... 21b. var. *alata*
1b. Stems densely caespitose, branched from rhizome, ca. 20 cm, internodes 2–10 mm; synflorescence dense; phyllaries white or weakly red.
  3a. Leaves green and sparsely lanate adaxially, densely lanate abaxially ..... 21c. var. *densata*
  3b. Leaves and stems densely white thickish lanate ..... 21d. var. *lanata*

21a. Anaphalis sinica var. **sinica**

香青(原变种) xiang qing (yuan bian zhong)

Anaphalis possietica Komarov; *A. pterocaulon* (Franchet & Savatier) Maximowicz; *A. pterocaulon* var. *sinica* (Hance) Handel-Mazzetti; *A. todaiensis* Honda; *Gnaphalium pterocaulon* Franchet & Savatier.

Stems laxly caespitose; internodes short, 5–10 mm. Leaves oblong or oblanceolate-oblong, 3–9 × 1–1.5 cm, abaxially densely lanate, adaxially arachnoid lanate. Synflorescence dense or expanding. Phyllaries white, rarely red.

Hill or mountain woods, grasslands, slopes, banks; 400–2000 m. S Anhui, Guangxi, W Hubei (Fangxian, Lichuan), E and S Hunan, S Jiangsu, W Jiangxi, NE Sichuan (Wanyuan), Zhejiang [Japan, Korea].

This taxon is widespread in Asia and is extremely variable.

21b. Anaphalis sinica var. **alata** (Maximowicz) S. X. Zhu & R. J. Bayer, **comb. et stat. nov.**

疏生香青 shu sheng xiang qing

Basionym: *Anaphalis alata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 478. 1882; *A. chanetii* (H. Léveillé) H. Léveillé; *A. sinica* var. *remota* Y. Ling, nom. illeg. superfl.; *Gnaphalium chanetii* H. Léveillé.

Stems laxly caespitose; internodes 10–20 mm. Leaves lanceolate, linear-oblong, or linear, 4–9 × 0.5–1.5 cm, abaxially densely white or whitish yellow lanate, adaxially sparsely lanate, base attenuate, decurrent on stems and becoming narrow wing. Phyllaries white.

• Hill or mountain woods, grasslands, slopes, banks; 800–2100 m. Gansu (Zhangxian), Hebei (Jingxing, Neiqiu, Xingtai), Shaanxi (Ningqiang, Taibai Shan, Yangxian), Shanxi [?Nepal].

Anaphalis alata was recorded from C and W Nepal in Annot. Checkl. Fl. Pl. Nepal (49. 2000). This occurrence is disjunct from the distribution in N China (see http://www.efloras.org/florataxon.aspx?flora_id=110&taxon_id=242302857; accessed 15 Apr 2011).

The valid publication of *Anaphalis alata* Maximowicz var. *viridis* Handel-Mazzetti (Acta Horti Gothob. 12: 245. 1938) simultaneously created the autonym *A. alata* var. *alata*, which has priority at varietal rank over *A. sinica* var. *remota* Y. Ling (Acta Phytotax. Sin. 11: 103. 1966), hence the need for this new combination.

21c. Anaphalis sinica var. **densata** Y. Ling, Acta Phytotax. Sin. 11: 103. 1966.

密生香青 mi sheng xiang qing

Stems densely caespitose, ca. 20 cm; internodes 2–10 mm. Leaves lanceolate, linear-oblong, or linear, 2.5–4 × 0.2–0.5 cm, abaxially densely white or whitish yellow lanate, adaxially green and sparsely lanate. Phyllaries white or whitish red.

• Shandong (Laoshan, Taishan).

21d. Anaphalis sinica var. **lanata** Y. Ling, Acta Phytotax. Sin. 11: 103. 1966.

棉毛香青 mian mao xiang qing

Stems densely caespitose, ca. 20 cm; internodes 2–10 mm. Leaves and stems densely white thickish lanate. Phyllaries white or weakly red.

• Mountaintop grasslands; 1000–1100 m. W Henan (Song Shan).

This variety is similar to *Anaphalis sinica* var. *densata*.

22. Anaphalis spodiophylla Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 103, 112. 1966.

灰叶香青 hui ye xiang qing

Rhizome long. Stems erect, 20–45 cm, lower parts thickish and woody, branching at base or having slender branches at lower axils, with long flowering branches at upper parts, densely hairy, lower leaves dense and upper leaves sparse. Rosette leaves obovate, ca. 1.5 × 1 cm, base cuneate and becoming short stalk; lower leaves caducous and lost by anthesis; middle leaves obovate, oblanceolate-spatulate, or oblong, 3–7 × 0.8–2 cm, base attenuate and forming a petiole, or almost equal width and base cuneate, semiamplexicaul, decurrent on stem and becoming a short wing, margin smooth, apex obtuse or rounded, rarely acute; upper leaves bractlike, lanceolate-linear or linear, apiculate; all leaves slightly thickish, ash-gray arachnoid lanate, mixed with capitate shortly stalked glandular hairs, midvein raised on both surfaces, conspicuously 3-veined or with another pair of veinlets near margin. Capitula considerably numerous and dense, compound corymbiform, terminal on stems and branches; peduncle ca. 3 mm. Involucre narrowly campanulate, 4–5 × ca. 4 mm; phyllaries 5-seriate; outer phyllaries light brownish, ovate, ca. 2.5 mm, arachnoid tomentose; middle ones white or dirty white, oblong-lingulate, ca. 4 × 1–1.3 mm, apex rounded-obtuse; innermost ones narrowly oblong, ca. 3.5 mm, with a claw ca. 2/3 of full length. Receptacle with fimbrillate appendage. Center of predominantly female capitula with female florets and 1 or 2 male florets. Corolla 2.5–3 mm. Pappus slightly longer than corolla. Achene oblong, ca. 0.8 mm, papillate. Fl. and fr. Aug.

• Sunny roadsides; 3000–3100 m. E and S Xizang (Luliang, Nyingchi).

No specimens of this species were seen by the second author.

23. Anaphalis yangii Y. L. Chen & Y. L. Lin, Acta Phytotax. Sin. 41: 387. 2003.

竟生香青 jing sheng xiang qing

Herbs, perennial. Rhizome unknown. Stems erect or arcuate, ca. 25 cm or more, lower stems 4–5 mm in diam., densely gray lanuginous, simple or upper part 1- or 2-branched, 4–9 cm, with sparse leaves; internode 1.5–2 cm. Lower leaves usually withered in anthesis; middle leaves broadly elliptic or suborbicular, 5–6.5 × 3–4 cm, base sharply narrowed to winged petiole, dilated and amplexicaul, margin flat, apex acute or subrounded, rarely acuminate; upper leaves gradually diminutive, oblanceolate-spatulate or oblanceolate-oblong, 5–6 × 1.3–2 cm, base attenuate to broadly winged petiole, amplexicaul, apex acuminate with tip; all leaves thick, both surfaces densely yellowish gray lanate, intermixed with villiform glandular hairs, 3- or 5-veined, lateral veins 1 or 2 pairs, midvein prominent abaxially. Capitula few, compound corymbiform, 1.5–3 cm in diam.; peduncle 2–3 mm, densely tomentose. Involucre narrowly campanulate, 4–5 × 3–4 mm; phyllaries ca. 5-seriate; outer phyllaries beige, ovate, 1.5–2 mm, arachnoid; middle ones sordid white, elliptic-oblong, 2.5–3 × 1–1.2 mm, apex rounded, or rarely 3-denticulate; innermost ones narrowly oblong or linear, ca. 3.5 mm, with green vittate claw. Capitula with heteromorphic florets, outer with many female florets, center with 1 or 2 male florets; male floret corolla tubular, female floret corolla filiform; pappus white, slightly exserted to corolla, in male slightly thick, in female setaceous. Achene brown, oblong, 0.7–0.8 mm, mammillate. Fl. Sep.

• Canal sides, roadsides; ca. 3700 m. Xizang (Gongbo'gyamda).

No specimens of this species were seen by the second author.

24. Anaphalis transnokoensis Sasaki, Trans. Nat. Hist. Soc. Formosa 20: 166. 1930.

能高香青 neng gao xiang qing

Rhizome ascending. Stems solitary, not caespitose, erect, 10–18 cm, unbranched, densely lanate, with leaves at apex. Rosette leaves at base, caducous and lost by anthesis, smaller than middle leaves; leaves erect, light green abaxially, green adaxially, narrowly oblong, 3–4 cm × 9–12 mm, thin, both surfaces lanate and scabrid, base decurrent on stem and becoming a broad short wing, margin flat, apex acute; upper leaves smaller. Synflorescence dense, corymbiform. Involucre hemispheric when dry, ca. 5 × 9 mm; phyllaries 5-seriate, middle ones longest, longer than floret, apex obtuse, middle to apex white, somewhat brownish abaxially. Capitula with heteromorphic florets; female florets numerous and present in margin, corolla ca. 2.5 mm, pappus thinly scabrid hairy; male florets fewer, tubular, apex glandular, pappus dirty white, apex slightly thickish. Receptacle glabrous. Achene unknown. Fl. Aug–Oct.

• Taiwan.

No specimens of this species were seen by the present authors.

25. Anaphalis aureopunctata Lingelsheim & Borza, Repert. Spec. Nov. Regni Veg. 13: 392. 1914 [*"aureo-punctata"*].

黄腺香青 huang xian xiang qing

Rhizome slender or somewhat thickish; runner ca. 12 cm, or rarely to 20 cm. Stems erect or ascending, 20–50 cm, slender or thickish, simple, rarely with erect flowering branches after efflorescence, herbaceous or woody at base, white or pallid arachnoid tomentose, or lower parts somewhat glabrous. Lower leaves dense or upper leaves lax; rosette leaves broadly spatulate-elliptic, lower part attenuate and becoming a long stalk, usually densely lanate. Lower leaves caducous and lost by anthesis, spatulate or lanceolate-elliptic, with winged stalk, 5–16 × 1–6 cm; middle leaves slightly smaller, somewhat spreading, base attenuate, decurrent on stem and becoming a wide or narrow wing, margin flat, apex acute or rarely acuminate, with mucro or long cusp; upper leaves small, lanceolate-linear; all leaves white or pallid arachnoid hairy with tentacles, lanate, or glabrous abaxially, cauliferous lanate and easily deciduous arachnoid adaxially, 3- or 5-veined, lateral veins conspicuous and reaching margin or disappearing at margin, or 1-veined. Capitula numerous, dense, compound corymbiform; peduncle slender. Involucre campanulate or narrowly campanulate, 5–6 × ca. 5 mm; phyllaries ca. 5-seriate; outer phyllaries light or dark brownish, ovate, ca. 2 mm, lanate; middle ones white or yellow-white, ca. 5 mm, apex broadly rounded in male florets, ca. 2.5 mm wide, apex obtuse or acute in female florets, ca. 1.5 mm wide; innermost ones slightly narrow and short, spatulate or oblong, with a claw ca. 2/3 of full length. Receptacle with fimbrillate appendage. Center of predominantly female capitula with female florets and 3 or 4 male florets; predominantly male capitula with male florets only or 3 or 4 female florets present in outer layer. Corolla 3–3.5 mm. Pappus slightly longer than corolla, incrassate at tip of apex in male florets, serrulate. Achene ca. 1 mm, villosulous. Fl. Jul–Sep, fr. Sep–Oct.

• Forests, forest margins, hills, grasslands, bamboo or grassy slopes, rocky places, valleys, wetlands; 1000–4200 m. S Gansu, N Guangdong, N Guangxi, Guizhou, W Henan, W Hubei, SW and W Hunan, NW Jiangxi, E Qinghai, S Shaanxi, S Shanxi, Sichuan, Yunnan.

No specimens of this species were seen by the second author.

This species is similar to *Anaphalis sinica* but differs in having stems herbaceous, only sometimes slightly woody at base, leaves dense on lower stems, internode longer on upper stems; involucre large, especially in male plants, phyllaries large and broadly rounded; and leaves with long lateral veins.

1a. Phyllaries yellowish white, base black-brown or purple-brown ..... 25d. var. *atrata*
1b. Phyllaries white or yellowish white, base beige after desiccation.
  2a. Leaves abaxially densely lanate, 3-veined to apex ..... 25c. var. *tomentosa*
  2b. Leaves abaxially arachnoid hairy or glabrous, 1-, 3-, or 5-veined.
    3a. Leaves narrow, 3-veined or sometimes 1-veined ..... 25a. var. *aureopunctata*
    3b. Leaves broad, 5-veined to apex, upper leaves 3-veined ..... 25b. var. *plantaginifolia*

25a. Anaphalis aureopunctata var. **aureopunctata**

黄腺香青(原变种) huang xian xiang qing (yuan bian zhong)

Anaphalis aureopunctata f. *calvescens* (Pampanini) Y. L. Chen; *A. pterocaulon* (Franchet & Savatier) Maximowicz var. *calvescens* Pampanini; *A. pterocaulon* var. *intermedia* Pampanini; *A. sinica* Hance var. *calvescens* (Pampanini) S. Y. Hu; *A. sinica* subsp. *intermedia* (Pampanini) Kitamura.

Stems slender or thickish, arachnoid lanate or somewhat glabrous on lower parts. Leaf shape variable, or lower leaves elliptic-spatulate or broadly elliptic, with winged petiole; middle leaves oblong-lanceolate or oblanceolate, 5–12 × 1–2.5 cm; all leaves 3-veined, lateral veins not reaching apex, or sometimes linear and 1-veined, abaxially arachnoid or thinly lanate or glabrous.

• Forests, forest margins, grasslands, valleys, rocky places; 1200–3600 m. S Gansu (Chengxian, Yuzhong), N Guangdong (Lechang, Renhua), N Guangxi (Rongshui), Guizhou (Panxian), W Henan (Lushi), W Hubei, S Hunan (Yizhang), E Qinghai (Datong, Menyuan), S Shaanxi (Huxian, Lüeyang), S Shanxi (Yuanqu), Sichuan, E to W Yunnan.

25b. Anaphalis aureopunctata var. **plantaginifolia** F. H. Chen, Acta Phytotax. Sin. 11: 105. 1966.

车前叶黄腺香青 che qian ye huang xian xiang qing

Stems thickish, with arachnoid adnate hairs. Lower or middle leaves broadly elliptic, base attenuate to long petiole, 6–16 cm × 2–6 mm, both surfaces at first with arachnoid or stalked glandular hairs, later glabrous except along veins abaxially, 5-veined, and lateral veins reaching apex; upper leaves small, elliptic to linear-lanceolate, (1 or)3-veined.

• Hills, wetlands; 1000–2700 m. W Hubei (Sangzhi), W Hunan (Baojing), NW Jiangxi (Huanglong Shan), S Sichuan (Emei).

25c. Anaphalis aureopunctata var. **tomentosa** Handel-Mazzetti, Acta Horti Gothob. 12: 242. 1938.

绒毛黄腺香青 rong mao huang xian xiang qing

Anaphalis sinica var. *tomentosa* (Handel-Mazzetti) Kitamura.

Stems thickish, arachnoid hairy. Lower and middle leaves broadly elliptic, spatulate to lanceolate-elliptic, 5–9 × 2–4 cm, abaxially densely white or gray lanate and with rust-colored hairs along veins, adaxially with arachnoid and capitate-stalked glandular hairs, 3-veined up to apex, base sharply narrowed to broad wing. Phyllaries base beige.

• Forests, bamboo slopes; 2100–3800 m. Guizhou (Fanjing Shan), W Henan (Lushi), W Hubei, S Shaanxi (Taibai Shan), Sichuan, Yunnan.

25d. Anaphalis aureopunctata var. **atrata** (Handel-Mazzetti) Handel-Mazzetti, Acta Horti Gothob. 12: 242. 1938.

黑鳞黄腺香青 hei lin huang xian xiang qing

Anaphalis pterocaulon var. *atrata* Handel-Mazzetti, Symb. Sin. 7: 1103. 1936; *A. conferta* C. C. Chang; *A. sinica* var. *atrata* (Handel-Mazzetti) Kitamura.

Stems thickish or slender. Leaves stenophyllous, spatulate or oblanceolate-elliptic, abaxially densely white or gray lanate, adaxially with arachnoid and glandular hairs, 3-veined, base gradually narrow, apex acute. Phyllaries yellowish white, dried base puce or purple-brown.

• Alpine forests, grassy and rocky slopes; 3000–4200 m. SW and W Sichuan (Kangding, Muli), NW Yunnan.

This taxon is an alpine type, easily distinguishable from the above varieties.

26. Anaphalis flaccida Y. Ling, Acta Phytotax. Sin. 11: 105. 1966.

萎软香青 wei ruan xiang qing

Rhizome slender, slightly woody; stolons slender, with smaller leaves or terminal rosette leaves. Stems caespitose, erect from geniculate base, 20–30 cm, slender, usually curved, simple or with few synflorescence branches, herbaceous, pallid arachnoid villous, lower leaves dense and upper leaves lax. Lower leaves caducous and lost by anthesis, narrowly spatulate, base acuminate and becoming a long stalk, ca. 5 × 0.8 cm; middle and upper leaves erect or spreading, linear-spatulate or linear, 2.5–5 × 0.2–0.5 cm, base attenuate or equilateral, decurrent on stem and becoming a narrow wing, margin flat, apex obtuse or rounded, with small cusp; all leaves pallid arachnoid lanate on both surfaces, inconspicuously 3-veined. Capitula numerous, compound corymbiform, terminal on stems and branches; peduncle 1–3 mm. Involucre campanulate, 4–5 × 4–5 mm; phyllaries 4- or 5-seriate; outer phyllaries light fulvous, elliptic, ca. 2 mm, lanate, apex obtuse; middle ones oblong or elliptic, 4–5 × 1–1.5 mm, upper parts white, apex obtuse or acute, sometimes lacerate, lower parts membranous, subhyaline; innermost ones narrowly oblong, ca. 4 mm, with a claw ca. 2/3 of full length. Receptacle with fimbrillate short hairs. Center of predominantly female capitula with female florets and 1–6 male florets. Corolla 2.5–3 mm. Pappus slightly longer than corolla. Achene subterete, ca. 0.7 mm, villosulous and with small glandular spot. Fl. and fr. Jun–Aug.

• Peaks, hillside grasslands, shrub forests; 1800–2400 m. W Guizhou (Weining), Sichuan, NE Yunnan.

No specimens of this species were seen by the second author.

27. Anaphalis corymbifera C. C. Chang, Sinensia 6: 545. 1935.

伞房香青 san fang xiang qing

Rhizome slender, repent, stolons slender, with lanceolate membranous scales and terminal rosette leaves. Stems erect or ascending, 7–16 cm, considerably slender, simple or with synflorescence branches, white arachnoid piliferous, with slender sulcus, lower leaves dense and upper leaves lax. Basal leaves caducous and lost by anthesis, almost homomorphic with rosette leaves, obovate or spatulate, 0.5–1(–2) × 0.4(–0.8) cm, base cuneate, apex rounded and obtuse; middle leaves oblanceolate-oblong or elliptic, 2–4 × 0.3–0.8 cm, base attenuate and decurrent along stem and becoming a short wing, margin smooth, apex acute or obtuse, mucronulate; upper leaves stenophyllous, linear-lanceolate, with long cusp; all leaves densely

pallid arachnoid lanate abaxially, green and arachnoid piliferous adaxially, usually later glabrous, midvein exserted abaxially, conspicuously 3-veined. Capitula numerous, 2–5 congested and terminal on branches, compound corymbiform; peduncle 1–4 mm. Involucre campanulate, 4–5 × 4–5 mm; phyllaries 5- or 6-seriate; outer phyllaries deep brownish, broadly ovate, 1.5–2 mm, base arachnoid piliferous, apex obtuse; middle ones oblong-lanceolate, 4.5–5 × 1.5–2.2 mm, base light brownish, upper parts white, apex obtuse; innermost ones linear, 3.5–4 mm, with a claw ca. 2/3 of full length. Receptacle with fimbrillate appendage. Center of predominantly female capitula with female florets and 1 or 2 male florets; predominantly male capitula with 12 or 13 male florets. Corolla 3–3.5 mm, rarely ca. 2 mm. Pappus slightly longer than corolla, incrassate at tip of apex in male florets. Ovary somewhat ovoid, ca. 0.5 mm, almost glabrous. Fl. Jun–Jul.

Alpine grasslands and deserts; 3000–3200 m. NW Yunnan (Nujiang) [N Myanmar].

No specimens of this species were seen by the second author.

28. Anaphalis pachylaena F. H. Chen & Y. Ling, Acta Phytotax. Sin. 11: 106. 1966.

厚衣香青 hou yi xiang qing

Herbs, perennial, throughout densely silvery gray tangled to cottony lanate. Rhizome thickish, woody; branches short, with dense withered leaves, rosette leaves terminal. Stems erect from curved base, 20–50 cm, somewhat thickish, herbaceous, piliferous, lower leaves dense and upper leaves lax. Rosette leaves spatulate or obovate-oblong, 3–7 × 0.6–1.4 cm, at first yellowish white or gray lanate, later gradually tangled to cottony-papery hairy, base attenuate and becoming a long stalk, apex obtuse or rounded. Lower leaves almost homomorphic with rosette leaves, caducous and lost by anthesis; middle leaves somewhat erect, spatulate or linear-oblong, 3–7 × 0.3–0.8 cm, base somewhat narrow, decurrent on stem and becoming a narrow wing, margin flat, apex acute; upper leaves linear, with long cusp; all leaves 1- or 3-veined, midvein exserted abaxially. Capitula considerably numerous, terminal on stems and branches, compound corymbiform; peduncle ca. 4 mm. Involucre campanulate, 4–5 × 3–4 mm; phyllaries 5-seriate; outer phyllaries oval, ca. 3 mm, base fulvous or deep brownish, lanate; middle ones white (lutescent when dry), oblong, ca. 4.5 × 1.5 mm, apex rounded; innermost ones linear-oblong, ca. 3 mm, with a claw ca. 2/3 of full length. Receptacle alveolate, with cusp. Center of predominantly female capitula with female florets and 1 or few male florets; predominantly male capitula with male florets only. Corolla 2–3 mm. Pappus ca. 3 mm, somewhat incrassate at tip of apex in male florets, serrulate. Achene ca. 0.9 mm, papillate. Fl. Jul–Sep, fr. Sep–Oct.

• Alpine or subalpine grassy slopes; 3200–3800 m. SW Sichuan (Muli).

No specimens of this species were seen by the second author.

29. Anaphalis tibetica Kitamura, Acta Phytotax. Geobot. 15: 38. 1953.

西藏香青 xi zang xiang qing

Rhizome thickish, shrublike, branching; sobols numerous, with withered leaves at upper parts, rosette leaves terminal, with densely caespitose flowering stems. Stems erect, 15–35 cm, slender, simple, woody at base, usually persistent, arachnoid laxly lanate and with capitate cauliferous tentacles, somewhat glabrous at lower parts, densely leafy. Lower leaves shorter and caducous and lost by anthesis; middle leaves somewhat spreading, linear, 2–3.5 × 0.3–0.5 cm, base decurrent and becoming a narrow and long wing, margin sinuous and recurved, apex slightly obtuse; upper leaves small, acuminate; all leaves densely white lanate abaxially, green adaxially, with capitate cauliferous tentacles, 1-veined, somewhat raised abaxially. Capitula 10 or numerous, terminal on stems and branches, compound corymbiform; peduncle absent; common peduncle of synflorescence white lanate. Involucre narrowly campanulate, 4–6 × 3–4 mm; phyllaries 4- or 5-seriate; outer phyllaries light or deep brownish, broadly ovate, ca. 2.5 mm, irregularly toothed-scissile, lanate; middle ones light lutescent, elliptic, 4.2–5 × ca. 2 mm, apex rounded and obtuse; innermost ones spatulate-linear, somewhat short, with a claw ca. 2/3 of full length. Involucre of female florets usually small. Receptacle with fimbrillate short hairs. Center of predominantly female capitula with female florets and 1–4 male florets; predominantly male capitula with male florets only. Corolla 3.5–4 mm. Pappus slightly equal to corolla, incrassate at tip of apex in male florets, dentate. Achene oblong, ca. 0.8 mm, villosulous. Fl. Jul–Aug, fr. Aug–Sep.

• Sunny alpine and subalpine conifer forests, shrub forests or hillsides. S Xizang.

No specimens of this species were seen by the second author.

30. Anaphalis surculosa (Handel-Mazzetti) Handel-Mazzetti, Acta Horti Gothob. 12: 243. 1938.

萌条香青 meng tiao xiang qing

Anaphalis pterocaulon (Franchet & Savatier) Maximowicz var. *surculosa* Handel-Mazzetti, Symb. Sin. 7: 1103. 1936.

Rhizome thickish, woody. Stems 50–100 cm, lower parts repent or ascending, woody, persistent, stems with ascending branches, thickish, channeled and angulate, herbaceous, arachnoid hairy, and with capitate-stalked glandular hairs, lower parts usually glabrous, usually with tomentose axillary or short branches, densely leafy. Lower leaves caducous and lost by anthesis; middle leaves spreading, linear, linear-lanceolate, or oblong, 3–8 × 0.5–1(–1.5) cm, base attenuate, decurrent on stem and becoming a 1.5–3 mm wide or cuneate wing, margin flat or undulate, apex acute, with long cusp; upper leaves small; uppermost leaves linear or subulate, acuminate, bractlike; all leaves thin, with capitate-stalked glandular hairs or arachnoid hairy on both surfaces, or only abaxially or glandular abaxially, 3-veined. Capitula considerably numerous, dense, compound corymbiform; peduncle short or ca. 3 mm. Involucre subcampanulate, 4–5 × 3–4 mm; phyllaries 6-seriate; outer phyllaries light brownish, ovate, ca. 2 mm; middle ones white, elliptic or spatulate-elliptic, ca. 4 mm, less than 1.5 mm in female florets, apex rounded; innermost ones white, subspatulate, ca. 4 mm, with a claw ca. 2/3 of full length. Receptacle chaffy hairy. Center of predominantly female capitula with female florets

and 1 or 2 male florets; predominantly male capitula with male florets only. Pappus slightly longer than corolla, incrassate at tip of apex in male florets, dentate. Achene oblong, ca. 1 mm, hairy and glandular. Fl. Jul–Oct, fr. Sep–Oct.

• Low hill or subalpine grasslands and shrub forests; 100–2700 m. NW and W Sichuan, NW Yunnan (Dêqên).

31. Anaphalis larium Handel-Mazzetti, Symb. Sin. 7: 1104. 1936.

德钦香青 de qin xiang qing

Rhizome slender, woody; sobols short, with membranous oval squamiform leaves, rosette leaves terminal. Stems caespitose, erect, 1–30 cm, slender, channeled, herbaceous, white arachnoid lanate, lower parts glabrous, simple, densely leafy. Lower leaves caducous and lost by anthesis; middle and upper leaves broad and large, spreading, oblanceolate-elliptic to oblanceolate, 2.5–4 × 0.7–1.2 cm, base attenuate or cuneate, decurrent on stem and becoming a short cuneate wing, margin flat, apex acute, with small cusp; apical leaves smaller; all leaves thickish, densely light yellow lanate, 3-veined and veins gradually disappearing toward apex, midvein slender, slightly exserted abaxially. Capitula 10 or numerous, dense, compound corymbiform; peduncle ca. 2 mm, light lutescent lanate. Involucre broadly campanulate, 5–8 × 5–6 mm; phyllaries 3- or 4-seriate, erect; outer phyllaries dark brownish, obovate, ca. 2.5 mm, lanate; middle ones spatulate-oblong, ca. 4 × 2 mm, apex obtuse, slightly yellowish white; innermost ones spatulate-linear, ca. 3.5 mm, with a claw ca. 2/3 of full length. Predominantly male capitula with male florets only. Corolla ca. 3 mm. Pappus dirty white, incrassate at tip of apex, serrulate. Fl. Aug–Sep.

• Alpine or subalpine dry slopes; 3000–4300 m. NW Yunnan (Dêqên).

No specimens of this species were seen by the second author.

32. Anaphalis oxyphylla Y. Ling & C. Shih, Acta Phytotax. Sin. 11: 107. 1966.

锐叶香青 rui ye xiang qing

Rhizome arranged horizontally; runners short, with brownish lanceolate squamiform leaves and dense slender roots. Stems caespitose, erect, 16–30 cm, slender, usually slightly twisted, simple or with short sterile branches, arachnoid lanate or usually glabrate on lower parts; upper parts densely leafy. Lower leaves caducous and lost by anthesis, oblong-lanceolate, 1–1.5 cm, abaxially sparsely lanate; middle and upper leaves becoming large, spreading, elliptic or oblong-lanceolate, 2.5–5 × 0.5–1 cm, base attenuate, almost not decurrent, margin flat, apex acuminate, with brownish long cusp 1–1.5 mm, apical and middle leaves somewhat equal in length; all leaves gray-brownish and fulvous lanate abaxially, brownish lanate and usually glabrescent adaxially, 3-veined, midvein slender, usually glabrous abaxially. Capitula 3–9, terminal or axillary, dense, corymbiform, 1.5–2 cm in diam., or laxly compound corymbiform with long peduncle. Involucre broadly campanulate, ca. 5 × 5–6 mm; phyllaries 5- or 6-seriate; outer phyllaries light brownish, oval, thick, scarious, apex obtuse, white; middle ones white in upper parts, ovate-lanceolate, ca. 4 × 2.5 mm, apex obtuse, with longitudinal corrugation; innermost ones narrowly lanceolate, with a claw ca. 1/2 of full length. Receptacle with fimbrillate short hairs. Predominantly male capitula with male florets only or 1–3 female florets present in outer layer. Corolla ca. 3.5 mm in male florets and ca. 3.8 mm in female florets. Pappus almost as long as corolla, slightly incrassate at tip of apex in male florets, dentate. Ovary 0.8–1.2 mm, with small glandular spots. Fl. Sep–Oct.

• Rocky hillsides. NW Yunnan (Gongshan).

No specimens of this species were seen by the second author.

33. Anaphalis porphyrolepis Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 107. 1966.

紫苞香青 zi bao xiang qing

Rhizome repent or ascending, brown squamate; withered leaves growing in upper part, with slender root. Stems few (3 or 4), caespitose, erect, 23–30 cm, slightly slender, simple, white pallid tomentose, densely leafy in upper parts. Lower leaves squamate, oblong, withered in efflorescence; leaves gradually larger from middle part to apex of stem, slightly expanding, oblong-lanceolate, 2.5–5 cm × 3–6 mm, base attenuate, almost not decurrent, margin flat, apex acute with short cusp; uppermost leaves as large as or smaller than middle leaves, densely arranged in synflorescence, radiate; all leaves yellowish white, both surfaces tomentose, 3-veined; midvein slightly convex on both surfaces. Capitula 3–5, densely arranged at top of stems, compound corymbiform, without peduncle. Involucre campanulate, 5–6 × ca. 5 mm; phyllaries 4- or 5-seriate, mauve or margin white; outer phyllaries ovate-elliptic, ca. 5 × 2 mm, apex obtuse or lacerate; middle ones oblong, ca. 5.5 mm, keeled, clawed; innermost ones linear-oblong, ca. 4 mm, with a ca. 3/4 of full length claw, apex lacerate. Receptacle with fimbrillate short hairs. Capitula with numerous marginal female florets, center of predominantly female capitula with 3–6 male florets. Corolla tube ca. 3.2 mm, upper parts mauve. Pappus slightly exceeding corolla. Ovary ca. 0.5 mm, glabrous. Achenes not seen. Fl. Aug.

• Alpine meadows; ca. 4000 m. E Xizang.

No specimens of this species were seen by the second author.

34. Anaphalis yunnanensis (Franchet) Diels, Notes Roy. Bot. Gard. Edinburgh 7: 337. 1912.

云南香青 yun nan xiang qing

Gnaphalium yunnanense Franchet, J. Bot. (Morot) 10: 410. 1896.

Subshrubs, multibranched. Rhizome thickish, contorted; sobol or sterile branches erect or ascending, with withered marcescent leaves and axillary or acrogenous floriferous stems. Floriferous stems erect, 10–20 cm, white pallid arachnoid tomentose, rather densely leafy. Basal leaves or sobol acrogenous leaves rather short, spatulate or spatulate-oblong, 0.5–1.5 cm × 3–5 mm, rounded at apex; middle and upper leaves oblong-spatulate, 2–4 cm × 2–5 mm, base attenuate, decurrent on stem to a narrow wing, margin flat, apex obtuse or acute, with indis-

tinct short cusp; uppermost leaves somewhat erect, acuminate, with short cusp; all leaves pallid yellowish white tomentose on both surfaces, 1-veined or distinctly 3-veined. Capitula numerous, densely compound corymbiform; peduncle rather short. Involucre broadly campanulate, 6–7 × 4–6 mm; phyllaries ca. 5-seriate; outer phyllaries brown or dark brown, oval-lanceolate, ca. 3 mm, arachnoid; middle ones elliptic-lanceolate, ca. 5 × 1.5 mm, apex obtuse or slightly rounded, white or yellowish white; innermost ones linear-oblong, ca. 4 mm, with a ca. 2/3 of full length claw. Receptacle with fimbrillate short hairs. Capitula with numerous marginal female florets, center of predominantly female capitula with 1 or 2 male florets. Corolla tube 2.5–3 mm. Pappus slightly exceeding corolla, incrassate at tip of apex in male florets. Achenes oblong, ca. 1.5 mm, densely papillose. Fl. Jun–Sep, fr. Aug–Sep.

SW Sichuan, NW Yunnan [Nepal].

35. Anaphalis muliensis (Handel-Mazzetti) Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 631. 1937.

木里香青 mu li xiang qing

Anaphalis yunnanensis (Franchet) Diels var. *muliensis* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 61: 203. 1924.

Subshrubs, multibranched, 10–20 cm tall. Rhizome thickish; sobol or sterile branches erect or ascending, white arachnoid tomentose, later glabrous, with dense leaves, and with tomentose acrogenous buds; cauline leaves oblong or linear-lanceolate, 1–2 cm × 1–3 mm, slightly decurrent, somewhat revolute on margin, withered, marcescent. Floriferous branches growing at tip of sterile branch, 4–10 cm, slender, white tomentose, densely leafy in lower parts. Basal leaves obovate-oblong, rosulate; middle leaves obovate or linear-oblong, 1.5–3.5 cm × 2–4 mm, base attenuate, decurrent on stem into a narrow wing, margin flat or slightly revolute, apex obtuse or rounded, with indistinct cusp; upper leaves erect or expanding, with withered long cusp; all leaves white tomentose abaxially, arachnoid adaxially or sometimes glabrous, midvein slightly convex abaxially. Capitula 5–25, densely compound corymbiform; peduncle rather short. Involucre broadly campanulate, 6–7 × 5–7 mm; phyllaries 4- or 5-seriate; outer phyllaries rufous, ovate, 3–4 mm, apex rounded; middle ones spatulate or elliptic, ca. 7 × 2.5 mm, apex obtuse or slightly rounded; innermost ones spatulate, slightly short, with a ca. 2/3 of full length claw. Receptacle with membranous appendages. Capitula with numerous marginal female florets, center of predominantly female capitula with 1 or 2 male florets. Corolla tube 3–3.5 mm. Pappus slightly exceeding corolla, incrassate at tip of apex in male florets. Achenes oblong, ca. 1.5 mm, glabrous. Fl. Jun–Sep, fr. Sep–Oct.

Alpine taiga, rocky places, grasslands; 3400–4000 m. SW Sichuan (Jiulong, Muli), NW Yunnan (Zhongdian) [Nepal].

36. Anaphalis suffruticosa Handel-Mazzetti, Notizbl. Bot. Gart. Berlin-Dahlem 13: 631. 1937.

亚灌木香青 ya guan mu xiang qing

Subshrubs, small, multibranched, 40–60 cm tall. Rhizome thickish; sobol or sterile stem erect or ascending, cinereous arachnoid tomentose, often denuded, with fertile axillary buds or short branches and sparse leaves. Leaves expanding or adherent to stem, spatulate-obovate or spatulate, 1–2(–3) cm × 5–10 mm, thick, both surfaces pallid or white tomentose, or adaxially pallid arachnoid tomentose, distinctly 3-veined, lateral veins slender, midvein slightly convex abaxially, base decurrent on stem into a narrow long wing, margin flat or slightly revolute, apex obtuse or rounded, with brown cusp; leaves on sterile stems long hairy. Capitula numerous, densely compound corymbiform; peduncle short. Involucre narrowly campanulate, 4–5 × 2–3 mm; phyllaries ca. 6-seriate, imbricate; outer phyllaries white or light red, narrowly ovate, ca. 2 mm; middle ones spatulate-elliptic, 3–3.5 mm, apex rounded; innermost ones linear-lanceolate, with a ca. 2/3 of full length claw. Receptacle with fimbrillate short hairs. Capitula with numerous marginal female florets, center of predominantly female capitula with 1 or 2 male florets. Corolla tube ca. 3 mm. Pappus slightly shorter than corolla, incrassate at tip of apex in male florets. Achenes glabrous. Fl. Aug.

• Low mountain or subalpine valleys, slope grasslands; 1800–3100 m. NW Yunnan (Lijiang, Zhongdian).

No specimens of this species were seen by the second author.

Male plants were not seen by the present authors. According to the protologue, this species has 1-veined leaves.

37. Anaphalis stenocephala Y. Ling & C. Shih, Acta Phytotax. Sin. 11: 108. 1966.

狭苞香青 xia bao xiang qing

Subshrubs, multibranched, ca. 60 cm tall. Rhizome thickish, with numerous sterile branches or floriferous branches, erect or ascending; sterile branches short, whitish cinereous tomentose, herbaceous. Floriferous branches or annual branches somewhat woody, often glabrous, with sulcus; internode 0.5–1 cm, rarely up to 1.5 cm; axillary buds growing into short densely foliate branches after efflorescence. Leaves expanding, elliptic or oblong-linear, 1.5–3 × 0.3–0.5 cm, abaxially thickly white or ochroleucous tomentose, adaxially arachnoid tomentose, indistinctly 1- or 3-veined, midvein slightly convex abaxially, base attenuate, decurrent on stem into a long and narrow wing, margin flat or slightly revolute, apex obtuse or slightly acute; upper leaves gradually smaller, apex obtuse or with brown cusp. Capitula without peduncle or with a short peduncle, 9 to numerous capitula densely forming corymbiform synflorescence, 1.5–4 cm in diam. Involucre cylindric, 4–5 × 2–3 mm; phyllaries ca. 5-seriate, imbricate; outer phyllaries usually brown, broadly ovate, ca. 2.5 mm, arachnoid tomentose; middle ones white, oblong-spatulate, 3.5–4 mm; innermost ones spatulate-linear, with a 2/3 or 3/4 of full length claw. Receptacle with fimbrillate appendage. Predominantly female capitula with numerous marginal female florets, center with 1–3 male florets; predominantly male capitula with male florets only. Corolla tube ca. 3 mm. Pappus white, slightly exceeding corolla, incrassate at tip of apex in male florets, serrulate. Achenes oblong, ca. 1 mm, papillose. Fl. and fr. Jul–Aug.

• Subalpine regions, *Pinus* forests. SE Xizang (Cawarong), NW Yunnan (Dêqên).

No specimens of this species were seen by the second author.

38. Anaphalis gracilis Handel-Mazzetti, Symb. Sin. 7: 1103. 1936.

纤枝香青 xian zhi xiang qing

Subshrubs. Rhizome thickish; sobols or sterile stems erect or ascending, densely withered, marcescent leafy and with distinct axillary buds and terminal buds. Flowering stems arising from axillary buds, 5–40 cm or more, often slender, upper parts herbaceous, simple, tomentose or cauliferous glandular pilose, sparsely leafy. Leaves expanding or somewhat erect, linear, linear-lanceolate, or oblanceolate, 1–3.5 × 0.1–0.7 cm, uniformly wide or base attenuate, decurrent on stem into a narrow or broad green wing, apex acute or acuminate, with short cusp; upper leaves acuminate, with long cusp, margin revolute; all leaves thickly arachnoid tomentose or cauliferous glandular pilose. Capitula 5–50, densely corymbiform or compound corymbiform; peduncle 1–2 mm. Involucre narrowly campanulate, 4–5 mm, rarely to 6 mm; phyllaries ca. 6-seriate, expanding; outer phyllaries brown, broadly ovate, ca. 1.5 mm, tomentose, slightly acute; middle ones lingulate-elliptic, 3–3.5 × ca. 1 mm, ca. 1.5 mm wide in male capitula, apex white, obtuse or rounded; innermost ones ca. 4 mm, with a ca. 3/4 of full length claw. Receptacle with fimbrillate appendage. Predominantly female capitula with numerous marginal female florets, center with 1–4 male florets; predominantly male capitula with male florets only. Corolla tube ca. 3 mm. Pappus slightly exceeding corolla, incrassate at tip of apex in male florets, serrulate. Achenes oblong, ca. 1 mm, densely papillose. Fl. Jul–Aug, fr. Aug–Sep.

• Alpine or subalpine shrublands, slopes, rocky places, valleys, and banks; 2000–4000 m. NW and W Sichuan, NW Yunnan.

This species is extremely variable.

1a. Leaves linear, linear-oblanceolate, or lanceolate, 3–7 mm wide, base decurrent along stems to broad wing, margin undulate-recurved, adaxially with arachnoid and capitate glandular hairs ..... 38c. var. *ulophylla*

1b. Leaves linear or linear-lanceolate, 1–3.5 mm wide, base decurrent along stems to narrow wing, margin recurved, adaxially arachnoid or lanate or with capitate-stalked glandular hairs.

2a. Leaves adaxially arachnoid or sparsely lanate ..... 38a. var. *gracilis*

2b. Leaves adaxially with capitate-stalked glandular hairs ..... 38b. var. *aspera*

38a. Anaphalis gracilis var. **gracilis**

纤枝香青(原变种) xian zhi xiang qing (yuan bian zhong)

Stems 5–30 cm, white arachnoid lanate, upper parts white lanate. Leaves linear or linear-lanceolate, 1–2.5 cm × 1–3 mm, abaxially densely gray arachnoid lanate, adaxially arachnoid or sparsely lanate, margin recurved.

• Alpine dry slopes and rocky places; 3200–4000 m. NW and W Sichuan.

38b. Anaphalis gracilis var. **aspera** Handel-Mazzetti, Acta Horti Gothob. 12: 244. 1938.

糙叶纤枝香青 cao ye xian zhi xiang qing

Stems ca. 40 cm, with capitate glandular hairs, upper parts also arachnoid hairy. Leaves usually linear or linear-lanceolate, 1.5–2.5(–4) cm × 1.5–3.5 mm, abaxially white arachnoid hairy, adaxially green with capitate-stalked glandular hairs.

• Alpine or subalpine shrublands and slopes; 2600–3500 m. NW and W Sichuan (Barkam, Ganzi, Lixian).

38c. Anaphalis gracilis var. **ulophylla** Handel-Mazzetti, Acta Horti Gothob. 12: 244. 1938.

皱缘纤枝香青 zhou yuan xian zhi xiang qing

Sobol long, runnerlike. Stems tall, with thickish branches, arachnoid and capitate glandular hairy. Leaves linear, linear-oblanceolate, or lanceolate, 1.5–2.5 cm × 3–7 mm, abaxially white lanate, adaxially arachnoid and capitate glandular hairy, base attenuate and decurrent on stems to broad wing, margin undulate-recurved, apex acute or acuminate.

• Subalpine grassy slopes, valleys, and banks; 2000–3000 m. W Sichuan, NW Yunnan (Dêqên).

39. Anaphalis lactea Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 479. 1882.

乳白香青 ru bai xiang qing

Shrubs, much branched, erect or ascending, upper part with dense withered leaves, with terminal rosette of leaves and stems. Rhizome thickish. Stems erect, 10–40 cm, slightly thickish, simple, herbaceous, white or pallid tomentose, upper parts densely leafy. Rosette leaves lanceolate or spatulate-oblong, 6–13 × 0.5–2 cm, base attenuate into a winged, sheathlike petiole; lower leaves smaller than rosette leaves, margin flat, apex acute or acuminate, with or without short cusp; middle and upper leaves somewhat erect and adherent to stem, oblong, linear-lanceolate, or linear, 2–10 × 0.8–1.3 mm, base slightly narrow, decurrent on stem into a narrow wing, apex acuminate, with withered long cusp; all leaves white or pallid tomentose on both surfaces, 1- or 3-veined. Capitula numerous, densely compound corymbiform, at apex of stems or branches; peduncle 2–4 mm. Involucre campanulate, (5–)6(–7) × 5–7 mm; phyllaries 4- or 5-seriate; outer phyllaries light or dark brown, ovate, ca. 3 mm, tomentose; middle ones milky white, ovate-oblong, ca. 6 × 2–2.5 mm, apex rounded; innermost ones narrowly oblong, ca. 5 mm, with a ca. 2/3 of full length claw. Receptacle with fimbrillate short hairs. Predominantly female capitula with numerous marginal female florets, center with 2 or 3 male florets; predominantly male capitula with male florets only. Corolla tube 3–4 mm. Pappus slightly exceeding corolla, incrassate at tip of apex in male florets, serrulate. Achenes terete, ca. 1 mm, almost glabrous. Fl. and fr. Jun–Sep.

• Subalpine or low mountain grasslands or taiga; 2000–3400 m. S Gansu, E Qinghai (Datong, Menyuan, Qilian), NW Sichuan (Songpan).

40. Anaphalis batangensis Y. L. Chen, Acta Phytotax. Sin. 28: 488. 1990.

巴塘香青 ba tang xiang qing

Rhizome repent, thickish, with slender sobols. Stems erect or ascending, 10–40 cm, densely gray or grayish white tomentose, upper parts densely leafy. Lower and middle leaves small, 4–4.5 × 0.3–0.5 cm, base attenuate, decurrent on stem into a narrow wing, margin flat, apex acute or acuminate; upper leaves somewhat erect or adnate to stem, acuminate at apex, with withered long cusp; all leaves white or ash-gray tomentose on both surfaces, 1- or 3-veined. Capitula 4–8, densely corymbiform or capitate, at apex of stems or branches; peduncle 2–4 mm. Involucre broadly campanulate, ca. 7 × 8 mm; phyllaries 4- or 5-seriate; outer phyllaries light or dark brown, ovate, ca. 3 mm, tomentose; middle ones milky white, ovate-oblong, ca. 6 × 2–2.5 mm, rounded at apex; innermost ones narrowly oblong, ca. 5 mm, with a ca. 2/3 of full length claw. Receptacle with fimbrillate short hairs. Predominantly female capitula with numerous marginal female florets, center with 2 or 3 male florets; predominantly male capitula with male florets only. Corolla tube 3–4 mm. Pappus slightly exceeding corolla, incrassate at tip of apex in male florets, serrulate. Fl. and fr. Jul–Aug.

• *Picea* forest margins; 4000–4200 m. Sichuan (Batang).

No specimens of this species were seen by the second author.

41. Anaphalis souliei Diels, Repert. Spec. Nov. Regni Veg. Beih. 12: 505. 1922.

蜀西香青 shu xi xiang qing

Rhizome thickish, erect or ascending, upper leaves dense, withered, with terminal rosette leaves and stems. Stems erect, 5–30 cm, slender, herbaceous, simple, arachnoid tomentose. Rosette leaves lanceolate or obovate-elliptic, 2–9 × 0.3–1.3 cm, sometimes up to 20 cm, base attenuate to a long or short, winged, sheathlike petiole, margin flat, apex rounded or acute, with short cusp; lower leaves homomorphic with rosette leaves, smaller, withered or persistent in efflorescence; middle and upper leaves somewhat expanding, or erect and adherent to stem, oblanceolate-oblong or linear, 20–40 × 3–5 mm, abruptly narrow at base, apex acuminate, with withered long cusp; all leaves tomentose on both surfaces, sometimes with capitate glandular hairs, lower parts convexly 3-veined. Capitula numerous, densely compound corymbiform. Involucre broadly campanulate, 5–7 × 5–6 mm; phyllaries 5- or 6-seriate; outer phyllaries light brown, ovate, ca. 3 mm, tomentose; middle ones white in upper parts, oblong or obovate-oblong, 4.5–5 × 1.5–2 mm, apex acute or rounded; innermost ones linear, ca. 3 mm, with a ca. 2/3 of full length claw; phyllaries of male capitula often long and narrow. Receptacle with fimbrillate appendage. Predominantly female capitula with numerous marginal female florets, center with 2–4 male florets; predominantly male capitula with male florets only. Corolla tube 2.3–3 mm. Pappus exceeding corolla, incrassate at tip of apex in male florets, serrulate. Achenes oblong, ca. 1 mm, papillose. Fl. Jun–Aug, fr. Jul–Sep.

• Alpine or subalpine ridges, grasslands, and forests; 3000–4200 m. W Sichuan.

42. Anaphalis rhododactyla W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 10: 169. 1918.

红指香青 hong zhi xiang qing

Rhizome thickish, with dense withered leaves, numerous erect branches or sterile stems congested to pulvinate. Sterile stems with dense squamate leaves and fertile axillary buds; cauline leaves obovate, 0.5–1.5 × 0.2–0.4 mm, cinereous tomentose, rounded at apex, sometimes with gland-dotted short cusp. Flowering stems on sterile stems, 5–30 cm, slender, cinereous to yellowish white tomentose, densely leafy; basal leaves obovate or spatulate-oblong, 1.5–4 × 0.3–0.5 mm, base attenuate to a long petiole; middle leaves erect or slightly expanding, spatulate or lanceolate-oblong, uniformly wide or slightly narrow at base, decurrent on stem into a short wing; upper leaves lanceolate or linear, apex acute, with long chaffy cusp; all leaves pallid arachnoid tomentose, 3-veined, midvein convex abaxially, tomentose. Capitula 5–10, densely corymbiform; peduncle 1–2 mm. Involucre broadly campanulate, 7–8 × 5–6 mm; phyllaries ca. 5-seriate, expanding; outer phyllaries upper parts mauve, lower parts brown, ovate or elliptic, 3–5 mm, tomentose; middle ones mauve or white, yellowish white when dry, oblong-lanceolate, ca. 7 × 1.5–2 mm, acute at apex; innermost ones linear-oblanceolate, ca. 5 mm, with a ca. 3/5 of full length claw. Receptacle with fimbrillate appendage. Predominantly female capitula with numerous marginal female florets, center of 1 or 2 male florets; predominantly male capitula with male florets only. Corolla tube ca. 4 mm. Pappus slightly exceeding corolla, incrassate at tip of apex in male florets, serrulate. Achenes oblong, ca. 1 mm, densely glandular. Fl. Jul–Aug, fr. Sep. $2n = 56$*.

• Alpine grasslands, open slopes, rock fissures; 3800–4200 m. SW Sichuan (Chawalong, Muli), E Xizang (Zayü, Zogang), N Yunnan (Gongshan, Weixi, Zhongdian).

43. Anaphalis szechuanensis Y. Ling & Y. L. Chen, Acta Phytotax. Sin. 11: 109. 1966.

四川香青 si chuan xiang qing

Rhizome thickish, contorted, with upper leaves dense, withered terminal rosette leaves, and flowering stems. Stems erect or ascending, ca. 20 cm, herbaceous, slender, white-canescent arachnoid tomentose, densely leafy. Lower leaves homomorphic with rosette leaves, spatulate, 0.5–3.5 × 0.3–0.7 cm, base abruptly narrowed into a purple, slender, short or rather long petiole, margin flat, apex rounded or obtuse; middle leaves erect or somewhat expanding, spatulate or spatulate-oblanceolate, 1–1.5 × 0.3–0.6 cm, base decurrent on stem into a indistinct short wing, apex obtuse or slightly acute; upper leaves gradually smaller, linear-lanceolate, with short cusp or withered long cusp; all leaves white-canescent tomentose on both surfaces, sometimes lower leaves glabrous to reveal capitate glandular hairs, indistinctly 1- or 3-veined. Capitula 8–15, densely corymbiform or compound corymbiform. Involucre narrowly campanulate, ca. 5 × 4–5 mm; phyllaries 5- or 6-seriate; outer phyllaries light brown, ovate, ca. 2.5 mm, abaxially tomentose; middle ones white, oblong-elliptic, ca. 4 × 1.5 mm, apex obtuse, but subrounded in male florets; innermost ones spatulate-oblong, ca. 3.5 mm, with a ca. 2/3 of full length claw. Receptacle with fimbrillate appendage. Predominantly female capitula with numerous marginal female florets, center with 5 male florets; predominantly male capitula with male florets only. Corolla tube 2.5–3.5 mm. Pappus exceeding corolla, incrassate at tip

of apex in male florets, serrulate. Achenes oblong, ca. 1 mm, densely papillose. Fl. Jul–Aug, fr. Sep.

• Alpine rocky grassy slopes and calcareous ground; 3500–4500 m. W Sichuan (Kangding, Lixian, Taining).

No specimens of this species were seen by the second author.

44. Anaphalis xylorhiza Schultz Bipontinus ex J. D. Hooker, Fl. Brit. India 3: 281. 1881.

木根香青 mu gen xiang qing

Rhizome thickish, with numerous branches; upper leaves squamate, withered terminal rosette leaves and flowering stems congested to pulvinate. Stems erect or ascending, 3–7(–17) cm, slender, herbaceous, simple, white-canescent arachnoid tomentose, densely leafy. Rosette leaves and lower leaves spatulate, oblong, or linear-spatulate, 0.5–3 × 0.3–0.7 cm, base attenuate to a broadly winged long petiole, margin flat, apex rounded; upper leaves gradually smaller, erect or adherent to stem, oblanceolate or linear-oblong, base decurrent on stem into a short narrow wing, apex obtuse with short cusp or acuminate with withered long cusp; all leaves sparsely canescent taupe tomentose on both surfaces, basal and upper parts except margin usually denuded or with capitate glandular hairs, distinctly 3-veined, midvein raised on both surfaces, lateral veins raised abaxially, or upper leaves 1-veined. Capitula 5–10, densely compound corymbiform; peduncle short. Involucre broadly campanulate or obconical, 5–6 × ca. 6 mm; phyllaries 5-seriate, expanding; outer phyllaries ovate, ca. 3 mm, tomentose; middle ones oblong-lanceolate, ca. 6 × 2 mm, lower parts puce or purple-brown, acute at apex, in female florets slightly obtuse; innermost ones linear-oblong, ca. 4 mm, with a claw ca. 3/4 of full length. Receptacle with chaffy hairs. Predominantly female capitula with numerous marginal female florets, center with 3 or 4 male florets; predominantly male capitula with male florets only. Corolla tube ca. 3.5 mm. Pappus exceeding corolla, incrassate at tip of apex in male florets, serrulate. Achenes obovoid-oblong, ca. 1.5 mm, tomentose. Fl. Jun–Sep, fr. Aug–Oct. $2n = 28$*.

Alpine grasslands and lichen-covered areas; 3800–4000 m. S Xizang [Bhutan, N India, Nepal].

45. Anaphalis chlamydophylla Diels, Notes Roy. Bot. Gard. Edinburgh 5: 188. 1912.

茧衣香青 jian yi xiang qing

Shrubs, multibranched; rhizome thickish; upper leaves dense, withered, rosette leaves and flowering stems congested to pulvinate. Stems erect or ascending, 3–25 cm (from protologue up to 40 cm), white-canescent glutinous cottony papery tomentose, all stems densely leafy. Basal leaves persistent in efflorescence, homomorphic with rosette leaves, obovate, oblong, or oblong-spatulate, 0.5–2.5 × 0.3–0.5 cm, canescent tomentose; middle leaves erect or adherent to stem, linear-lanceolate, 1.5–2.5 × 0.3–0.5 cm, base attenuate on stem into a narrow wing, margin flat, apex acute, often with membranous long cusp; upper leaves small, linear, same as middle leaves with grayish twined papery tomentose hairs. Capitula 7–20, densely compound corymbiform; peduncle ca. 2 mm. Involucre broadly campanulate, ca. 10 × 8–10 mm; phyllaries 4- or 5-seriate, somewhat expanding; outer phyllaries fulvous except apex, ovate, tomentose; middle ones ochroleucous, oblanceolate, ca. 9 × 2 mm, acute at apex; innermost ones short, narrow, ca. 5 mm, with a claw ca. 2/3 of full length. Receptacle with fimbrillate hairs. Predominantly female capitula with numerous marginal female florets, center with 2–4 male florets; predominantly male capitula with male florets only. Corolla tube ca. 3.5 mm. Pappus white, ca. 4 mm, incrassate at tip of apex in male florets, serrulate. Achenes oblong, ca. 1.2 mm, densely papillose. Fl. Jul–Aug, fr. Sep.

• Subalpine meadows, taiga, copses or calcareous ground; 2700–3700 m. NW Yunnan (Lijiang).

46. Anaphalis pannosa Handel-Mazzetti, Symb. Sin. 7: 1100. 1936.

污毛香青 wu mao xiang qing

Rhizome slightly thickish, much branched; upper leaves dense, withered, with terminal rosette leaves and flowering stems. Stems erect or ascending, up to 20 cm, slightly thickish, herbaceous, fulvous tomentose, with slightly dense or sparse leaves. Lower leaves persistent in efflorescence, homomorphic with rosette leaves, obovate or oblong-spatulate, 1.5–4 × 0.5–1 cm, base attenuate to a brown, glabrous, broad sheath, apex rounded or obtuse; middle and upper leaves erect, adherent to stems, spatulate-oblong or narrowly oblong, 2–4 × 0.3–0.7(–1) cm, base decurrent on stem into an indistinct short wing, margin flat, apex obtuse or rounded, with short black cusp; upper leaves acuminate, with withered long cusp; all leaves fulvous brown tomentose on both surfaces, indistinctly 3-veined. Capitula 7–10, densely glomerulate. Involucre broadly campanulate, ca. 10 × 10 mm; phyllaries ca. 5-seriate, expanding; outer phyllaries brown, oval-lanceolate, ca. 4 mm, brown tomentose; middle ones obovate or oblong-lanceolate, 9–10 × 2.5–3.5 mm, acute at apex, but obtuse in male capitula, upper parts yellowish white; innermost ones linear-lanceolate, ca. 5 mm, with a claw ca. 3/5 of full length. Receptacle with chaffy process. Predominantly female capitula with numerous marginal female florets, center with 3–6 male florets; predominantly male capitula with numerous male florets. Corolla tube ca. 5 mm. Pappus 6–7 mm, incrassate at tip of apex in male florets, serrulate. Achenes oblong, ca. 2 mm, densely papillose. Fl. Jul–Aug, fr. Sep.

• Alpine dry rocky slopes; 3800–4300 m. NE, NW, and W Yunnan.

47. Anaphalis cinerascens Y. Ling & W. Wang, Acta Phytotax. Sin. 11: 110. 1966.

灰毛香青 hui mao xiang qing

Rhizome usually thickish, woody, much branched, upper part with dense squamate withered leaves, rosulate and flowering stems congested to pulvinate. Stems erect or ascending, (2–)3–8 cm (or plants acaulescent), herbaceous, slender. Basal leaves homomorphic with rosette leaves, obovate or spatulate, obtuse, rounded, or acute at apex, usually with gland-dotted short cusp; lower leaves oblanceolate-oblong, base attenuate, decurrent on stem into short wing, margin smooth, apex acute or obtuse; upper leaves rather narrow, erect or adherent to stem,

or foliate on stem; all leaves thin, both surfaces argenteous tomentose, denuded at base, indistinctly 3-veined. Capitula 5–10, densely corymbiform, or solitary. Involucre broadly campanulate, 9–10 × 10(–15) mm; phyllaries ca. 5-seriate, expanding, white, rarely yellowish white, puce at base; outer phyllaries elliptic-lanceolate, ca. 5 mm, sparsely tomentose at base; middle ones oblong-lanceolate, ca. 9 × 2.5 mm, acute at apex; innermost ones broadly oblong or spatulate-linear, ca. 5 mm, with a claw ca. 1/2 of full length; phyllaries of male capitula slightly obtuse. Receptacle with fimbrillate hairs. Predominantly female capitula with numerous marginal female florets, center with 2–5 male florets; predominantly male capitula with male florets only. Corolla tube 3.5–4 mm. Pappus slightly exceeding corolla, incrassate at tip of apex in male florets, serrulate. Achenes oblong, ca. 1 mm, glabrous. Fl. Jul–Sep.

• Alpine slopes and rocks; 4300–4400 m. S Sichuan, NW Yunnan.

No specimens of this species were seen by the second author.

1a. Plants caulescent; capitula 5–10, densely corymbiform, with short peduncle ..... 47a. var. *cinerascens*
1b. Plants acaulescent; capitulum single, without peduncle ..... 47b. var. *congesta*

47a. Anaphalis cinerascens var. **cinerascens**

灰毛香青(原变种) hui mao xiang qing (yuan bian zhong)

Stems erect or ascending, 3–6 cm, with dense leaf rosettes 1.5–3 cm in diam.; internodes 0.5–1 cm. Rosette leaves obovate-oblong or spatulate, 5–15 × 3–5 mm; lower leaves oblanceolate-oblong, 1–1.5 cm × 2–3 mm, base sometimes glabrous, attenuate, decurrent into short wing along stems, margin flat, apex obtuse or acute; upper leaves narrow, erect or adnate to stems, acuminate. Capitula 5–10, congested to corymb; peduncle short, lanate. Involucre ca. 10 mm in diam.

• Alpine slopes and rocks; ca. 4000 m. SW Sichuan (Mianning), NW Yunnan (Zhongdian).

47b. Anaphalis cinerascens var. **congesta** Y. Ling & W. Wang, Acta Phytotax. Sin. 11: 111. 1966.

密聚灰毛香青 mi ju hui mao xiang qing

Plants acaulescent or stems only ca. 2 mm; rosette and basal leaves congested to globose, 8–12 mm in diam. Leaves more layered, densely imbricate, lower layers (subterranean leaves) flat, rounded, gradually withered, upper layers (rosette and basal leaves) obovate or broadly spatulate, ca. 5 mm, rarely ca. 7 mm, membranous, brown, upper parts gray lanate, base glabrous, apex obtuse or rounded. Capitulum usually solitary, without peduncle. Involucre 12–15 mm in diam. Achene obovoid-oblong, ca. 1 mm.

• Alpine sunny slopes, rocky peaks; 4300–4400 m. S Sichuan (Mianning).

48. Anaphalis viridis Cummins, Bull. Misc. Inform. Kew 1908: 19. 1908.

绿香青 lü xiang qing

Stems and leaves densely caespitose, pulvinate. Stems erect or ascending, 4–8 cm (or plants acaulescent), herbaceous, slender, canescent tomentose, densely leafy, or upper part sparse. Basal leaves persistent during efflorescence, homomorphic with rosette leaves, obovate, oblanceolate, or spatulate-elliptic, 0.3–2 × 0.3–0.7 cm, apex acute; middle and upper leaves (if present) erect or adherent to stem, lanceolate or oblanceolate-oblong, rather acerose, base decurrent on stem into a short cuneate wing, margin smooth, apex acute or acuminate, often with withered cusp; all leaves keeled on both surfaces, canescent yellow tomentose, base sometimes glabrous, 1-veined or indistinctly 3-veined. Capitula 2–15, glomerulate or simple, without distinct peduncle. Involucre broadly campanulate, 9–11 × 10–12 mm, slightly exceeding disk; phyllaries 4- or 5-seriate, somewhat expanding; outer phyllaries brown, elliptic, ca. 4 mm, tomentose; middle ones white, upper parts white or ochroleucous, oblong-lanceolate, 9–10 × 2–3 mm, acute at apex; innermost ones linear-oblanceolate, ca. 8 mm, with a claw ca. 2/3 of full length. Receptacle with chaffy process. Capitula with numerous marginal female florets, center of predominantly female capitula with 1–5 male florets. Corolla tube 4–5 mm. Pappus equaling corolla. Achenes obovoid-oblong, ca. 2 mm, densely papillose. Fl. Jul–Aug, fr. Aug–Sep.

• Mountaintops, on granite of alpine glacial valleys, rocky or grassy slopes; 3000–4800 m. W Sichuan, E Xizang, NW Yunnan.

No specimens of this species were seen by the second author.

1a. Stems 4–8 cm; capitula 5–15, congested into globose corymb at stem apex, 2–3 cm in diam. ..... 48a. var. *viridis*
1b. Plants acaulescent or stems up to 4 mm; capitula solitary or 2- or 3-fasciate on rosette leaves ..... 48b. var. *acaulis*

48a. Anaphalis viridis var. **viridis**

绿香青(原变种) lü xiang qing (yuan bian zhong)

Stems 4–8 cm tall; lower leaves dense; internodes 0.2–0.5 cm, while upper internodes to 1 cm. Leaves lanceolate or oblanceolate-oblong, 1.5–3.5 × 1.5–3.5 cm. Capitula 5–15, densely congested into globose corymb at stem apex, 2–3 cm in diam.

• Mountaintops, rocky or grassy slopes; 3000–4800 m. E Xizang (Cawarong, Qamdo), NW Yunnan (Lijiang).

48b. Anaphalis viridis var. **acaulis** Handel-Mazzetti, Acta Horti Gothob. 12: 240. 1938.

无茎绿香青 wu jing lü xiang qing

Plants acaulescent or stems up to 4 mm. Leaves spatulate-elliptic, 0.7–1.5 × 0.3–0.5 cm. Capitula solitary or 2- or 3-fasciate on rosette leaves.

• On granite of alpine glacial valleys; 3600–4800 m. W Sichuan (Dawu, Kangding, Muli).

49. Anaphalis flavescens Handel-Mazzetti, Symb. Sin. 7: 1100. 1936.

淡黄香青 dan huang xiang qing

Rhizome slightly slender; runners acerose, membranous squamate leafy, with terminal rosette leaves. Stems erect or ascending from geniculate base, 10–22 cm, slender, canescent arachnoid tomentose, rarely thickly white tomentose, lower leaves dense. Rosette leaves oblanceolate, 1.5–5 × 0.5–1 cm, lower part attenuate to a long petiole, apex acute or obtuse; basal leaves withered in efflorescence; lower and middle leaves oblong-lanceolate or lanceolate, 2.5–5 × 0.5–0.8 cm, erect or adherent to stem, base decurrent on stem into narrow wing, margin flat, apex acute, with withered long brown cusp; upper leaves small, narrowly lanceolate, 1–1.5 cm; all leaves canescent or yellowish white arachnoid tomentose or white tomentose, somewhat distinctly 3-veined. Capitula 6–16, densely corymbiform or compoundly so; peduncle 3–5 mm. Involucre broadly campanulate, 8–10 × ca. 10 mm; phyllaries 4- or 5-seriate, somewhat expanding; outer phyllaries fulvous, elliptic, ca. 6 mm, tomentose at base; middle ones white, lanceolate, ca. 10 × 3–4 mm, acute at apex; innermost ones linear, 6–8 mm, with a claw 1/3–1/2 of full length. Receptacle with fimbrillate hairs. Predominantly female capitula with numerous marginal female florets, center with 3–12 male florets; predominantly male capitula with 10–25 male florets. Corolla exceeding pappus; corolla tube 4.5–5.5 mm. Pappus incrassate at tip of apex in male florets, serrulate. Achenes oblong, 1.5–1.8 mm, densely papillose. Fl. Aug–Sep, fr. Sep–Oct.

• Gansu, Qinghai, Shaanxi, W Sichuan, E and S Xizang.

1a. Stems and leaves gray or yellowish white arachnoid tomentose; rosette and lower leaves oblanceolate-oblong or oblong, 2–5 × 0.5–1 cm ..... 49a. var. *flavescens*

1b. Stems and leaves densely white or gray lanate; rosette and lower leaves spatulate-oblong, 1.5–2.5 × 0.5–0.7 cm .... 49b. var. *lanata*

49a. Anaphalis flavescens var. **flavescens**

淡黄香青(原变种) dan huang xiang qing (yuan bian zhong)

Anaphalis flavescens f. *rosea* Y. Ling; *A. flavescens* f. *sulphurea* Y. Ling.

Stems and leaves gray or yellowish white arachnoid tomentose. Rosette and lower leaves oblanceolate-oblong or oblong, 2–5 × 0.5–1 cm.

• Alpine or subalpine slopes, grasslands, forests; 2800–4700 m. S and W Gansu, E Qinghai, S Shaanxi, W Sichuan, E Xizang.

This taxon is extremely variable. The phyllaries can be buff with a fulvous base, yellow with a black-brown base, or pale red with a puce base.

49b. Anaphalis flavescens var. **lanata** Y. Ling, Acta Phytotax. Sin. 11: 111. 1966.

棉毛淡黄香青 mian mao dan huang xiang qing

Stems and leaves densely white or gray lanate. Rosette and lower leaves spatulate-oblong, 1.5–2.5 × 0.5–0.7 cm. Involucre 8–10 mm; phyllaries buff.

• W Sichuan.

50. Anaphalis hancockii Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 479. 1882.

铃铃香青 ling ling xiang qing

Anaphalis bodinieri Franchet; *Gnaphalium bodinieri* (Franchet) Franchet.

Rhizome slender, somewhat woody, runners membranous squamate leafy, with terminal rosette leaves. Stems erect from geniculate base, 5–35 cm, slender, arachnoid tomentose and capitate cauliferous glandular pilose, upper part arachnoid tomentose, often sparsely leafy. Rosette and lower leaves spatulate or linear-oblong, 2–10 × 0.5–1.5 cm, base attenuate into a petiole, or sessile, apex rounded or acute; middle and upper leaves erect or adherent to stem, linear or linear-lanceolate, rarely linear-oblong, somewhat expanding, margin flat, membranous, apex with withered long cusp; all leaves thin, both surfaces with capitate glandular hairs, canescent arachnoid tomentose on margin, distinctly 3-veined or additionally with 2 indistinct lateral veins. Capitula 9–15, densely compound corymbiform; peduncle 1–3 mm. Involucre broadly campanulate, 8–9(–11) × 8–10 mm; phyllaries 4- or 5-seriate, somewhat expanding; outer phyllaries rufous or puce, oval, 5–6 mm; middle ones white, oblong-lanceolate, 8–10 × 3–4 mm, acute at apex; innermost ones linear, with a claw ca. 1/3 of full length. Receptacle with fimbrillate short hairs. Capitula with numerous female florets, center of predominantly female capitula with 1–6 male florets; predominantly male capitula with male florets only. Corolla tube 4–4.5 mm. Pappus exceeding corolla, incrassate at tip of apex in male florets, serrulate. Achenes oblong, ca. 1.5 mm, densely papillose. Fl. Jun–Aug, fr. Aug–Sep.

• Subalpine peaks and grassy slopes; 2000–3700 m. SW and W Gansu, N and W Hebei, E Qinghai (Datong, Haiyuan), S Shaanxi (Taibai Shan), N and W Shanxi, NW and W Sichuan (Gede, Xiaojin), E Xizang (Lulang).

This taxon is extremely variable.

51. Anaphalis nepalensis (Sprengel) Handel-Mazzetti, Symb. Sin. 7: 1099. 1936.

尼泊尔香青 ni bo er xiang qing

Herbs, perennial. Rhizome slender or slightly robust, runners ca. 20 cm, rarely ca. 40 cm; leaves of runner obovate or spatulate, 1–2 cm, with terminal rosette leaves. Stems erect or ascending, 4–45 cm (or plants acaulescent), white tomentose, densely or sparsely leafy. Lower leaves persistent during efflorescence, rarely withered, homomorphic with rosette leaves, spatulate, oblanceolate, or oblong-oblanceolate, 1–7 × 0.5–2 cm or larger, base attenuate, margin flat, apex rounded or acute; middle leaves oblong or oblanceolate, often rather narrow, base amplexicaul, sessile, apex obtuse or acute, with acerose cusp; upper leaves attenuate; or short stems without middle and upper leaves; all leaves white tomentose or cauliferous glandular pilose on both surfaces or abaxially, (1 or)3-veined. Capitula solitary or few, rarely numerous, sparsely corymbiform; peduncle 0.5–2.5 cm. Involucre somewhat spherical, 8–12 × 15–20 mm, exceeding disk; phyllaries 8- or 9-seriate, radiate in efflorescence; outer phyllaries puce except at apex, oval or lanceolate, 3–3.5 mm; middle ones white, lanceolate, 7–10 × 2.5–3 mm, acute at apex; innermost ones linear-lanceolate, 5–8 mm, with a claw ca. 1/3 of full length. Receptacle lacunose. Predominantly female capitula with numerous marginal female florets, center

with 3–6 male florets; predominantly male capitula with male florets only, or 1–3 female florets outside. Corolla of male florets ca. 3 mm, ca. 4 mm in female florets. Pappus ca. 4 mm, incrassate at tip of apex in male florets, serrulate. Achenes terete, ca. 1 mm, hirsutulous. Fl. Jun–Sep, fr. Aug–Oct.

Alpine or subalpine grasslands, conifer forests, forest margins, scrub, valleys, riverbanks, river sands, rocks, rock crevices, among lichens on slopes; 2400–4500 m. Gansu, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, ?Myanmar, Nepal].

1a. Plants acaulescent, or stems low, up to 6 cm tall, rarely taller, with leaves densely clustered; capitulum solitary, among rosette leaves or at stem apex ..... 51c. var. *monocephala*
1b. Stems 5–45 cm tall; capitula few or numerous, arranged in sparse corymb, rarely solitary.
2a. Stem thickish, 30–45 cm tall; capitula usually 8–15; lower leaves usually withered by anthesis ..... 51b. var. *corymbosa*
2b. Stem slender, 5–30 cm tall; capitula 1–6; lower leaves usually surviving during anthesis ..... 51a. var. *nepalensis*

51a. Anaphalis nepalensis var. **nepalensis**

尼泊尔香青(原变种) ni bo er xiang qing (yuan bian zhong)

Helichrysum nepalense Sprengel, Syst. Veg. 3: 485. 1826, based on *H. stoloniferum* D. Don, Prodr. Fl. Nepal. 176. 1825, not (Linnaeus f.) Willdenow (1803); *Anaphalis cuneifolia* (Candolle) J. D. Hooker; *A. intermedia* (Candolle) Duthie; *A. mairei* H. Léveillé; *A. mucronata* Candolle var. *polycephala* Candolle; *A. nubigena* Candolle var. *intermedia* (Candolle) J. D. Hooker; *A. nubigena* var. *polycephala* (Candolle) C. B. Clarke; *A. triplinervis* (Sims) C. B. Clarke var. *intermedia* Airy Shaw; *Antennaria triplinervis* Sims var. *cuneifolia* Candolle; *A. triplinervis* var. *intermedia* Candolle.

Stems erect or ascending, slender, 5–30 cm tall, sparsely caespitose. Lower leaves usually surviving during anthesis, spatulate or oblanceolate, 2–7 × 0.8–2.5 cm, gradually attenuate at base into long petiole. Capitula 1–6 or more; peduncle 0.5–1.5 cm.

Alpine or subalpine grasslands, forest margins, valleys, rocks; 2400–4500 m. S and SW Gansu, S Shaanxi, W Sichuan, S Xizang, Yunnan [Bhutan, India, Nepal].

This taxon is extremely variable.

51b. Anaphalis nepalensis var. **corymbosa** (Bureau & Franchet) Handel-Mazzetti, Acta Horti Gothob. 12: 239. 1938.

伞房尼泊尔香青 san fang ni bo er xiang qing

Gnaphalium corymbosum Bureau & Franchet, J. Bot. (Morot) 5: 71. 1891; *Anaphalis corymbosa* (Bureau & Franchet) Diels.

Stems thickish, 30–45 cm tall. Lower leaves usually withered by anthesis, oblong-lanceolate, ca. 10 cm, gradually attenuate at base into long petiole. Capitula 8–15, forming a spreading corymb; peduncle 1–3 cm or more.

• Alpine or subalpine grasslands, scrub, conifer forests, river sands; 2500–4100 m. W Sichuan, NW and W Yunnan [?Bhutan, ?Myanmar, ?Nepal].

This taxon is recorded in Annot. Checkl. Fl. Pl. Nepal (50. 2000, as *A. corymbosa*) from Bhutan, Myanmar, and Nepal. However, it is not mentioned in Fl. Bhutan (2(3): 1515–1522. 2001).

51c. Anaphalis nepalensis var. **monocephala** (Candolle) Handel-Mazzetti, Acta Horti Gothob. 12: 239. 1938.

单头尼泊尔香青 dan tou ni bo er xiang qing

Anaphalis monocephala Candolle, Prodr. 6: 272. 1838; *A. mucronata* Candolle; *A. mucronata* var. *monocephala* Candolle; *A. nubigena* Candolle; *A. triplinervis* var. *monocephala* (Candolle) Airy Shaw.

Plants acaulescent, or stems low, up to 6 cm tall, rarely taller, congested with rosette leaves. Leaves densely clustered, spatulate to oblanceolate-oblong, 0.8–2(–3) × 0.2–2 cm, abaxially densely white lanate, adaxially arachnoid tomentose, 1-veined or inconspicuously 3-veined. Capitulum solitary, terminal, rarely 2 or 3 capitula among rosette leaves.

Among lichens on alpine dank slopes, rock crevices, riverbanks; 4100–4500 m. W Sichuan (Kangding), S Xizang, NW Yunnan [Bhutan, India, Nepal].

52. Anaphalis triplinervis (Sims) C. B. Clarke, Compos. Ind. 105. 1876.

三脉香青 san mai xiang qing

Antennaria triplinervis Sims, Bot. Mag. 51: t. 2468. 1824; *Gnaphalium cynoglossoides* Treviranus.

Herbs perennial, caespitose; rhizome woody; stolons repent, with slender roots. Stems annotinal, erect, corymbiform branches on upper parts, 40–60 cm, white tomentose. Lower leaves small, rarely cauliferous, elliptic, 3-veined. Cauline leaves oblong or elliptic, 3-veined or more, abaxially white tomentose, adaxially arachnoid tomentose, base sessile, sometimes amplexicaul, apex acute; lower leaves oblong-lanceolate, cauliferous (sometimes long) or attenuate into a petiole; middle leaves broadly lanceolate, 7–10 × 1.5–2.5 cm. Capitula large. Involucre 5–7 × 7–10 mm; phyllaries white, apex acute; inner elliptic or oblong-lanceolate. Fl. Aug–Oct, fr. Oct–Nov. $2n$ = 28.

Grassy slopes; ca. 2300 m. S Xizang (Nyalam) [Afghanistan, Bhutan, N India, Kashmir, Nepal, Pakistan].

53. Anaphalis nagasawae Hayata, Bot. Mag. (Tokyo) 20: 15. 1906 [*"nagasawai"*].

永健香青 yong jian xiang qing

Gnaphalium niitakayamense Hayata.

Rhizome slender, slightly woody; stolons densely leafy, with terminal rosette leaves. Stems and sterile branches or stolons densely caespitose; stem 8–12 cm, slender, mainly ascending, simple, white tomentose, densely leafy. Lower leaves persistent during efflorescence, spatulate or obovate, 0.5–1 × 0.3–0.5 mm, apex rounded or obtuse; middle leaves oblong or lanceolate, 1–2 × 0.4–0.6 cm, base slightly attenuate, decurrent

on stem into a narrow wing, margin flat, apex obtuse, without distinct short cusp; upper leaves slightly short; all leaves pallid tomentose on both surfaces. Involucre subspherical, ca. 1 × 1–1.5 cm, red-brown, thinly tomentose at base; middle phyllaries white or ochroleucous, elliptic-lanceolate, 7–8 × ca. 3 mm, apex acute; innermost linear-lanceolate, ca. 7 mm, with a claw ca. 1/2 of full length. Receptacle lacunose, glabrous. Capitula with numerous marginal female florets, center of predominantly female capitula with few to 15 female florets present. Corolla of female florets ca. 4 mm, rather short; male florets unknown. Achenes terete, ca. 1 mm. Fl. Jul–Aug.

• Alpine dry grasslands. Taiwan.

54. Anaphalis acutifolia Handel-Mazzetti, J. Bot. 76: 286. 1938.

尖叶香青 jian ye xiang qing

Rhizome thickish, creeping, caespitose, usually with marcescent leaves. Stems erect, 12–23 mm, slender, 1–1.5 mm in diam., becoming slightly woody at base, white arachnoid tomentose, sometimes glabrate in lower parts; leaves at base persistent, short, membranous, broadly ovate or orbicular, brown squamiform leaves arising from base, internode 3–10 mm. Lower leaves persistent and withered; middle leaves somewhat spreading, linear or linear-lanceolate, 2.5–3.5 × ca. 0.6 cm, herbaceous, pallid or ochroleucous (when young), both surfaces tomentose or glandular pilose, 1-veined, base attenuate, not decurrent, margin flat, apex acute, with very short cusp; upper leaves small, equaling or exceeding synflorescence, somewhat erect or clinging to synflorescence, apex acute, with short or withered long cusp. Capitula 5–10, densely glomerulate, 5–10 mm in diam.; peduncle short to 3 mm, white tomentose. Involucre globose, ca. 10 × 15 mm, slightly exceeding disk; phyllaries 7- or 8-seriate, radiate, equal in length; outer phyllaries ovate-lanceolate, ca. 3.5 mm, base brownish, apex acute; middle ones white, elliptic-lanceolate, 5–7 × ca. 2 mm, claw deep brown, apex acute or acuminate; innermost ones linear-lanceolate, with a claw ca. 1/2 of full length. Receptacle without fimbrillate appendage. Capitula with numerous marginal female florets, center of predominantly female capitula with 5–14 male florets. Corolla 3–3.5 mm. Pappus white, filiform-dentate. Ovary ca. 0.5 mm, pubescent. Fl. Jul–Sep.

• Gravel slopes, gritty regions; ca. 3900 m. S Xizang (Yadong).

No specimens of this species were seen by the second author.

Species incertae sedis

Anaphalis horaimontana Masamune, Trans. Nat. Hist. Soc. Formosa 26: 57. 1936.

大山香青 da shan xiang qing

Stems unbranched, erect, ca. 10 cm, densely tomentose, base ca. 1 mm in diam., foliose, apex ascending corymbiform branched. Basal leaves rosulate, small, obovate, withered by anthesis, both surfaces gray tomentose; middle leaves spatulate, 12–14 × 3–3.5 mm, both surfaces densely tomentose, base attenuate, almost sheathlike, apex obtuse; upper leaves linear, 5–6 mm. Capitula 6, corymbiform, pedunculate. Involucre campanulate-globose, ca. 6 × 6 mm, base rounded, densely lanate; phyllaries imbricate, 6-seriate; outer phyllaries red-brown, ovate-lanceolate, apex acuminate or obtuse; inner ones white, apex obtuse. Capitula with many marginal female florets, corolla filiform, ca. 3.5 mm; bisexual florets few, corolla tubular, ca. 3.5 mm, apex 5-denticulate. Pappus in female florets ca. 3.5 mm, in male florets ca. 3.7 mm, apex scabrid, not clavate. Ovary small, puberulent.

• Alpine grasslands. Taiwan.

Specimens of this species were not seen by the present authors. The above description is based on the original literature.

183. PSEUDOGNAPHALIUM Kirpicznikov, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 9: 33. 1950.

拟鼠麴草属 ni shu qu cao shu

Chen Yousheng (陈又生); Randall J. Bayer

Gnaphalium subg. *Laphangium* Hilliard & B. L. Burtt; *Laphangium* (Hilliard & B. L. Burtt) Tzvelev.

Herbs, perennial, biennial, or annual. Leaves alternate, flat with entire margins, tomentose on both surfaces. Capitula many in corymbs. Phyllaries papery, whitish, rosy, tawny, or brownish, opaque or hyaline, dull or shiny; stereome divided. Receptacle flat, epaleate. Outer florets yellow, filiform. Central florets bisexual, yellow. Anthers with flat appendages. Style branches truncate, with hairs apically. Achenes oblong, with short clavate twin hairs. Pappus bristles capillary, barbellate, and free.

About 90 species: worldwide, mostly South America to North America, mostly in temperate regions; six species (two endemic) in China.

1a. Phyllaries light white or bright brown.
2a. Robust herbs, up to 1 m tall; leaves distinctly 3-veined ..... 1. *P. adnatum*
2b. Dwarf herbs, 10–40 cm tall; leaves 1-veined.
3a. Annual herbs; leaves spatulate or spatulate-oblong, apex obtusely rounded, base narrower ..... 2. *P. luteoalbum*
3b. Perennial herbs; leaves lanceolate or ovate-lanceolate, rarely linear, apex shortly acute, base broader ..... 3. *P. flavescens*
1b. Phyllaries golden yellow or citrine yellow.
4a. Stems shortly glandular; leaf base decurrent to form wings; capitula ca. 5 mm in diam. or larger ..... 4. *P. chrysocephalum*

4b. Stems white lanate; leaf base decurrent, sometimes slightly amplexicaul; capitula 2–4 mm in diam.
5a. Dwarf herbs, 10–40 cm tall, usually branched from base; leaves spatulate or spatulate-oblanceolate, not amplexicaul or auriculate, whitish tomentose on both surfaces; pappus connate at base ..... 5. *P. affine*
5b. Robust herbs, up to 80 cm tall, only branched in upper part; leaves linear, subamplexicaul-auriculate, green glandular adaxially, white tomentose abaxially; pappus distinct ..... 6. *P. hypoleucum*

1. Pseudognaphalium adnatum (Candolle) Y. S. Chen, **comb. nov.**

宽叶拟鼠麴草 kuan ye ni shu qu cao

Basionym: *Anaphalis adnata* Candolle, Prodr. 6: 274. 1838; *A. esquirolii* (H. Léveillé) H. Léveillé; *A. sericeoalbida* (Vaniot) H. Léveillé; *Gnaphalium adnatum* (Candolle) Wallich ex Thwaites; *G. esquirolii* H. Léveillé; *G. formosanum* Hayata; *G. sericeoalbidum* Vaniot.

Herbs, robust. Stems erect, 4–8 mm in diam., 50–100 cm tall, unbranched or rarely branched below, corymbosely branched above, densely lanate. Basal leaves withering at anthesis; middle and lower leaves oblanceolate or subelliptic, 4–9 × 1–2 cm, leathery, both surfaces densely tomentose, midrib elevated, base decurrent, apex obtuse. Capitula 5–7 mm in diam., in corymbs on upper stem. Involucre yellow or whitish, 3- or 4-seriate, globose, 5–6 mm wide, scarious; outer phyllaries obovate or oblanceolate, ca. 4 mm, rounded; inner ones elliptic or oblong, ca. 4 mm. Outer florets many; corolla ca. 3 mm. Central florets 5–7, ca. 3 mm. Achenes oblong, ca. 0.5 mm. Pappus white, ca. 3 mm. Fl. Aug–Oct.

Mountain slopes, roadsides, exposed rocky environments; 500–3000 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, SE Xizang, Yunnan, Zhejiang [Bhutan, India, Myanmar, Nepal, Philippines, Thailand, Vietnam].

2. Pseudognaphalium luteoalbum (Linnaeus) Hilliard & B. L. Burtt, Bot. J. Linn. Soc. 82: 206. 1981 [*"luteo-album"*].

丝棉草 si mian cao

Gnaphalium luteoalbum Linnaeus, Sp. Pl. 2: 851. 1753 [*"luteo-album"*]; *Laphangium luteoalbum* (Linnaeus) Tzvelev.

Herbs, annual, 15–40 cm, taprooted or fibrous-rooted. Stems loosely white tomentose, not glandular. Leaves crowded; internodes 1–5, sometimes to 10 mm; blade narrowly obovate to subspatulate, 1–3(–6) cm × 2–8 mm (distal smaller, oblanceolate to narrowly oblong or linear), both surfaces mostly concolorous to weakly bicolored, abaxially gray tomentose, adaxially usually gray tomentose, sometimes glabrescent, neither surface glandular, bases subclasping, usually decurrent 1–2 mm, margin weakly revolute. Capitula in terminal glomerules 1–2 cm in diam. Involucre broadly campanulate, 3–4 mm; phyllaries 3- or 4-seriate, silvery gray to yellowish, hyaline, ovate to ovate-oblong, glabrous. Female florets 135–160. Bisexual florets 5–10; corollas red tipped. Achenes not evidently ridged, conspicuously dotted with whitish, papilliform hairs. Pappus bristles loosely coherent basally, released in clusters or easily fragmented rings. $2n = 14, 28$.

Exposed fields, roadsides; below 3200 m. Gansu, Hainan, Henan, Hubei, Jiangsu, Shaanxi, Shandong, Sichuan, Taiwan [Afghanistan, India, Laos, Pakistan, N Thailand, Vietnam; Africa, SW Asia (Iran), Australia, Europe, North America].

3. Pseudognaphalium flavescens (Kitamura) Anderberg, Opera Bot. 104: 147. 1991.

拉萨拟鼠麴草 la sa ni shu qu cao

Gnaphalium flavescens Kitamura, Acta Phytotax. Geobot. 15: 71. 1953.

Herbs, perennial, somewhat woody at base. Stems in tufts, 1–1.2 mm thick, branched from middle and in upper part, 14–16 cm tall, arachnoid tomentose. Basal leaves withering at anthesis, linear, 10–12 × ca. 1.5 mm; middle leaves lanceolate or ovate-lanceolate, 15–18 × 2–3 mm, abaxially white lanate, adaxially green and arachnoid pubescent, base amplexicaul, apex mucronate; upper leaves ovate or ovate-oblong, 10–15 × 3–5 mm, base broader, apex mucronate. Capitula numerous, 4–5 mm in diam., pedunculate, in terminal compound corymbs. Involucre campanulate, 4–5 mm in diam.; phyllaries 4- or 5-seriate, nitid, grayish white or light yellow; outer ones ovate, 2–2.5 mm, abaxially densely lanate, apex obtuse; middle ones oblong or obovate-oblong, 3–4 mm, apex rounded or toothed; innermost ones obovate-oblong, 4.5–5 mm, abaxially glabrous. Receptacle slightly convex, glabrous. Outer florets female; corolla filiform, 2.5–3 mm, limbs usually 4-toothed, rarely 3- or 5-toothed. Disk corolla 5-toothed. Achenes oblong or elliptic, ca. 1 mm, papillose. Pappus white, ca. 3.5 mm, scabrid. Fl. Aug–Nov.

• Alpine grasslands, thickets; 3000–3800 m. Xizang.

4. Pseudognaphalium chrysocephalum Hilliard & B. L. Burtt, Bot. J. Linn. Soc. 82: 205. 1981.

金头拟鼠麴草 jin tou ni shu qu cao

Gnaphalium chrysocephalum Franchet, J. Bot. (Morot) 10: 412. 1896, not Schultz Bipontinus (1845).

Herbs, perennial, erect. Stem usually simple, 60–80 cm tall, shortly pubescent, upper part lanate. Leaves narrowly lanceolate or linear-lanceolate, 5–8 × 5–8 cm, abaxially scabrid, adaxially gray lanate, base half decurrent and narrowly cuneate, apex acute. Capitula densely corymbose, campanulate, ca. 6 mm in diam. Outer phyllaries lanate; middle ones golden yellow and polished, obovate-oblong, apex rounded; innermost ones pale, spatulate, base leathery, apex membranous. Florets bisexual. Achenes columnar to subellipsoid, glabrous. Pappus white, ca. 4 mm, deciduous. Fl. Jun–Oct.

• Grassy slopes; 2600–2800 m. W Sichuan, Yunnan.

5. Pseudognaphalium affine (D. Don) Anderberg, Opera Bot. 104: 146. 1991.

拟鼠麴草 ni shu qu cao

Gnaphalium affine D. Don, Prodr. Fl. Nepal. 173. 1825; *G. confusum* Candolle; *G. javanum* Candolle; *G. luteoalbum* Linnaeus subsp. *affine* (D. Don) J. Koster; *G. luteoalbum* var. *multiceps* (Wallich ex Candolle) J. D. Hooker; *G. multiceps* Wallich

ex Candolle; *G. ramigerum* Candolle; *Laphangium affine* (D. Don) Tzvelev; *Pseudognaphalium luteoalbum* (Linnaeus) Hilliard & B. L. Burtt subsp. *affine* (D. Don) Hilliard & B. L. Burtt.

Herbs, biennial. Stems 15–40 cm tall, densely white lanate tomentose. Leaves thin; lower leaves smaller than median cauline leaves; cauline leaves spatulate, 2–6 × 4–12 cm, white lanate on both surfaces, base angular, narrowed, sessile, decurrent, margin entire, apex rounded, mucronulate. Capitula numerous, densely aggregated in terminal corymbs. Involucre globose-campanulate, ca. 3 × 3.5 mm; phyllaries 3-seriate, pale yellow, outer ones shorter, broadly ovate, inner ones oblong, apex obtuse. Outer florets many, ca. 1.75 mm. Central florets 5–10; corolla ca. 2 mm. Achenes oblong, compressed, ca. 0.5 mm, papillose. Pappus white, ca. 2 mm, bristles deciduous separately. $2n = 14$.

A weed of wastelands and cultivated fields, common; sea level to 2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Indonesia, Japan, Korea, Myanmar, Nepal, Pakistan, Philippines, Vietnam; SW Asia (Iran), Australia].

6. Pseudognaphalium hypoleucum (Candolle) Hilliard & B. L. Burtt, Bot. J. Linn. Soc. 82: 205. 1981.

秋拟鼠麴草 qiu ni shu qu cao

Gnaphalium hypoleucum Candolle in Wight, Contr. Bot. India, 21. 1834; *G. amoyense* Hance; *G. confertum* Bentham; *G. hololeucum* Hayata; *G. hypoleucum* var. *amoyense* (Hance) Handel-Mazzetti; *G. hypoleucum* var. *brunneonitens* Handel-Mazzetti; *G. hypoleucum* var. *hololeucum* (Hayata) Yamamoto.

Herbs, erect, 30–60(–80) cm tall, usually simple, branched above, grayish pubescent to lanate or brownish glandular. Leaves linear, 1.5–7.5 × 0.1–0.7 cm, bicolored, white tomentose abaxially, dull green glandular pubescent adaxially, margin entire to crispate or revolute, subamplexicaul, usually undulate. Capitula in dense corymbose clusters, densely lanate, 3–3.5 mm in diam. Phyllaries 4- or 5-seriate, yellow to snow white, oblong, ca. 4 mm, apex acute rarely subacute. Outer florets filiform; corolla yellow, ca. 2 mm, 3- or 4-toothed. Disk florets ca. 2 mm; corolla 5-lobed. Achenes papillose, ca. 0.5 mm. Pappus setae white, free, minutely bristly, equaling corolla. Fl. Apr–Oct. $2n = 14$.

Waste fields, grasslands, roadsides; below 2700 m. Anhui, Fujian, Guangdong, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam; SW Asia (Iran)].

This species is easily distinguished by its robust habit and subamplexicaul leaves, which are dull green adaxially and white tomentose abaxially.

184. XEROCHRYSUM Tzvelev, Novosti Sist. Vyssh. Rast. 27: 151. 1990.

蜡菊属 la ju shu

Chen Yousheng (陈又生); Randall J. Bayer

Herbs, perennial, sometimes biennial or annual. Stems with fibers in phloem, without resin canals, without pericyclic cambium. Leaves alternate, sessile, glandular hairy, margin generally flat, entire. Capitula heterogamous, disciform, few to solitary. Phyllaries few to many seriate, entire, papery, monomorphic, monochromous; lamina yellow, pink, orange, red, or white, opaque; stereome undivided. Receptacle flat, epaleate. Female florets yellow, filiform, fewer than disk florets. Achenes and pappus as in disk florets. Disk florets bisexual; corolla yellow; corolla lobes erect, veins ending before apex of lobes. Anthers ecalcarate, shortly tailed; endothecial tissue polarized; apical appendages concave, as wide as thecae. Pollen gnaphalioid. Style bifid; style branches acute with obtuse sweeping hairs dorsally; stigmatic surface separated. Achenes large, terete to quadrangular with 3 vascular bundles, glabrous, epidermis smooth. Pappus of free, barbellate, capillary bristles without patent cilia; apical cells acute.

Six species: Australia; one species (introduced) in China.

1. Xerochrysum bracteatum (Ventenat) Tzvelev, Novosti Sist. Vyssh. Rast. 27: 151. 1990.

蜡菊 la ju

Xeranthemum bracteatum Ventenat, Jard. Malmaison, t. 2. 1803; *Bracteantha bracteata* (Ventenat) Anderberg & Haegi; *Helichrysum bracteatum* (Ventenat) Haworth.

Herbs, annual or biennial. Stems 20–120 cm tall. Leaves lanceolate to linear, up to 12 cm, costa prominent, base gradually narrower, margin entire, apex acute. Capitula 2–5 cm in diam., solitary on strong, branching stems. Phyllaries imbricate, outer ones shorter, inner ones broadly lanceolate, apex acuminate, nitid, white, red, yellow, pink, or purple. Florets numerous, yellow. Achenes glabrous. Pappus of scabrid bristles. Fl. Jul–Sep. $2n = 28$.

Widely cultivated in China as an ornamental plant [native to Australia].

185. HELICHRYSUM Miller, Gard. Dict. Abr., ed. 4, [462]. 1754 [*"Elichrysum"*], nom. cons.

拟蜡菊属 ni la ju shu

Chen Yousheng (陈又生); Randall J. Bayer

Herbs, perennial or annual, sometimes shrublets. Leaves alternate, generally flat with entire margins, often tomentose. Capitula solitary or many in corymbs. Phyllaries papery, brown, yellow, pink, or white; stereome divided or undivided. Receptacle flat,

epaleate or rarely paleaceous. Outer filiform florets yellow, or absent. Central florets bisexual, yellow. Anthers with flat appendages. Style branches truncate, with hairs apically. Achenes oblong, glabrous or with elongated or short clavate twin hairs. Pappus bristles capillary, barbellate or subplumose, connate or free.

About 600 species: Africa, Asia, Europe, Madagascar; three species (one endemic) in China.

1a. Phyllaries white ..... 1. *H. kashgaricum*
1b. Phyllaries yellow.
2a. Stems usually not branched; outer phyllaries apex rounded ..... 2. *H. arenarium*
2b. Stems branched; outer phyllaries apex acute ..... 3. *H. thianschanicum*

1. Helichrysum kashgaricum C. H. An, Fl. Xinjiang. 5: 476. 1999.

喀什蜡菊 ka shi la ju

Herbs, perennial. Rhizome with flowering stems and sterile stems. Stems 10–15 cm tall; entire plant white lanate, denser on peduncles. Leaves oblong-oblanceolate, 1–3 cm × 2–5 mm, base gradually narrowed, semiamplexicaul, apex acuminate. Capitula in terminal corymbs. Involucre 1.5–1.8 cm in diam.; phyllaries 4- or 5-seriate, ovate-lanceolate or lanceolate, 5–8 × ca. 2 mm; outer ones white, dry membranous, base dark brown, apex acuminate; inner ones lanceolate, subleathery, nearly black outside, margin white, membranous. Female florets few, narrowly funnelform, ca. 1.5 mm, limbs 5-lobed. Bisexual florets light brown, funnelform above, columnar below, ca. 4 mm, limbs 5-lobed. Pappus ca. 4 mm. Fl. Aug.

• Valleys; ca. 2000 m. Xinjiang.

2. Helichrysum arenarium (Linnaeus) Moench, Methodus, 575. 1794.

沙生蜡菊 sha sheng la ju

Gnaphalium arenarium Linnaeus, Sp. Pl. 2: 854. 1753.

Herbs, perennial. Rhizome woody, more often thick, 5–7(–15) mm in diam., or much thinner, only 1–4 mm in diam. Flowering stems few or many, erect or ascending, unbranched, 10–60 cm tall, at very base sometimes with decayed leaves; entire plant tomentose-lanate, usually forming ± dense clusters. Leaves at apex with a small brownish cusp, gradually diminishing upward; upper and middle ones sessile, lanceolate-linear, oblong-obovate, or oblong-elliptic, gradually narrowed toward base. Capitula (5–)10–30(–100) arranged in compact or slightly branching loose corymb, subspherical or widely obovate, (3–)4–6(–9) mm in diam., on peduncles of indefinite length; in young state corymbs capitate, usually surrounded by a few terminal leaves. Phyllaries ca. 50, slightly loosely arranged in (3 or)4–6(or 7) rows, often with declined tip at end of anthesis, bright lemon-yellow, more pallid yellow, pinkish, or orange; outer ones obovate or elliptic, abaxially densely villous, apex rounded; inner ones widely oblong-spatulate to sublinear. Florets (25–)35–45(–50), almost always bisexual, sometimes marginal florets female. Achenes papillate. Pappus of ca. 30 very thin soft scabrid yellowish or almost white hairs, approximately as long as corolla. Fl. Jul–Sep. $2n$ = 56.

Grassy slopes; 400–2400 m. N Xinjiang [Mongolia, Russia; Europe].

3. Helichrysum thianschanicum Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 307. 1879.

天山蜡菊 tian shan la ju

Herbs, perennial. Rhizome up to 1 cm in diam., woody, fibrous-splintery, multicipital. Flowering stems few to numerous, 30–60 cm tall, branching approximately from middle (rarely simple), with slender ramuscules 5–12 cm; entire plant covered, with thin dense whitish-grayish tomentose pubescence. Leaves of sterile offshoots linear-spatulate, wider and longer than linear-lanceolate acuminate leaves of flowering stems. Capitula 3–6 or more arranged at ends of shoots and branches, narrowly campanulate or obconical, 5–7 × 4–6 mm, almost as long as peduncles, or subsessile. Phyllaries ca. 30, yellow, rather loosely imbricate, arranged in 6 or 7 rows, ± squarrose in upper part, abaxially tomentose pubescent in lower part, outermost ones lanceolate and 1/3–1/2 as long as inner ones, linear-lanceolate or spatulate, acuminate or truncate at apex. Florets in a capitulum ca. 25. Pappus of ca. 40 very thin hairs. Fl. Jul–Sep. $2n$ = 28.

Gravelly places, dry slopes, dunes; below 3000 m. W Xinjiang [Kazakhstan].

11. Tribe CALENDULEAE

金盏花族 jin zhan hua zu

Chen Yilin (陈艺林 Chen Yi-ling); Bertil Nordenstam

Herbs, shrubs, or subshrubs, annual or perennial. Leaves often alternate. Capitula radiate, heterogamous. Involucre campanulate, hemispheric, or rarely conic; phyllaries 1–3(or 4)-seriate, often with scarious margins. Receptacle flat or convex, naked. Ray florets female, fertile or sterile, tube short; lamina yellow, orange, or white, sometimes pink to purple or blue, apically 3-denticulate. Style linear, glabrous, style branches obtuse, rarely acute. Disk florets bisexual or male, actinomorphic, funnel-shaped, 5-lobed. Anthers caudate at base. Style simple or minutely bifid, rare bifurcate, dorsally papillate or rarely hirsute. Corolla yellow or orange, rarely white. Achenes usually hard, thickened, sometimes with fleshy exocarp, terete, orbicular, obovate, or heteromorphic, curved or beaked. Pappus absent.

Twelve genera and ca. 120 species: mainly in S Africa, through tropical Africa to the Mediterranean, eastward to Iran; one species (introduced) in China.

186. CALENDULA Linnaeus, Sp. Pl. 2: 921. 1753.

金盏花属 jin zhan hua shu

Herbs, annual or perennial, sometimes suffrutescent, glandular pubescent. Leaves alternate, sessile, margin entire or repand-dentate. Capitula solitary, terminal. Involucre campanulate or hemispheric; phyllaries 1- or 2-seriate, lanceolate to linear-lanceolate, acuminate, with scarious margins. Receptacle flat or convex, glabrous, heterogamous. Ray florets female, 2- or 3-seriate, fertile; lamina apically 3-denticulate; style terete, 2-lobed. Disk florets bisexual, functionally male; corolla tubular-funnel-shaped. Style undivided, apically thickened or globose. Achenes polymorphic; outer cymbiform, somewhat curved, rostrate, or triquetrous; inner distinctly curved, sometimes winged, all dorsally rugose to tuberculate-aculeate. $x = 7, 8, 9, 11, 15$.

About 15 or 20 species: mainly in SW Asia, W Europe, Macaronesia, and Mediterranean region; one species (introduced) in China.

1. Calendula officinalis Linnaeus, Sp. Pl. 2: 921. 1753.

金盏菊 jin zhan ju

Herbs, annual, 20–75 cm tall, usually branched from base, green, ± glandular pubescent. Basal leaves oblong-obovate or spatulate, 15–20 cm, margin entire or remotely denticulate; stem leaves oblong, oblong-lanceolate, or oblong-obovate, 5–15 × 1–3 cm, ± amplexicaul, margin inconspicuously repand-denticulate, apex obtuse, rarely acute. Capitula 4–5 cm in diam.; phyllaries lanceolate or oblong-lanceolate, outer slightly longer than inner, acuminate. Ray florets yellow or orange, ca. 2 × as long as involucre, lamina up to 4–5 mm wide. Disk florets with triangular-lanceolate lobes. Achenes curved, yellowish or brownish, outer half-curved, often aculeate rostrate at apex, lateral-winged ridge irregularly rugose. Fl. Apr–Sep, fr. Jun–Oct.

Cultivated as an ornamental in parks and gardens of China [native origin unknown].

12. Tribe **INULEAE**

旋覆花族 xuan fu hua zu

Chen Yousheng (陈又生); Arne A. Anderberg

Shrubs, subshrubs, or herbs. Stems with or without resin ducts, without fibers in phloem. Leaves alternate or rarely subopposite, often glandular, petiolate or sessile, margins entire or dentate to serrate, sometimes pinnatifid to pinnatisect. Capitula usually in corymbiform, paniculiform, or racemiform arrays, often solitary or few together, heterogamous or less often homogamous. Phyllaries persistent or falling, in (2 or)3–7+ series, distinct, unequal to subequal, herbaceous to membranous, margins and/or apices usually scarious; stereome undivided. Receptacles flat to somewhat convex, epaleate or paleate. Capitula radiate, disciform, or discoid. Marginal florets when present radiate, miniradiate, or filiform, in 1 or 2, or sometimes several series, female and fertile; corollas usually yellow, sometimes reddish, rarely ochroleucous or purple. Disk florets bisexual or functionally male, fertile; corollas usually yellow, sometimes reddish, rarely ochroleucous or purplish, actinomorphic, not 2-lipped, lobes (4 or)5, usually ± deltate; anther bases tailed, apical appendages ovate to lanceolate-ovate or linear, rarely truncate; styles abaxially with acute to obtuse hairs, distally or reaching below bifurcation, branches ± linear, adaxially stigmatic in 2 lines from bases to apices (lines confluent distally), apices rounded to truncate, sterile apical appendage absent. Anthers with radial or polarized endothecial tissue. Achenes usually monomorphic within capitula, usually ellipsoid or columnar to prismatic, rarely with short beak, but sometimes abruptly constricted distally, often ribbed, glabrous or hairy, often glandular, hairs not myxogenic; pappus persistent, of ± barbellate bristles, of bristles and short scales, of short scales only, or rarely missing.

About 60 genera and 600 species: nearly worldwide, in both Old and New Worlds; 14 genera (one introduced) and 92 species (16 endemic, four introduced) in China.

1a. Capitula radiate, disciform, or discoid, florets yellow; marginal florets when present female, radiate (rarely miniradiate or tubular); disk florets bisexual; phyllaries herbaceous or leathery, sometimes leafy; achenes with large oxalate crystals in epidermis cells (subtribe Inulinae).
2a. Receptacle with paleae; style branch apex of bisexual florets rounded or truncate ..... 187. *Buphthalmum*
2b. Receptacle without paleae; style branch apex of bisexual florets broad, rounded.
3a. Pappus absent ..... 188. *Carpesium*
3b. Pappus present.
4a. Pappus in 2 rows, inner row of barbellate bristles, outer row of short, membranous scales ..... 189. *Pulicaria*
4b. Pappus all of barbellate bristles.
5a. Pappus bristles very few, sometimes missing in ray florets ..... 190. *Pentanema*
5b. Pappus bristles numerous; all florets with pappus.
6a. Marginal florets filiform, tubular ..... 191. *Blumea*
6b. Marginal florets radiate or missing.
7a. Ray florets 2- or 3-seriate, lamina 10–45 mm, rarely shorter; anther appendage rounded to acute; endothecial tissue radiate ..... 192. *Inula*
7b. Ray florets 1-seriate, lamina 1–15 mm; anther appendage truncate; endothecial tissue polarized ..... 193. *Duhaldea*
1b. Capitula disciform, heterogamous or homogamous; marginal florets filiform or tubular; achenes without large epidermis crystals (subtribe Plucheinae).
8a. Capitula in dense globose or elongated secondary capitula.
9a. Pappus absent ..... 194. *Sphaeranthus*
9b. Pappus present ..... 195. *Pterocaulon*
8b. Capitula solitary, or in sparse compound synflorescence.
10a. Pappus absent ..... 196. *Epaltes*
10b. Pappus of capillary bristles.
11a. Phyllaries broad, oval to lanceolate; perennial herbs, subshrubs, or shrubs.
12a. Involucre obovate, broadly campanulate, or hemispheric; herbs, subshrubs, or shrubs ..... 197. *Pluchea*
12b. Involucre oblong; perennial herbs ..... 198. *Karelinia*
11b. Phyllaries narrow, linear-lanceolate or lanceolate; annual or perennial herbs.
13a. Stem generally winged; anthers without tails ..... 199. *Laggera*
13b. Stem not winged; anthers shortly tailed at base ..... 200. *Pseudoconyza*

187. **BUPHTHALMUM** Linnaeus, Sp. Pl. 2: 903. 1753.

牛眼菊属 niu yan ju shu

Herbs, perennial. Stem not winged, with resin canals. Leaves alternate, sessile or petiolate, lanceolate to rhombic, entire or dentate, glabrescent or hairy. Capitula heterogamous, radiate, solitary, terminal. Receptacle paleate, paleae folded, subtending florets. Involucre hemispheric; phyllaries in 2 or 3 rows, narrowly linear, herbaceous, not subtended by leaves. Marginal florets female, in 1

row; corolla yellow, radiate. Achenes triquetrous to flattened. Pappus missing or a rim of scales. Disk florets bisexual; corolla yellow; epidermis with straight cell walls, without needlelike crystals; corolla lobes short, smooth. Anthers calcarate with very short tails; endothecial tissue polarized. Cells of antheropodium wider than long. Pollen spines with a cavity. Style branches with acute sweeping hairs not reaching furcation. Achenes flattened or somewhat triquetrous, shorter than corolla; epidermis with elongated crystals. Pappus of a rim of irregularly incised scales. $x = 10$.

Three species: Europe; one species (introduced) in China.

1. Buphthalmum salicifolium Linnaeus, Sp. Pl. 2: 904. 1753.

牛眼菊 niu yan ju

Herbs, perennial, 50–70 cm tall. Stems erect, purplish red, usually not branched or branched at upper part, pubescent or subglabrous. Lower leaves obovate-lanceolate, base gradually narrower and petiolate; middle leaves oblong to lanceolate, base gradually narrower, apex acute; upper leaves smaller, lanceolate or linear-lanceolate, surfaces pubescent, base gradually narrower, sessile, margin entire or sparsely serrulate, apex acute. Capitulum solitary and terminal on stems or branches. Involucre hemispheric; phyllaries green, herbaceous, ovate-lanceolate, abaxially pubescent, apex acuminate. Corolla yellow. Ray florets female, 2–3 mm wide, apex 2–4-dentate. Disk florets bisexual; corolla tubular, ca. 4 mm, 5-lobed. Achenes in ray florets trigonous, 3–4 mm; achenes in disk florets columnar, 3–4 mm, glabrous. Pappus of irregularly incised scales. $2n = 20$.

Cultivated in China [native to C Europe].

188. CARPESIUM Linnaeus, Sp. Pl. 2: 859. 1753.

天名精属 tian ming jing shu

Perennials or rarely annuals. Stem not winged, without resin canals. Leaves alternate, entire or toothed, sessile or petiolate; petioles often winged. Capitula disciform, heterogamous, terminal or axillary, sessile or shortly pedunculate, usually nodding, solitary or few together, or many in spiciform racemes. Involucres subglobose or depressed-globose; phyllaries 3- or 4-seriate, outer ones herbaceous or with leaflike tips, inner ones dry, broad, obtuse. Receptacle flat, glabrous. Marginal florets female, tubular to miniradiate, in 2 to several series, fertile, slender; corollas 3–5-toothed. Disk florets bisexual, fertile, slender, many; corolla limb slightly dilated, 4- or 5-toothed, yellowish. Anthers ecalcarate, with branched tails. Endothecial tissue radial. Pollen spines with a cavity. Style branches with acute sweeping hairs not reaching furcation. Achenes ellipsoid, glabrous, longer than corolla, ribbed, with a short glandular beak, crowned by a cartilaginous ring, with elongated crystals. Pappus absent. $x = 10, 18$.

About 20 species: Asia, Europe; 16 species (six endemic) in China.

1a. Outer phyllaries membranous or subherbaceous, shorter than inner ones, not similar to bracteal leaves.
2a. Corolla sparsely pubescent; capitula 6–10 mm in diam., terminal on stems or branches, with distinct peduncles ..... 1. *C. divaricatum*
2b. Corolla glabrous; capitula 3–5 mm in diam., axillary, sessile or shortly pedunculate.
3a. Capitula 3–6 mm in diam., with distinct peduncles or subsessile.
4a. Leaves long decurrent to winged petiole ..... 2. *C. tracheliifolium*
4b. Leaves shortly cuneate at base, abruptly narrowed to wingless petiole.
5a. Stems 10–30 cm; leaves elliptic or elliptic-lanceolate, usually glabrous and dotted with glands; peduncles distinct ..... 3. *C. minus*
5b. Stems 30–80 cm; leaves ovate to ovate-lanceolate, both surfaces pubescent; axillary capitula subsessile ..... 4. *C. faberi*
3b. Capitula 6–8 mm in diam., sessile or subsessile.
6a. Lower cauline leaves broadly ovate, base cordate or rounded ..... 5. *C. szechuanense*
6b. Lower cauline leaves elliptic to lanceolate, base attenuate.
7a. Lower cauline leaves broadly elliptic to oblong, densely pubescent ..... 6. *C. abrotanoides*
7b. Lower cauline leaves oblong-lanceolate to lanceolate, glabrous ..... 7. *C. longifolium*
1b. Outer phyllaries herbaceous or leafy, equal to or longer than inner ones, similar to bracteal leaves.
8a. Capitula campanulate, 4–10 mm in diam. ..... 8. *C. triste*
8b. Capitula cupuliform, over 10 mm in diam.
9a. Corolla glabrous; plants sparsely pubescent; rarely corolla sparsely pubescent and plants densely lanate.
10a. Capitula 2.5–3.5 cm in diam. ..... 9. *C. macrocephalum*
10b. Capitula 1–2 cm in diam.
11a. Phyllary apex obtuse; lower leaves decurrent to petiole at base ..... 10. *C. cernuum*
11b. Phyllary apex acute; lower leaves rounded, truncate, or cordate at base, not decurrent to petiole ..... 11. *C. nepalense*
9b. Corolla pubescent; plants pubescent or densely yellowish pilose.
12a. Lower cauline leaves broadly ovate, base cordate or rounded; petiole wingless ..... 12. *C. cordatum*
12b. Lower cauline leaves elliptic, base decurrent to petiole.

13a. Cauline leaves semiamplexicaul; plants tomentose-pilose; corolla sparsely pubescent ..... 13. *C. velutinum*
13b. Cauline leaves petiolate or sessile, base not amplexicaul; corolla densely pubescent.
14a. Bracteal leaves and outer phyllaries spatulate or linear-spatulate, apex rounded or obtuse, densely pubescent ..... 14. *C. scapiforme*
14b. Bracteal leaves and outer phyllaries lanceolate, apex acuminate, sparsely pubescent.
15a. Stems 12–35 cm tall, tomentose-pilose; capitula shortly pedunculate or subsessile; phyllaries usually not reflexed ..... 15. *C. humile*
15b. Stems 35–70 cm tall, sparsely pubescent; capitula long pedunculate; phyllaries reflexed ..... 16. *C. lipskyi*

1. Carpesium divaricatum Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 187. 1846.

金挖耳 jin wa er

Carpesium atkinsonianum Hemsley.

Herbs, perennial. Stems 25–150 cm tall, densely pubescent, branched above middle. Lower leaves thin, petiolate; petiole shorter than or as long as blade, shortly winged; blade ovate to ovate-oblong, 7–23 cm, pubescent on surfaces, abaxially pale and gland-dotted, adaxially green, base mostly rounded, sometimes shallowly cordate or truncate, rarely shortly cuneate, margin irregularly mucronulate-dentate, apex acute to obtuse; median leaves oblong, cuneate-attenuate at base, acuminate at apex; upper leaves much smaller, oblong or oblong-lanceolate, sessile. Capitula 6–8 mm in diam., terminal and solitary on branches or in subracemose synflorescences, nodding at anthesis, subtending bracteal leaves 2–4, lanceolate, reflexed, 2–5 × as long as head. Involucre ovoid, 6–8 × 5–6 mm; phyllaries 4-seriate, imbricate, outermost shortest, broadly ovate, cuspidate, herbaceous, median oblong, rounded, innermost linear, obtuse. Corolla of marginal florets cylindric, ca. 1.5 mm, 4-lobed; corolla of disk florets cylindric, 3–3.5 mm, limb 5-lobed. Achenes cylindric, ca. 3.5 mm. Fl. Jul–Oct, fr. Oct–Nov. $2n = 40$.

Broad-leaved forests, mixed forests; 600–1600 m. Anhui, Fujian, Guangdong, Guizhou, Henan, Hubei, Hunan, Jiangxi, Jilin, Liaoning, Sichuan, Taiwan, Zhejiang [Japan, Korea].

2. Carpesium tracheliifolium Lessing, Linnaea 6: 233. 1831.

粗齿天名精 cu chi tian ming jing

Carpesium cernuum Linnaeus var. *tracheliifolium* (Lessing) C. B. Clarke.

Stems 30–50 cm tall, usually sparsely pubescent. Leaves ovate, 4–15 × 2–8 cm, sparsely pubescent on surfaces, with subsessile glands abaxially, base usually acuminate to attenuate, margin subentire to coarsely serrate; lower leaves broadly (rarely narrowly) petiolate; upper ones sessile or shortly petiolate. Capitula 1–8 in racemes or spikes at branch ends, suberect to pendulous, 2–10 mm in diam., surrounded by leaflike bracts 4.5–37 × 2–9 mm. Involucre 4- or 5-seriate; phyllaries mostly oblong, to 3.5–5.2 mm, scarious, obtuse, outer ones sometimes shorter or herbaceous above or ovate and rounded to acuminate at apex. Disk florets: corollas ca. 2 mm, tube glabrous or hairy. Achenes ca. 3 mm, narrowed above to glandular apex. Fl. Jul–Aug, fr. Sep–Oct.

Valleys, forests; 2000–3500 m. Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Kashmir, Nepal].

3. Carpesium minus Hemsley, J. Linn. Soc., Bot. 23: 431. 1888.

小花金挖耳 xiao hua jin wa er

Stems 10–30 cm tall, erect, densely pubescent, often purplish, internodes 5–16 mm. Lower cauline leaves petiolate; petiole 1–3 cm, usually purple; blade elliptic or elliptic-lanceolate, 4–9 × 1–2.2 mm, thick, both surfaces glabrous or sparsely pubescent along veins, dotted with glands, base cuneate, margin with sparse tooth in middle and upper part, apex acute or obtuse; upper leaves gradually smaller upward, lanceolate or linear-lanceolate, subentire, shortly petiolate or sessile. Capitula ca. 5 mm in diam., solitary on ends of branches or branchlets, nodding at anthesis, subtended by many leaflike bracts; bracts linear-lanceolate, 6–15 mm. Involucres campanulate-globose, ca. 5 × 4–5 mm; phyllaries 3- or 4-seriate, outermost shortest, ovate, cuspidate, pubescent, median narrowly oblong, denticulate, rounded at apex, inner linear. Corolla of marginal florets cylindric, 1–1.5 mm; corolla of disk florets tubular, ca. 2 mm, limb 5-lobed. Achenes ca. 2 mm. Fl. Jul–Sep, fr. Sep–Oct.

• Grassy slopes along streams; 700–1000 m. Hubei, Hunan, Jiangxi, Sichuan, Yunnan.

This species is characterized by a dwarf, slender habit; narrow, rather thick leaves; and small, erect, slenderly pedunculate capitula.

4. Carpesium faberi C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 65. 1895.

中日金挖耳 zhong ri jin wa er

Carpesium hosokawae Kitamura; *C. kweichowense* C. C. Chang.

Herbs, perennial. Stems 30–80 cm tall, erect, densely pubescent, often purplish, branched in upper half. Lower cauline leaves long petiolate with petioles wingless, ovate-oblong, 7–10 × 2.5–3.5 mm, thin, base cuneate, apex obtuse to acuminate; median cauline leaves shortly petiolate or sessile, lanceolate, base cuneate-attenuate, apex acuminate; upper leaves linear-lanceolate, gradually smaller upward. Capitula numerous, ca. 4.5 mm in diam., solitary on branches, nodding at anthesis, subtended by many leaflike bracts; bracts longer than capitula. Involucres campanulate-globose, ca. 4 × 4–5 mm; phyllaries 4-seriate, outermost shortest, ovate, cuspidate, pubescent, median narrowly oblong, denticulate, rounded at apex, inner linear. Florets ca. 80; corolla of marginal florets cylindric, ca. 1.5 mm; corolla of disk florets tubular, ca. 1.5 mm, limb 4- or 5-lobed. Achenes 2–2.5 mm. Fl. Aug–Sep, fr. Oct–Nov.

Grassy slopes or thickets; 700–2000 m. Guangxi, Guizhou, Hubei, Sichuan, Taiwan [Japan].

This species is somewhat similar to *Carpesium minus* but differs by its stems usually taller; lower leaves ovate to ovate-lanceolate, pubescent on both surfaces; and axillary capitula subsessile, arranged in spikelike form.

5. Carpesium szechuanense F. H. Chen & C. M. Hu, Acta Phytotax. Sin. 12: 499. 1974.

四川天名精 si chuan tian ming jing

Herbs, perennial. Rhizome stout, with numerous fibrous roots. Stems 50–80 cm tall, pubescent, branched in upper part. Leaves alternate; lower and middle leaves petiolate; petiole 3–8 cm, wingless, densely tomentose; blade broadly ovate, 9–12 × 6.5–12 cm, abaxially white glandular, sparsely pubescent, white pilose along veins, adaxially hispid, base cordate or truncate, margin irregularly toothed, apex acute or shortly acuminate; upper leaves shortly petiolate or subsessile, elliptic or elliptic-lanceolate, base cuneate, margin subentire, apex acuminate. Capitula spicately arranged; terminal ones with bracteal leaves; axillary ones with smaller bracteal leaves or inconspicuous. Involucre hemispheric, ca. 7 × 8–10 mm; phyllaries 4-seriate, outer ones shorter, ovate-lanceolate, ca. 4 mm, abaxially pubescent, base membranous, apex herbaceous, acute, median dry membranous, ca. 5 mm, inner linear. Marginal florets tubular, ca. 1.5 mm, 5-dentate; disk florets tubular, ca. 3 mm, 5-dentate. Achenes ca. 2.5 mm. Fl. Jul–Sep, fr. Sep–Oct.

• Grassy slopes, forest margins; 1400–2500 m. Hubei, Sichuan, Yunnan.

6. Carpesium abrotanoides Linnaeus, Sp. Pl. 2: 860. 1753.

天名精 tian ming jing

Carpesium thunbergianum Siebold & Zuccarini.

Herbs, perennial. Stems 50–100 cm tall, stout, terete, leafy, pubescent apically, much branched. Lower cauline leaves thin, broadly elliptic to oblong, 20–28 × 8.5–15 cm, gland-dotted abaxially, shortly pubescent on both surfaces, narrowed at base into a broadly winged petiole, margin irregularly mucronulate-dentate, apex obtuse to acute; upper leaves sessile, oblong, gradually smaller, apex acute. Capitula many, 6–8 mm wide, sessile, spicately arranged, usually without bracts, deflexed in anthesis. Involucre campanulate-globose; phyllaries 3-seriate, outer ones shortest, ovate, acuminate, shortly pubescent, scarious-leathery at base, herbaceous toward apex, median and inner oblong, rounded at apex. Florets 130–300; corolla of marginal florets cylindric, ca. 1.5 mm; corolla of disk florets ca. 2.5 mm. Achenes ca. 3.5 mm, beak ca. 0.7 mm. Fl. Aug–Oct, fr. Oct–Dec. $2n = 40$.

Roadsides, grassy slopes, thickets, forest margins, streamsides; below 2800(–3400) m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Afghanistan, Bhutan, India, Japan, Korea, Myanmar, Nepal, Russia, Vietnam; SW Asia (Caucasus, Iran), Europe].

7. Carpesium longifolium F. H. Chen & C. M. Hu, Acta Phytotax. Sin. 12: 498. 1974.

长叶天名精 chang ye tian ming jing

Carpesium leptophyllum F. H. Chen & C. M. Hu; *C. leptophyllum* var. *linearibracteatum* F. H. Chen & C. M. Hu.

Herbs, perennial. Stems 50–100 cm tall, base woody and subglabrous, upper branched, puberulent. Leaves radical and cauline; radical leaves withering before flowering; lower and middle cauline leaves with 2–4 cm long petioles, elliptic or elliptic-lanceolate, 10–23 × 3.5–6 cm, both surfaces subglabrous or very sparsely pilose, abaxially light green, white and yellow globose glandular, adaxially deep green, costa purple, base cuneate, margin entire or with small cusps, apex acuminate; upper leaves sessile to shortly petiolate, lanceolate, 8–15 × 1.5–3 cm, base cuneate, margin subentire, apex acuminate. Capitula spicately arranged; axillary ones usually without bracteal leaves or very small bracteal leaves; terminal ones with 2–4 lanceolate 1.5–3.5 cm long bracteal leaves. Involucre hemispheric, 6–7 × 8–12 mm; phyllaries 4-seriate, outer ones ovate, ca. 3 mm, dry membranous, abaxially sparsely pubescent, apex acute, median oblong, 5–6 × ca. 2 mm, margin ciliate or serrulate, apex obtuse, innermost linear-lanceolate, 6–7 × ca. 1 mm, apex obtuse. Marginal florets 3- or 4-seriate, corolla tubular, ca. 2 mm, 5-dentate; disk florets tubular, 3–3.5 mm, limb 5-dentate. Achenes ca. 3 mm. Fl. Jul–Sep, fr. Sep–Oct.

• Moist forests, riversides, grasslands; 600–2300 m. Gansu, Guizhou, Hubei, Shaanxi, Sichuan.

8. Carpesium triste Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 19: 479. 1874.

暗花金挖耳 an hua jin wa er

Carpesium manshuricum Kitamura; *C. pseudotrachelifolium* Y. Ling; *C. triste* var. *manshuricum* Kitamura; *C. triste* var. *sinense* Diels; *C. tristiforme* Handel-Mazzetti.

Herbs, perennial. Stems slender, 40–100 cm tall, densely spreading pubescent, especially at base, branched in upper part. Leaves radical and cauline; radical leaves withering before flowering; lower cauline leaves with long, winged petiole, ovate-oblong, 13–20 × 3–5 cm, densely pubescent on surfaces, base rounded, margin irregularly mucronate-toothed; median leaves narrower, long acuminate; upper leaves gradually smaller, lanceolate or linear-lanceolate, acuminate at both ends. Capitula several to many, on branches; bracts linear-lanceolate, as long as or longer than capitula, reflexed. Involucre campanulate, 5–6 × 6–10 mm; phyllaries 3-seriate, mostly all alike, outer oblong-lanceolate, scarious. Corolla of marginal florets narrow, tubular, ca. 2.5 mm; corolla of disk florets ca. 3.5 × 1 mm, glabrous or sparsely pubescent. Achenes 3–3.5 mm. Fl. Jul–Sep, fr. Sep–Oct. $2n = 40$.

Forests, streamsides; 700–3700 m. Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Jilin, Liaoning, Shaanxi, Taiwan, Xinjiang, Zhejiang [Japan, Korea, Russia].

9. Carpesium macrocephalum Franchet & Savatier, Enum. Pl. Jap. 2: 405. 1878.

大花金挖耳 da hua jin wa er

Carpesium eximium C. Winkler.

Herbs, perennial. Stems flexuous, crisp pubescent, ca. 1 m tall, branch thickened below capitula. Leaves radical and cauline; radical leaves withering before flowering; lower cauline leaves winged petiolate, broadly ovate, 30–40 × 10–13 cm, shortly pubescent on both surfaces especially on veins, margin

irregularly coarsely doubly toothed, apex acute; median leaves gradually smaller, obovate-oblong, abruptly narrowed in lower half, apex acute; upper leaves narrow, apex acuminate. Capitula terminal, on long peduncles; bracts linear or lanceolate. Involucre cupuliform, 8–10 × 23–30 mm; phyllaries 4-seriate, outer ones similar to bracteal leaves, median oblong-linear, densely pubescent, acute, inner linear-spatulate, 5.5–6 mm. Marginal florets many seriate, corolla tubular, ca. 3.5 mm, 5-lobed; disk corolla ca. 4 mm, 5-lobed. Achenes cylindric, 5.5–6 mm, beak ca. 1 mm, gland-dotted. Fl. Jul–Sep, fr. Sep–Oct. $2n = 40$.

Moist humus in deciduous or mixed forests; 700–2300 m. Gansu, Heilongjiang, Henan, Jilin, Liaoning, Shaanxi, Sichuan [Japan, Korea, Russia].

10. Carpesium cernuum Linnaeus, Sp. Pl. 2: 859. 1753.

烟管头草 yan guan tou cao

Carpesium spathiforme Hosokawa.

Herbs, perennial. Stems 50–100 cm tall, robust, erect, densely white villous and crisp puberulent at base, much branched. Lower cauline leaves thin, spatulate-oblong, 9–25 × 4–6 cm, densely white villous on both surfaces, abaxially pale, adaxially green, base contracted and attenuate into winged petiole, margin irregularly doubly serrate, mucronulate, apex acute or obtuse; median leaves slightly smaller, oblong, apex obtuse or sometimes acuminate. Capitula solitary, 15–18 mm wide, long pedunculate, subtending leaves many, linear-lanceolate, 2–5 cm, base narrow, apex obtuse. Involucres cupuliform, 7–8 mm; outer phyllaries leaflike, scarious near base, abaxially white pilose, inner ones narrowly oblong, scarious, obtuse. Corolla of marginal florets tubular, ca. 1.5 mm; disk florets tubular, ca. 2.5 mm, limb ca. 1 mm. Achenes linear, 4.5–5 × ca. 1 mm. Fl. Jun–Aug, fr. Sep–Oct. $2n = 40$.

Waste fields, montane slopes; below 2900(–3400) m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Afghanistan, India, Indonesia, Japan, Korea, Pakistan, Papua New Guinea, Philippines, Russia, Vietnam; Australia, SW Asia (Caucasus), Europe].

"Carpesium ciliatum," "C. pedunculosum," and *"C. pubescens"* (Wallich, Numer. List, nos. 3214, 3200, 3199. 1831) belong here but are nomina nuda and were therefore not validly published (*Vienna Code*, Art. 32.1(d)).

11. Carpesium nepalense Lessing, Linnaea 6: 234. 1831.

尼泊尔天名精 ni bo er tian ming jing

Stems erect, 23–60 cm tall, robust, appressed lanate at base, branching toward base, flexuous apically. Lower cauline leaves long petiolate; petiole 2–2.5 × as long as blade; blade ovate, 12–18 × 2.5–4 cm, densely villous on surfaces, abaxially pale, adaxially green, base rounded or truncate, margin irregularly dentate or mucronulate, apex shortly acuminate; upper leaves becoming gradually smaller and with shorter petioles, ovate-oblong or oblong, acuminate; uppermost leaves oblong-lanceolate. Capitula 9–20 mm in diam., solitary, long pedunculate, subtended by leaflike bracts; bracts longer than or as long as capitula, oblong-lanceolate or lanceolate, coarsely serrate. Involucre cupuliform, 9–11 × 5–6 mm; phyllaries 4-seriate, equal in length. Corolla of marginal florets ca. 1.5 mm. Achenes ca. 3.5 mm. Fl. Jun–Sep, fr. Sep–Nov.

Mountain slopes, forests; 1100–3200 m. Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Nepal, Pakistan].

1a. Stems not white lanate; capitula 9–11 mm in diam.; corolla glabrous ..... 11a. var. *nepalense*

1b. Entire plant white lanate, especially dense on stems; capitula 12–20 mm in diam.; corolla sometimes sparsely pubescent ..... 11b. var. *lanatum*

11a. Carpesium nepalense var. **nepalense**

尼泊尔天名精(原变种) ni bo er tian ming jing (yuan bian zhong)

Carpesium acutum Hayata; *C. cernuum* Linnaeus var. *nepalense* (Lessing) C. B. Clarke.

Stems not white lanate. Capitula 9–11 mm in diam. Corolla glabrous.

Mountain slopes, forests; 1400–3200 m. Taiwan, Xizang, Yunnan [Bhutan, India, Nepal, Pakistan].

11b. Carpesium nepalense var. **lanatum** (J. D. Hooker & Thomson ex C. B. Clarke) Kitamura in H. Hara, Fl. E. Himalaya, 335. 1966.

棉毛尼泊尔天名精 mian mao ni bo er tian ming jing

Carpesium cernuum var. *lanatum* J. D. Hooker & Thomson ex C. B. Clarke, Compos. Ind. 130. 1876; *C. verbascifolium* H. Léveillé.

Entire plant white lanate, especially dense on stems. Capitula 12–20 mm in diam. Phyllaries acute. Corolla sometimes sparsely pubescent. Fl. Jul–Sep, fr. Sep–Nov.

Montane slopes; 1100–2700 m. Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan [Bhutan, India].

12. Carpesium cordatum F. H. Chen & C. M. Hu, Acta Phytotax. Sin. 12: 497. 1974.

心叶天名精 xin ye tian ming jing

Herbs, perennial. Stems up to 60 cm tall, vertically striped, sparsely pubescent. Basal leaves withered at anthesis; cauline leaves ovate or oblong, 7–13 × 6–10 cm, abaxially light green, sparsely pubescent on veins, adaxially green and sparsely pubescent, base cordate or rounded, margin irregularly and sparsely dentate, apex acute. Capitula terminal on stems and branches; peduncles 5–10 cm; bracteal leaves 3–5, shortly petiolate, ovate or ovate-oblong, 1–2.5 cm, surfaces sparsely pubescent, apex acuminate. Involucre hemispheric, 6–7 × 1–1.5 mm; phyllaries ca. 4-seriate, subequal, outer ones herbaceous, narrowly oblong or oblong-lanceolate, abaxially sparsely pubescent, apex acute, inner lanceolate, dry membranous, apex acute. Marginal florets tubular, ca. 2 mm. Disk florets ca. 2.5 mm; corolla ca. 1.5 mm, pubescent, limb funnelform, 5-lobed; lobes triangular, ca. 0.5 mm. Achenes slenderly cylindric, 4–4.5 mm. Fl. Jul–Aug, fr. Sep–Oct.

Grassy slopes, conifer forests; 2300–3500 m. Sichuan, Xizang, Yunnan [India, Nepal].

13. Carpesium velutinum C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 73. 1895.

绒毛天名精 rong mao tian ming jing

Carpesium zhouquense J. Q. Fu.

Herbs, perennial. Stems 30–50 cm tall, grayish yellow pilose, sometimes densely tomentose, usually not branched except peduncles. Basal leaves persistent, 3 or 4, elliptic, 4–10 × 2–4.5 cm, abaxially velutinous, more densely so on costa, adaxially hispid, base cuneate, decurrent to broadly winged petiole, margin serrate, apex obtuse or acute; lower cauline leaves similar to basal leaves, base semiamplexicaul, with winged 3–10 cm long petiole; upper leaves sessile, much smaller, elliptic-oblong, base semiamplexicaul, apex acute or obtuse. Capitula solitary on stems or axils, in racemose synflorescences, sessile or with peduncles to 3–5 cm; bracteal leaves numerous, lanceolate, with 1 or 2 larger ones 10–15 mm; other ones equal to phyllaries in length, densely pilose and glandular. Involucre hemispheric, 5–6 × 6–12 mm; phyllaries 4-seriate, subequal, outer ones lanceolate or linear-spatulate, pilose, herbaceous above, membranous below, inner dry membranous, lanceolate, apex obtuse. Marginal florets tubular, 1.5–2 mm, 5-dentate, sparsely pubescent or glabrous; disk florets tubular, 2.5–3 mm, 5-dentate, sparsely pubescent. Achenes ca. 3 mm. Fl. Jul–Sep, fr. Sep–Oct.

• Forests, montane slopes; 2000–3200 m. Gansu, Shaanxi, Sichuan.

14. Carpesium scapiforme F. H. Chen & C. M. Hu, Acta Phytotax. Sin. 12: 497. 1974.

葶茎天名精 ting jing tian ming jing

Herbs, perennial, 25–50 cm tall. Stems erect, simple, sparsely pilose, rarely villous. Leaves 4 or 5(–8) per stem below synflorescence, ovate-lanceolate to oblanceolate, pubescent (usually sparsely), with shorter glandular hairs more numerous abaxially, rarely villous on veins abaxially, base attenuate, margin subentire, rarely serrulate, apex rounded to subacute; lower leaves close together, 7–28 × 2.5–6 cm, usually long petiolate; middle and upper leaves distant, (±) sessile, much reduced. Capitula 1 or 2(or 3)[–6], 8–20 mm in diam., surrounded by several whorls of ± regular, spatulate, obtuse, herbaceous, pilose bracts 7–15 × 1.5–6 mm, rarely oblong, acute or few much larger. Phyllaries oblong, ca. 6 × 1.6 mm, scarious, acute or obtuse. Disk florets yellow; corollas ca. 2 mm, tube hairy. Achenes 4–5 mm. Fl. Jul–Sep, fr. Sep–Oct.

Alpine meadows, forest margins, streamsides; 3000–4100 m. Sichuan, Xizang, Yunnan [Bhutan, India, Nepal].

In Fl. Pakistan (210: 86. 2003), *Carpesium scapiforme* is treated as a synonym of *C. nepalense* var. *glandulosum* (J. D. Hooker & Thomson ex C. B. Clarke) Qaiser & Abid. Considering that the habitat of *C. scapiforme* is so distinct, it seems inappropriate to treat it as a variety of *C. nepalense*.

15. Carpesium humile C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 70. 1895.

矮天名精 ai tian ming jing

Herbs, perennial. Rhizome short and stout, with numerous fibrous roots. Stems 12–35 cm tall, simple or branched in upper part, grayish yellow pilose, more densely so on upper part and peduncles. Basal leaves persistent at anthesis, spatulate-oblong, 6–9 × 2.5–4 cm, surfaces glandular, abaxially white pilose, adaxially pubescent, base cuneate, decurrent to very short petiole, margin serrulate or subentire, apex obtuse or acute; upper leaves sessile, oblong to oblong-lanceolate, base cuneate, apex acute. Capitula solitary on stems, branches, or axils, shortly pedunculate; bracteal leaves 3–7, lanceolate, 8–16 mm, pubescent, apex acuminate. Involucre discoid, ca. 8 × 1–1.5 cm; phyllaries 4-seriate, outer ones lanceolate, 7–8 × 2–3.5 mm, herbaceous above, dry membranous below, abaxially pilose, apex acuminate, inner linear, dry membranous, apex acute. Marginal florets tubular, ca. 2 mm, 5-dentate, pubescent. Disk florets 2.5–3 mm, pubescent; limb funnelform, 5-dentate. Achenes ca. 3 mm. Fl. Jul–Sep, fr. Sep–Oct.

• Grassy slopes, river beaches, forest margins; 2000–3700 m. Gansu, Qinghai, Sichuan, Xizang, Yunnan.

16. Carpesium lipskyi C. Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 68. 1895.

高原天名精 gao yuan tian ming jing

Herbs, perennial. Rhizome prostrate. Stems 35–70 cm tall, densely pilose. Basal leaves usually withering before flowering, blade elliptic or spatulate, 7–15 × 3–7 cm, glandular on both surfaces, abaxially white pilose, more densely so along veins, adaxially pubescent, base decurrent to petiole, margin subentire or serrulate, apex obtuse or acute; upper leaves sessile, elliptic to elliptic-lanceolate, base broadly cuneate, apex acuminate. Capitula solitary on ends of stems, branches, or in axils, pendulous; bracteal leaves 5–7, lanceolate, subequal, 8–16 × 2–3 mm, reflexed, sparsely pubescent, more densely so along costae. Involucre discoid, 1–1.5 cm in diam.; phyllaries 4-seriate, outer ones similar to bracteal leaves, lanceolate, ca. 7 mm, herbaceous above, dry membranous below, abaxially pubescent, usually reflexed, median lanceolate, dry membranous, apex acuminate, innermost linear-lanceolate, apex irregularly serrulate. Marginal florets narrowly funnelform, ca. 2.5 mm, limb 5-dentate. Disk florets 3–3.5 mm; corolla white pubescent, limb funnelform, 5-dentate. Achenes 3.5–4 mm. Fl. Jul–Sep, fr. Aug–Oct.

• Forest margins, thickets; 2000–3700 m. Gansu, Qinghai, Shanxi, Sichuan, Yunnan.

189. PULICARIA Gaertner, Fruct. Sem. Pl. 2: 461. 1791.

蚤草属 zao cao shu

Annual or perennial herbs or subshrubs. Stems not winged, without resin canals. Leaves alternate, usually sessile or rarely petiolate. Capitula heterogamous radiate or disciform, or homogamous discoid, in corymbiform or racemiform arrays. Involucres hemispheric to campanulate, [3–]5–10[–20+] mm in diam.; phyllaries persistent (sometimes reflexed in fruit), in (2 or)3 or 4+ series,

unequal to subequal. Receptacles flat, smooth or minutely alveolate, epaleate. Ray florets when present female, fertile; corollas yellow, laminae 1.5–2+ mm. Disk florets bisexual; corollas yellow, lobes 5. Anthers ecalcarate, with branched tails; endothecial tissue radial. Pollen spines with a cavity. Style branches with acute sweeping hairs, not reaching furcation. Achenes ellipsoid, shorter than corolla and often apically contracted and glandular, hairy, with elongated crystals. Pappus of barbellate, capillary to ± flattened bristles in 1 row with an outer cup of free or connate scales. $x = 6, 7, 8, 9, 10$.

About 77 species: Africa, Asia, Europe; six species (one endemic, one introduced) in China.

1a. Annual or perennial herbs, densely branched; capitula small; involucre 5–8(–10) mm in diam.
2a. Annual herbs; leaves oblong-lanceolate; phyllaries in 5 or 6 series, margin membranous; inner pappus of 6–12 bristles, 1–1.5 mm ..... 1. *P. vulgaris*
2b. Perennial herbs; leaves oblong-spatulate; phyllaries in 2 or 3 series, outer one herbaceous; inner pappus of 15–25 bristles, 4–5 mm ..... 2. *P. gnaphalodes*
1b. Perennial herbs or subshrubs, not branched or few branched; capitula large; involucre 9–25 mm in diam.
3a. Capitula solitary, rarely 2 or 3 ..... 3. *P. insignis*
3b. Capitula numerous.
4a. Subshrubs ..... 4. *P. chrysantha*
4b. Perennial herbs.
5a. Leaves oblong, apex acute, base cordate and slightly amplexicaul; phyllaries in 5 or 6 series, densely lanate ..... 5. *P. dysenterica*
5b. Leaves obovate-spatulate, apex rounded, base narrower; phyllaries in 2 or 3 series, slightly pubescent ..... 6. *P. salviifolia*

1. Pulicaria vulgaris Gaertner, Fruct. Sem. Pl. 2: 461. 1791.

蚤草 zao cao

Inula pulicaria Linnaeus, Sp. Pl. 2: 882. 1753; *Aster pulicaria* (Linnaeus) Scopoli; *Diplopappus vulgaris* (Gaertner) Bluff & Fingerhuth; *Pulicaria inuloides* Vahl ex Hornemann, nom. illeg. superfl.; *P. prostrata* Ascherson, nom. illeg. superfl.; *P. uliginosa* Gray, nom. illeg. superfl.

Herbs, annual, entire plant tomentose-pilose pubescent or lanate-villous (*Pulicaria vulgaris* var. *villosa* Hohenacker). Stems erect or ascending, almost from base, more rarely branched from middle, clothed above with villous tomentum of rather long thin hairs and dispersed fine yellowish transparent sessile or very shortly stalked glands, less densely pubescent below. Leaves (0.7–)1–3(–40) × 0.2–0.8(–1) cm, lower ones oblong, basally narrowed into very short petiole, others sessile, oblong-lanceolate with truncately rounded base, somewhat undulate at margin, entire, or slightly finely distantly toothed, apex acute or obtuse; both surfaces, but more densely abaxially, tomentose-pilose or sublanate and, also mostly densely, finely sessile or subsessile glandular, glands transparent golden yellow. Capitula semiglobose, numerous, (10–)20–80(–100) per plant, borne in a few or solitarily at ends of sprigs in loose irregularly paniculate synflorescences. Involucre 5–8(–10) mm in diam., semiglobose; phyllaries numerous, arranged in 5 or 6 rows, inner ones longer, all appressed, linear or narrowly oblanceolate-linear, villous-pilose and finely dotted sessile glandular outside, apex acute and sometimes unbent. Radiate marginal florets short, not exceeding involucre or only slightly so, almost as long as or slightly longer than tubular disk florets; corollas of ray florets 2.5–3.5 mm, almost as long as style, slightly longer than inner row of pappus, outside, mainly in upper part, beset with dispersed transparent golden yellow glands and simple hairs; lamina erect, almost oval, ca. 1 mm wide; corolla of tubular disk floret ca. 2 mm, slightly longer than inner row of pappus, outside also as corollas of ray florets covered with glands and simple hairs. Achenes 1.5–1.8 × ca. 0.5 mm, equal in length to inner row of pappus bristles or even slightly longer, oblong, slightly compressed and longitudinally costate, entire surface not densely shortly appressed pilose. Inner row of pappus consisting of 6–12 denticulate-scabrid hairs, ca. 1.5 mm, somewhat unequal in length; outer pappus shortly coroniform, ca. 0.3 mm. Fl. Jun–Sep. $2n = 18$.

Dry grasslands, sandy places, riverbeds, roadsides; 600–2800 m. Xinjiang [Kazakhstan, Mongolia, Pakistan, Russia, Turkmenistan, Uzbekistan; N Africa, SW Asia, Europe].

2. Pulicaria gnaphalodes (Ventenat) Boissier, Diagn. Pl. Orient., ser. 1, 6: 76. 1846.

鼠麴蚤草 shu qu zao cao

Inula gnaphalodes Ventenat, Descr. Pl. Nouv. t. 75. 1802; *Strabonia gnaphalodes* (Ventenat) Candolle.

Herbs, perennial. Stems very densely branched; entire plant, especially at base, covered with rather dense and long white and thin lanate tomentum, less dense toward apex. Leaves sessile, except very lower ones tapered into short petiole; blade oblong, oblong-spatulate, or at base rounded or slightly cordate, 5–30(–40) × 1–10 mm, both surfaces covered with somewhat less dense pubescence of thin tomentum and glands, midrib impressed adaxially, but prominent abaxially and lateral veins less distinct, base semiamplexicaul, margin distinctly crisped-undulate, apex obtuse. Capitula small, numerous, terminal on slightly thickened ends of terminal and axillary sprigs. Involucres 5–8(–10) mm in diam.; phyllaries loosely arranged in 2(or 3) rows, 2–4 × 0.5–0.7 mm, outer ones slightly shorter and wider than inner ones, oblong-lanceolate, pubescent outside, with ± dense tomentum and sessile glands, apex acute, inner less densely pubescent, margin somewhat membranous and slightly dentate-fimbriate. Ray florets small, slightly longer than involucre; corolla 4–5 mm, sparsely glandular outside; lamina ca. 1 mm wide, suboval. Disk florets tubular; corolla 3–4.5 mm, with prominent anther tips, stigma branches sparsely glandular outside. Achenes 2–2.5 × ca. 0.5 mm, slightly compressed,

not densely patent, or appressed silky-pilose above, mostly coroniform, granulose-glandular. Inner row of pappus of 15–25 pinnate scabrid hairs, 4–5 mm; outer row of pappus coroniform, ca. 0.5 mm. Fl. May–Sep. $2n = 14$.

Stony places, dried riverbeds. W Xizang [Afghanistan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan; SW Asia (Iran, Iraq)].

3. Pulicaria insignis J. R. Drummond ex Dunn, Bull. Misc. Inform. Kew 1922: 118. 1922.

臭蚤草 chou zao cao

Herbs, perennial. Rhizome long, stout and densely branched, with densely white lanate buds. Stems 5–25 cm tall, not branched or with 2 or 3 flowering branches, densely tomentose. Basal leaves oblanceolate, base gradually narrowed to petiole, apex obtuse; cauline leaves sessile, 4–8 × 1.2–2 cm, oblong or ovate-oblong, surfaces densely pubescent, base semiamplexicaul, margin entire, apex obtuse; lateral veins 4 or 5 pairs, inconspicuous. Capitula solitary, rarely with additional 1 or 2 axillary capitula. Involucre broadly campanulate, 1.2–1.5 × 2–2.5 cm; phyllaries in 2 or 3 series, linear-lanceolate or linear, apex acuminate, outer ones 10–15 × ca. 1 mm, herbaceous above, abaxially densely hispid, apex acuminate, inner herbaceous, 14–20 × ca. 1 mm, abaxially hispid, apex acuminate. Ray florets yellow, pubescent outside; lamina 1–1.5(–2) × ca. 1.5 mm, apex 3-dentate. Disk florets: corolla tubular, ca. 7 mm, glabrous. Achenes cylindric, 2.5–3.5 mm, light brown sericeous, apex truncate, base narrower. Pappus white, in 2 series; outer ones of ca. 5 chaffs of 1–1.3 mm, apex acuminate; inner ones of 5 plumose bristles ca. 7 mm. Fl. Jul–Sep.

Rocky slopes, alpine meadows; 3400–4600 m. SW Qinghai, Xizang [N India].

4. Pulicaria chrysantha (Diels) Y. Ling, Acta Phytotax. Sin. 10: 180. 1965.

金仙草 jin xian cao

Inula chrysantha Diels, Bot. Jahrb. Syst. 29: 614. 1901; *I. wardii* J. Anthony.

Subshrubs. Rhizome stout, with several caespitose stems and dense pubescent shoots. Stems 30–50 cm tall, branched, densely leafy, pubescent; axillary buds densely white pubescent. Leaves linear-lanceolate to oblong-lanceolate, 15–55 × 3–12 mm, abaxially grayish pubescent and glandular, adaxially sparsely pubescent, base rounded or slightly cordate, margin serrulate, apex acute or obtuse. Capitula terminal on stems or branches, solitary, 15–35 mm in diam. Involucre broadly campanulate, 10–13 × ca. 15 mm; phyllaries in 5 or 6 series, outer ones shorter, oblanceolate or lingulate, leathery below, herbaceous above, usually reflexed, abaxially glandular and pubescent, inner linear-lanceolate, dry membranous, margin ciliate, apex acuminate. Ray florets in 1 series; lamina oblong-linear, yellow, ca. 10 mm, apex 3-dentate. Disk florets: corolla slenderly tubular, ca. 8 mm, glandular outside; lobes deep yellow, lanceolate, apex acute; anthers apex acuminate, base caudate. Achenes cylindric, ca. 2.7 mm, striped, densely pubescent, apex truncate. Pappus white, later slightly yellowish, in 2 series; inner ones of serrulate bristles; outer ones of 5–8 chaffs, ca. 0.3 mm. Fl. Jul–Aug, fr. Aug–Sep.

• Grasslands, forest margins; 2500–3000 m. Sichuan.

5. Pulicaria dysenterica (Linnaeus) Bernhardi, Syst. Verz. 153. 1800.

止痢蚤草 zhi li zao cao

Inula dysenterica Linnaeus, Sp. Pl. 2: 882. 1753; *Aster dysentericus* Scopoli; *Diplopappus dysentericus* Bluff & Fingerhuth.

Herbs, perennial. Stems 20–60 cm tall, branched, lanate-tomentose and sparsely glandular, in lower part less densely pubescent. Leaves sessile, soft, 1.7–6 × 0.7–2.3 cm, most lower leaves oblong or oblanceolate, narrowed to base, other cauline leaves lanceolate, with auriculate profoundly cordate and slightly amplexicaul base, thinly gray tomentose or sublanate abaxially, green and scabrid adaxially, with short sessile fine tuberculate hairs, rarely subglabrous, margin almost entire or slightly undulate. Capitula 3–15(–20) per plant, in loose, corymbiform or racemose synflorescences, on rather long lanate tomentose peduncles, 2–6 mm. Involucre semiglobose, 1.1–1.5 cm in diam.; phyllaries numerous, in 5 or 6 series, linear, long and tapered-acuminate at apex, almost filiform, sometimes, mostly outer ones, hamate-unbent, tomentose-pilose and not densely dotted granulate-glandular outside, sparsely pilose or subglabrous inside. Ray florets ca. 2 × as long as involucre and almost 3 × as long as tubular disk florets; corolla 8–11 mm, sparsely glandular outside, mainly in upper part; lamina unbent, 1–1.3 mm wide, longitudinally 4-veined. Disk florets tubular, 3.5–4.5 mm. Achenes oblong, 1.25–1.5 × 0.3–0.4 mm, slightly compressed, longitudinally costate, ribs in upper half covered with short bristly hairs. Inner row of pappus consisting of 15–22 denticulate-scabrid hairs, 3–4.3 mm; outer row coroniform, ca. 0.25 mm. Fl. Jun–Sep. $2n = 18$.

Introduced in China [native to N Africa, SW Asia, Europe, India, Nepal, and Pakistan].

6. Pulicaria salviifolia Bunge, Beitr. Fl. Russl. 155. 1852 [*"salviaefolia"*].

鼠尾蚤草 shu wei zao cao

Herbs, perennial. Stems solitary or a few, densely branched, entire plant grayish tomentose or densely white tomentose. Leaves obovate-spatulate, 8–45 × 4–15 mm, lower one larger, glandular, basally gradually tapered into petiole, margin slightly undulate. Capitula numerous, in rather loose racemose synflorescences at ends of branches. Involucre 9–15 mm in diam., pubescent; phyllaries in 2 or 3 series, of equal length, lanceolate, ca. 4.7 × 0.5–1.2 mm, apex rounded. Ray florets 7–8 mm, with glands outside; lamina obovate, 1.5–2 mm, narrowed at apex. Disk florets: corolla 5–8 mm, sparsely glandular outside. Achenes 2–2.8 × ca. 0.5 mm, slightly compressed. Pappus in 2 series; inner ones of numerous 5–8 mm, pinnately scabrid whitish bristles; outer ones coroniform, ca. 0.5 mm. Fl. Jul–Oct.

Pebbly and stony slopes, sandy-stony riverbanks. Xinjiang [Afghanistan, Kashmir, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan; SW Asia (Iran)].

190. PENTANEMA Cassini, Bull. Sci. Soc. Philom. Paris 1818: 74. 1818.

苇谷草属 wei gu cao shu

Shrublets or annual herbs. Stems not winged, without resin canals. Leaves alternate, oblong to lanceolate, entire to serrate, often villous. Capitula generally heterogamous, radiate, but in some species heterogamous disciform, or homogamous discoid. Hibernating young capitula often present in frutescent species. Receptacle epaleate, smooth. Marginal florets female; corolla yellow, radiate, miniradiate, or ± tubular; epidermis not crested. Disk florets bisexual; corolla yellow; epidermis with straight cell walls, with needlelike crystals; corolla lobes short, smooth. Anthers ecalcarate, with branched tails; endothecial tissue radial; cells of anteropodium wider than long. Pollen spines with a cavity. Style branches with acute sweeping hairs, not reaching furcation. Achenes with elongated crystals. Pappus of barbellate, capillary bristles in 1 row. $x = 9$.

About 18 species: Africa, C, S, and SE Asia; three species in China.

1a. Leaf base hastate or auriculate; achenes densely pubescent ..... 1. *P. indicum*
1b. Leaf base narrower or cordate; achenes sparsely pubescent.
2a. Plants puberulent; capitula pendulous; leaves scabrid on both surfaces ..... 2. *P. cernuum*
2b. Plants densely pilose; capitula erect; leaves densely pilose on both surfaces ..... 3. *P. vestitum*

1. Pentanema indicum (Linnaeus) Y. Ling, Acta Phytotax. Sin. 10: 179. 1965.

苇谷草 wei gu cao

Herbs, annual or perennial, up to 1 m tall. Stems erect, branched, 1–4 mm in diam., striped, pubescent or rarely glabrous. Leaves sessile, oblong-lanceolate or linear-lanceolate, abaxially yellowish green and hispidulous or densely white tomentose, adaxially deep green and strigillose, base truncate or auriculate and subclasping or hastate, margin entire or shallowly serrulate, apex acuminate. Capitula solitary and terminal; peduncles 3–5 cm. Involucre broadly campanulate, ca. 6 mm; phyllaries in numerous series, outer ones subulate, herbaceous, pubescent and glandular, inner narrowly linear, glandular, innermost 4–5 × as long as outer. Receptacle hemispheric, glabrous. Florets yellow, glandular in outer surfaces. Ray florets in 1 series; lamina narrow, 6–10 × 1–1.2 mm. Disk florets numerous; corolla ca. 4 mm. Achenes terete, 0.6–0.7 mm, densely pubescent, apex truncate. Pappus white, or yellowish later, of ca. 15 bristles, ca. 4 mm in disk florets, absent in ray florets. Fl. Sep–Apr.

Waste fields, grassy slopes; 700–2000 m. Guangxi, Guizhou, Sichuan, Yunnan [India, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam; tropical Africa].

1a. Leaves broader, 3–8 cm × 3–10 mm, base truncate or auriculate, subclasping, margin entire, abaxially yellowish green, hispidulous ..... 1a. var. *indicum*
1b. Leaves narrower, 2–9 cm × 2–8 mm, base hastate, apex obtuse, margin entire or shallowly serrulate, abaxially densely white tomentose ..... 1b. var. *hypoleucum*

1a. Pentanema indicum var. **indicum**

苇谷草(原变种) wei gu cao (yuan bian zhong)

Inula indica Linnaeus, Sp. Pl., ed. 2, 2: 1236. 1763; *Vicoa appendiculata* Candolle; *V. auriculata* Cassini; *V. indica* (Linnaeus) Candolle.

Leaves broader, 3–8 cm × 3–10 mm, abaxially yellowish green, hispidulous, base truncate or auriculate, subclasping, margin entire. $2n = 18$.

Waste fields, grassy slopes; 700–2000 m. Guangxi, Guizhou, Yunnan [India, Myanmar, Pakistan, Sri Lanka, Thailand, Vietnam; tropical Africa].

"Inula appendiculata" and *"I. auriculata"* (Wallich, Numer. List, nos. 2966, 2965. 1831) belong here but are nomina nuda and were therefore not validly published (*Vienna Code*, Art. 32.1(d)).

1b. Pentanema indicum var. **hypoleucum** (Handel-Mazzetti) Y. Ling, Acta Phytotax. Sin. 10: 179. 1965.

白背苇谷草 bai bei wei gu cao

Inula indica var. *hypoleuca* Handel-Mazzetti, Symb. Sin. 7: 1107. 1936; *Aster lofouensis* H. Léveillé & Vaniot.

Leaves narrower, 2–9 cm × 2–8 mm, abaxially densely white tomentose, base hastate, margin entire or shallowly serrulate, apex obtuse. Fl. Feb–Jul, fr. Oct.

Waste fields, grassy slopes; 700–2000 m. Guangxi, Guizhou, Sichuan, Yunnan [India, Myanmar, Sri Lanka, Vietnam].

2. Pentanema cernuum (Dalzell) Y. Ling, Acta Phytotax. Sin. 10: 180. 1965.

垂头苇谷草 chui tou wei gu cao

Vicoa cernua Dalzell in Dalzell & A. Gibson, Bombay Fl. 126, 314. 1861; *Inula dalzellii* Handel-Mazzetti.

Herbs, annual. Stems 25–50 cm tall, pubescent. Petiole very short; leaf blade oblong-lanceolate, 5–7.5 × 2–2.5 cm, both surfaces shortly pubescent, base narrower, margin shallowly serrulate or dentate, rarely entire, apex acute or acuminate. Capitula 5–7 mm in diam., pendulous, in sparse corymbs; peduncles slender, usually with 1 small bracteal leaf. Phyllaries linear, apiculate, pubescent; outer ones squamiform. Ray florets 20–40; lamina yellow, linear, longer than involucre, apex 3-toothed. Achenes oblong, ca. 0.6 mm, sparsely pubescent. Pappus of disk florets few, brown, 3–4 mm.

Grassy slopes; ca. 1500 m. Yunnan [Bhutan, India, Nepal].

3. Pentanema vestitum (Wallich ex Candolle) Y. Ling, Acta Phytotax. Sin. 10: 180. 1965.

毛苇谷草 mao wei gu cao

Inula vestita Wallich ex Candolle, Prodr. 5: 470. 1836;

Pentanema radiatum Boissier; *Vicoa vestita* (Wallich ex Candolle) Bentham.

Herbs, annual or biennial, 10–50 cm tall. Stems simple or branched above, pilose. Leaves oblong or ovate in synflorescence, 1–3 × 0.5–1 cm, pilose on both surfaces, base cordate, semiamplexicaul, or lower ones tapered, margin partially and usually shallowly serrate, apex acute or obtuse. Involucre 4- or 5-seriate; outer phyllaries herbaceous, linear, 4.5–6 mm, inner ones linear-lanceolate, 6–7.2 mm, scarious margined, apex acuminate. Ray corolla tube ca. 2.7 mm; lamina ca. 4.5 × 0.6 mm, pilose at base. Disk 0.6–1 cm in diam.; corollas 3.3–4.5 mm, glandular at apex. Achenes brown, ca. 0.8 mm, sparsely pubescent. Pappus bristles fine, usually 10, yellowish white, 2.5–3.5 mm. Fl. Apr–Jul.

Riverbeds, stony places; ca. 1500 m. W Xizang [Afghanistan, India, Nepal, Pakistan].

191. BLUMEA Candolle, Arch. Bot. (Paris) 2: 514. 1833, nom. cons., not *Blumia* Nees (1825).

艾纳香属 ai na xiang shu

Blumeopsis Gagnepain.

Herbs or shrubs. Stems not winged, with resin canals. Leaves alternate, simple, sessile or shortly petiolate, mucronate-toothed to laciniate or sometimes pinnately lobed. Capitula heterogamous, disciform, solitary or paniculate. Involucre campanulate-globose; phyllaries numerous, imbricate or reflexed, in 4 or 5 series, outer series shortest. Receptacle epaleate, with scalelike ridges. Marginal florets female, in several rows; corolla yellow, filiform, minutely 2- or 3-toothed. Disk florets bisexual; corollas often yellow, rarely white to purplish, tubular, 5-toothed. Anthers ecalcarate, tailed; tails connate, caudate-acuminate; endothecial tissue radial or polarized. Pollen spines with a cavity. Style branches with acute sweeping hairs, not reaching furcation. Achenes cylindric, hirsute, terete or obscurely 4-angular or 5- or 10-ribbed, shorter than corolla; epidermis with elongated crystals. Pappus of barbellate, capillary bristles in 1 row, white to reddish. $x = 8, 9, 10, 11$.

About 50 species: Africa, tropical Asia, Australia, Pacific islands; 30 species (five endemic) in China.

Blumeopsis is treated here as a synonym of *Blumea*. It is a derived ingroup in this large genus and should be included therein; see Pornpongrungrueng et al. (Pl. Syst. Evol. 269: 223–243. 2007).

The name *Blumea gomphrena* (Walpers) Schultz-Bipontinus ex Handel-Mazzetti (Oesterr. Bot. Z. 88: 310. 1939), based on *Vernonia gomphrena* Walpers (Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 253. 1843), is of uncertain application. The only known specimen associated with the name, the type, collected by Meyen from an island ("Lintin") near Guangzhou, was probably destroyed in the Berlin herbarium fire of 1943. The protologue describes a pubescent annual with amplexicaul leaves, cymes with few capitula, and lanceolate phyllaries, but it is completely lacking in useful information on floral morphology including microcharacters. A specimen at GH comprises a drawing of the type together with two fragments (leaves and immature capitula) of the type. Merrill (J. Arnold Arbor. 18: 75. 1937), who saw this material, treated *V. gomphrena* as a synonym of *B. obliqua* (Linnaeus) Druce, a species not otherwise recorded from China. Certainly the material resembles a *Blumea*, but examination of the microcharacters of the capitula are needed to confirm its identity. In particular, the shape of the style sweeping hairs, the endothecial tissue thickenings, the shape and size of the anther thecae (calcarate, tailed, etc.), and the pollen morphology could be informative.

1a. Anthers with sagittate or obtuse bases, without tails ..... 1. *B. flava*
1b. Anthers tailed.
2a. Outer phyllaries ovate or ovate-oblong; receptacle densely pilose; pappus white.
3a. Erect herbs; old leaves abaxially densely pubescent or tomentose, margin biserrate ..... 2. *B. repanda*
3b. Climbers; old leaves abaxially very sparsely pubescent or glabrescent, margin regularly and sparsely serrate.
4a. Capitula 12–13 mm in diam., usually 1–7 axillary or in sparse terminal panicles; involucre hemispheric; receptacle 6–11 mm in diam. ..... 3. *B. megacephala*
4b. Capitula 5–8 mm in diam., usually axillary or in dense terminal panicles; involucre campanulate; receptacle 2–3 mm in diam. ..... 4. *B. riparia*
2b. Outer phyllaries linear to linear-lanceolate (or if ovate-lanceolate then pappus not white); receptacle glabrous; pappus white, reddish brown, yellowish brown, or yellow.
5a. Pappus reddish brown, yellowish brown, or yellow.
6a. Leaf blade sagittate at base; marginal florets bilabiate at apex ..... 5. *B. sagittata*
6b. Leaf blade rounded or acute at base; marginal florets equally 2–4-lobed at apex.
7a. Leaf blade pinnatisect ..... 6. *B. hookeri*
7b. Leaf blade margin serrate, rarely deeply dentate.
8a. Leaf blade linear ..... 7. *B. linearis*
8b. Leaf blade oblong.
9a. Stems, leaves, and peduncles densely white lanate ..... 8. *B. martiniana*
9b. Stems, leaves, and peduncles pubescent or tomentose.

10a. Outer phyllaries ovate-lanceolate ..... 9. *B. lanceolaria*
10b. Outer phyllaries oblong, linear, or linear-lanceolate.
11a. Leaf base usually with 1–5 pairs of appendages ..... 10. *B. balsamifera*
11b. Leaf base without appendages.
12a. Leaf base acuminate, margin serrulate ..... 11. *B. formosana*
12b. Leaf base acute, margin coarsely dentate.
13a. Leaf blade 20–30 × 6–12 cm; capitula 8–15 mm in diam. ..... 12. *B. aromatica*
13b. Leaf blade 30–45 × 10–15 cm; capitula 4–5 mm in diam. ..... 13. *B. conspicua*

5b. Pappus white.
14a. Capitula few, in axillary or terminal small and compact racemes; leaf blade linear-lanceolate ..... 14. *B. tenuifolia*
14b. Capitula in large and sparse panicles or dense spikes; leaf blade much broader.
15a. Plants prostrate; leaves spinose-toothed ..... 15. *B. oxyodonta*
15b. Plants erect; leaves not spinose-toothed.
16a. Leaf blade lyrately lobed or pinnatisect.
17a. Leaves abaxially white lanate, adaxially tomentose ..... 16. *B. lacera*
17b. Leaves pubescent or subglabrous.
18a. Capitula in spiciform panicle; phyllaries not reflexed after anthesis ..... 17. *B. sessiliflora*
18b. Capitula in sparse or dense panicle, peduncles obvious; phyllaries reflexed after anthesis.
19a. Receptacle 4–5 mm in diam., pilose; phyllary apex purplish red.
20a. Leaf blade pinnatisect, base amplexicaul; achenes 6-ribbed ..... 18. *B. saussureoides*
20b. Leaf blade lyrately lobed, base narrow; achenes 10-ribbed ..... 19. *B. sinuata*
19b. Receptacle 2–3 mm in diam., glabrous; phyllary apex green.
21a. Stems, peduncles, and phyllaries glabrous or sparsely pubescent, without glands ..... 20. *B. virens*
21b. Stems, peduncles, and phyllaries pubescent and glandular.
22a. Leaf blade upper lobe orbicular, apex rounded; capitula pedunculate, in sparse panicle ..... 21. *B. napifolia*
22b. Leaf blade upper lobe ovate-oblong or elliptic, apex acute; capitula subsessile, in dense panicle ..... 22. *B. membranacea*
16b. Leaf blade unlobed, margin dentate, serrate, or biserrate.
23a. Receptacle pilose.
24a. Capitula 8–12 mm in diam.
25a. Leaf blade margin regularly serrate; capitula sessile or with 0.5–1(–2) cm long peduncles, in dense panicles; innermost phyllaries ca. 1 mm wide, apex acute ..... 23. *B. clarkei*
25b. Leaf blade margin biserrate; capitula with up to 2 cm long peduncles, in sparse panicles; innermost phyllaries ca. 0.5 mm wide, apex caudate-acuminate ..... 24. *B. oblongifolia*
24b. Capitula 3–6 mm in diam.
26a. Stems green, long pilose, glandular; blade oblong or oblong-lanceolate, glandular; capitula few, in short and dense panicles ..... 25. *B. adenophora*
26b. Stems purplish red, pubescent or tomentose, without glands; blade obovate to oblanceolate; capitula many, sessile, in spikelike panicles ..... 26. *B. fistulosa*
23b. Receptacle glabrous.
27a. Achenes not ribbed.
28a. Florets purplish red ..... 27. *B. axillaris*
28b. Florets yellow ..... 16. *B. lacera*
27b. Achenes distinctly ribbed.
29a. Leaves abaxially whitish sericeous or lanate.
30a. Leaves mainly cauline, elliptic, margin denticulate; phyllary apex purplish red ..... 28. *B. hieraciifolia*
30b. Leaves mainly basal, obovate-spatulate or obovate-oblong, margin serrate or biserrate; phyllaries green or yellowish ..... 29. *B. sericans*
29b. Leaves abaxially glabrous.

31a. Leaves mainly basal, subsessile, cauline leaves 4–6; capitula few, in globose panicles; phyllaries and corollas purplish red ..... 30. *B. veronicifolia*

31b. Leaves mainly cauline, with 2.5–3.5 cm long petioles; capitula many, in sparse panicles; phyllaries green; corollas yellow ..... 21. *B. napifolia*

1. Blumea flava Candolle, Prodr. 5: 439. 1836.

拟艾纳香 ni ai na xiang

Blumea lecomtei Vaniot & H. Léveillé; *Blumeopsis flava* (Candolle) Gagnepain; *Laggera flava* (Candolle) Bentham.

Herbs, annual, erect, 25–100 cm tall. Leaves 1.5–8 × 0.5–4 cm, spinulose-dentate, lower ones obovate, obtuse, narrowed to base, upper ones ovate-oblong, acute with an amplexicaul base. Capitula 3–4 mm in diam. Phyllaries 5-seriate, imbricate, glabrous, outer ones ovate, subacute, inner ones linear-oblong, acuminate. Marginal florets female, filiform, 3-toothed. Disk florets bisexual or with few sub-bisexual ones (with partially developed androecium), tubular 4- or 5-toothed. Achenes very small, glabrous, 10-ribbed. Pappus white, 2.5–5 mm. Fl. Oct–Mar.

Grassy slopes, sparse forests; below 2000 m. Guangxi, Guizhou, Hainan, Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, Pakistan, Thailand, Vietnam].

2. Blumea repanda (Roxburgh) Handel-Mazzetti, Symb. Sin. 7: 1378. 1936.

高艾纳香 gao ai na xiang

Conyza repanda Roxburgh, Fl. Ind., ed. 1832, 3: 431. 1832; *Blumea eberhardtii* Gagnepain; *B. procera* Candolle; *Leveillea procera* (Candolle) Vaniot.

Herbs (or subshrubs), perennial, erect, 1–3.5 m tall. Stems sparsely pubescent at base, densely velutinous-villous in younger parts especially synflorescence axes. Leaves subsessile, oblanceolate-oblong to elliptic-oblong, 6–18.5 × 2.5–8 cm, abaxially scabrid to tomentose, adaxially densely villous, base tapering, sometimes nearly semiamplexicaul, margin coarsely biserrate or dentate, apex acuminate; upper epidermal cells with undulate walls, lower with sinuate walls. Capitula in large, terminal, divaricate panicles, densely aggregated at ends of branches, clusters sometimes lax, subsessile, 5–7 mm in diam. Phyllaries slightly longer than florets, 1–7 mm, outer ones oblong-ovate, inner ones linear-oblong and with scarious margins, all acute, densely pubescent abaxially. Receptacle 1.5–2.5 mm in diam., flat, alveolate, pubescent. Corollas yellow, tubular; those of marginal florets filiform, 4–5 mm, with 2–4 lobes, occasionally pubescent on lobes; those of central florets 4.5–6 mm, with 5 lobes, lobes triangular, papillate, pubescent with colleters. Anther tails shorter than thickened portion of filament. Achenes pale brown, pubescent, ribbed. Pappus copious, white, ca. 5 mm. Fl. Jan–May.

Evergreen forests or thickets; 1200–2000 m. Yunnan [Bhutan, India, Myanmar, Nepal, Pakistan, Vietnam].

3. Blumea megacephala (Randeria) C. C. Chang & Y. Q. Tseng in Y. Ling, Fl. Reipubl. Popularis Sin. 75: 11. 1979.

东风草 dong feng cao

Blumea riparia Candolle var. *megacephala* Randeria, Blumea 10: 215. 1960.

Subshrubs or shrubs, perennial, scandent; branches elongated, to 4–6 m. Stems woody, 2–3 cm in diam., terete, striate, glabrate or sparsely puberulent particularly on synflorescence axes and on younger parts. Cauline leaves thick, oblong, 9–11 × 2.5–4 cm, glabrate or minutely pilose on surfaces, base obtuse to cuneate, margin remotely mucronulate or mucronulate-denticulate, apex shortly acuminate; veins 5 or 6 pairs. Capitula hemispheric, 10–15 × 12–13 mm, in terminal and axillary lax panicles. Phyllaries in 3 or 4 series, usually distinctly purple tipped, outer ones shorter, linear-lanceolate, 2–4 × ca. 1 mm, with multicellular hairs, inner linear-lanceolate, 8–9 × ca. 0.9 mm, ciliate. Receptacle flat, 6–11 mm in diam., with white, multicellular hairs. Corollas yellow, tubular; marginal florets 8–9 mm, 3- or 4-lobed; central florets 9–10 mm with 5 triangular lobes, lobes with sessile glands and multicellular hairs. Achenes oblong to cylindric, 1.2–1.4 × ca. 0.5 mm, 10-ribbed, sparsely hirsute. Pappus white, 5–6 mm. Fl. Aug–Apr. $2n = 16$.

Thickets, grassy slopes at forest margins; 100–1900 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan (Ryukyu Islands), Thailand, Vietnam].

4. Blumea riparia Candolle, Prodr. 5: 444. 1836.

假东风草 jia dong feng cao

Conyza riparia Blume, Bijdr. 899. 1826, not Kunth (1818).

Shrubs, scandent. Stems 0.5–2.5 m tall, somewhat pubescent among synflorescences. Leaves petiolate; petioles usually distinct, narrow, up to 6 mm, not amplexicaul; leaf blade ovate-lanceolate, 5–13 × 1.5–4 cm, ± glabrous on both surfaces, base rounded or sometimes subacute, margin remotely denticulate without coarser teeth, apex acuminate. Capitula 5–8 mm in diam., on short peduncles (1–7 mm) in tight or loose clusters in axillary and terminal panicles. Involucre 5-seriate; phyllaries of outer 2 series ovate, 2.2–3.5 mm, pubescent, of inner 2 series narrowly oblong to linear, ca. 7 mm. Receptacle 2–3 mm in diam., densely long hairy. Corollas yellow, 5.5–7 mm; lobes of central florets with glandular and few or many eglandular hairs. Pappus white. Fl. Jan–Jun. $2n = 18$.

Forests, thickets, streamsides; 400–1800 m. Guangdong, Guangxi, Taiwan, Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam; Pacific islands (Solomon Islands)].

5. Blumea sagittata Gagnepain, Bull. Soc. Bot. France 68: 43. 1921.

戟叶艾纳香 ji ye ai na xiang

Herbs. Stems 60–150 cm tall, usually not branched, terete, densely pale brown pilose. Leaves sessile or very shortly petiolate up to 5 mm, oblong-lanceolate or lanceolate, rarely elliptic, 6–20 × 2.5–7 cm, abaxially densely pilose, adaxially scabrid with prominent hairs, base sagittate with 2 distinct acute auricles, margin distantly and minutely dentate, apex acute or shortly acuminate. Capitula in a large, terminal, bracteate panicle. Involucre campanulate, ca. 10 mm; phyllaries in 5 series, outer ones lanceolate, ca. 1.5 mm, abaxially pubescent and glandular, median linear, 3–5 mm, pubescent and glandular adaxially, inner linear, ca. 7 mm, dry membranous, glabrous. Receptacle 2–3 mm in diam., alveolate, fimbrillate. Corollas yellow, tubular; marginal florets filiform, ca. 5 mm, subequally 5-lobed; central florets 5–6 mm, with 5 ovate, acute lobes. Anther tails longer than thickened portion of filament. Achenes spindly, ca. 1.2 mm, pubescent, 10-ribbed. Pappus light yellow or whitish yellow, ca. 8 mm. Fl. Aug–Dec.

Mixed forests, moist grassy slopes, thickets; 500–1000 m. Guangxi, Guizhou, Yunnan [Laos, Vietnam].

6. Blumea hookeri C. B. Clarke ex J. D. Hooker, Fl. Brit. India 3: 269. 1881.

薄叶艾纳香 bao ye ai na xiang

Blumea densiflora Candolle var. *hookeri* (C. B. Clarke ex J. D. Hooker) C. C. Chang & Y. Q. Tseng.

Herbs, perennial, coarse. Stems erect, puberulent. Leaves pinnatifid, subsessile, elliptic, 7–38 × 3–18 cm, puberulent on both surfaces, base long attenuate, apex acuminate; lobes 3–5 pairs, oblong to lanceolate, acuminate, subentire or remotely serrulate, sometimes also with few coarse teeth. Capitula numerous, in open, leafy, rounded or elongate, terminal panicles. Involucre in 5 or 6 series; phyllaries 2–6 mm, outermost oblong-lanceolate, pubescent, others linear. Receptacle glabrous, sometimes sparsely hairy. Corolla lobes of central florets with minute glandular pubescence and eglandular hairs. Ovaries pubescent; pappus somewhat reddish. Fl. Jan–Apr.

Forests; 1200–2800 m. Yunnan [Bhutan, NE India, Vietnam].

7. Blumea linearis C. I Peng & W. P. Leu, Bot. Bull. Acad. Sin. 40: 53. 1999.

条叶艾纳香 tiao ye ai na xiang

Subshrubs, to 1.5–2.5(–3) m tall. Stems striate, center hollow, base woody, 1.5–2.5 cm in diam., puberulent or sometimes glabrate; main stems usually simple or 2–4-branched from middle. Leaves linear, 25–35 × 2.5–3.5 cm, herbaceous, rugose, villous abaxially, sparsely pilose adaxially, base attenuate into a short petiole, margin remotely biserrate, apex acute; veins 24–30 pairs. Capitula numerous, pedunculate, terminal and axillary, in a pyramidal panicle. Involucre globose-campanulate; phyllaries in 2 or 3 series, outer ones shorter, linear-lanceolate, 2–3 × 0.7–0.9 mm, compressed, abaxially with numerous sessile glands and multicellular hairs, inner linear-lanceolate, 7–8 × ca. 0.6 mm, margins scarious, margins and apices ciliate. Receptacle convex, 1.5–2 mm in diam., alveolate, sparsely pilose. Marginal florets ca. 6 mm, 2- or 3-lobed, glabrous. Central florets yellowish, 6–7 mm, with 5 triangular lobes, lobes with sessile glands and sparsely multicellular hairs. Achenes pale brown, oblong-terete, 1.1–1.3 × ca. 0.3 mm, pilose, 10-ribbed. Pappus pale brown to yellowish white, 5–6 mm. Fl. and fr. Mar–May. $2n = 18$*.

• Roadsides, riverbanks; below 400 m. Taiwan.

8. Blumea martiniana Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 26. 1903.

裂苞艾纳香 lie bao ai na xiang

Blumea henryi Dunn; *B. tonkinensis* Gagnepain; *Leveillea martini* Vaniot.

Subshrubs, 1.5–2.5 m tall. Stems branched, woody; branches terete, densely matted-lanate with long, white hairs. Leaves ± sessile, oblanceolate to oblong-oblanceolate, 15–40 × 4–15 cm, very densely lanate abaxially with long white hairs, pilose adaxially with prominent multicellular hairs, base tapering into an indistinct petiole, margin distantly denticulate-mucronulate, apex shortly acuminate; epidermal cells with sinuate walls, stomata only on abaxial surface. Capitula in axillary clusters of 2–4, arranged ultimately in large panicles, pedunculate, 14–17 mm in diam.; peduncles up to 15 mm, along with rest of panicle branches densely white lanate. Phyllaries slightly longer than florets, 3–12 mm, linear, apex acute, outer densely lanate on abaxial surface, inner gradually scarious. Receptacle 4–6 mm in diam., flat, alveolate, glabrous. Corollas reddish yellow, tubular; those of marginal florets filiform, ca. 6 mm, 2- or 3-lobed, glabrous; those of central florets 6–7 mm, with 5 lobes, lobes triangular-ovate, acute, papillate, pubescent with long multicellular hairs and colleters. Anther tails equal in length to thickened portion of filament. Achenes brown, columnar, densely pubescent, finely ca. 10-ribbed. Pappus yellowish white, 5–7 mm. Fl. Oct–Feb.

Ravines, forests; 600–1300 m. Guangxi, Guizhou, Yunnan [Vietnam].

9. Blumea lanceolaria (Roxburgh) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 4: 609. 1917.

千头艾纳香 qian tou ai na xiang

Conyza lanceolaria Roxburgh, Fl. Ind., ed. 1832, 3: 432. 1832; *Bileveillea granulatifolia* H. Léveillé; *Blumea lanceolaria* var. *spectabilis* (Candolle) Randeria; *B. myriocephala* Candolle; *B. spectabilis* Candolle.

Herbs or subshrubs, perennial, erect, 1–2.5 m tall. Stems striate, green, woody at base, hollow in center, 1–25 cm in diam., glabrate or puberulent particularly on younger parts and in synflorescence, usually unbranched except for synflorescence. Leaves herbaceous, dark green adaxially, narrowly oblong to oblanceolate, 20–30 × 4–8 cm, abaxially glabrate or puberulent with sparse multicellular hairs, adaxially often rugose and glabrous, base attenuate into auriculate petiole, margin minutely serrate-dentate, apex acuminate; veins 14–16 pairs. Capitula numerous, 7.5–8.5 × 2.5–3.5 mm, terminal, in a pyramidal panicle. Involucre campanulate-globose; phyllaries in 2 or 3 series, outer ones shorter, ovate-lanceolate to linear, 6.5–7.5 ×

ca. 0.5 mm, with prominent scarious margins, margins and apices ciliate. Receptacle flat, 1.5–2.5 mm in diam., alveolate, fimbriate or densely pilose. Marginal florets 6–7 mm, 2- or 3-lobed, glabrous. Central florets yellowish, 6.5–7.5 mm, with 5 broadly triangular lobes, lobes with sessile glands and remote multicellular hairs. Anthers sagittate, tailed. Achenes oblong, ca. 1 × 0.3–0.4 mm, 10-ribbed, pubescent. Pappus pale reddish, ca. 5 mm. Fl. Jan–Apr. $2n = 18$.

Forests, grassy slopes, riversides; 400–1500 m. Guangdong, Guangxi, Guizhou, Taiwan, Yunnan [Bhutan, India, Indonesia, Japan, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam].

10. Blumea balsamifera (Linnaeus) Candolle, Prodr. 5: 447. 1836.

艾纳香 ai na xiang

Conyza balsamifera Linnaeus, Sp. Pl., ed. 2, 2: 1208. 1763; *Baccharis salvia* Loureiro; *Blumea balsamifera* var. *microcephala* Kitamura; *Pluchea balsamifera* (Linnaeus) Lessing.

Shrubs or subshrubs, perennial, erect, 1–3 m tall. Stems corymbosely branched, woody at base; bark grayish brown; branches terete, densely lanate-villous with yellowish white hairs. Leaves narrowly oblong, 15–18 × 3.5–5 cm, abaxially densely silky-lanate, adaxially rugose and pilose with blunt multicellular hairs, base narrowed, auriculate, auricles 10–12 mm on short petiole, margin serrulate to serrate usually with upcurved teeth, apex acuminate; veins 10–12 pairs. Capitula 6–7 mm, in spreading pyramidal panicles, pedunculate. Involucres campanulate; phyllaries in 3 or 4 series, densely lanate on outer surface, outer ones smaller, oblong-lanceolate 1–3 mm, compressed, inner longer, linear 5–6 mm. Receptacle 2.5–3 mm in diam., flat, alveolate, glabrous. Marginal florets filiform, to 6 mm, 2–4-lobed. Central florets yellow, tubular, 6–7 mm, lobes papillate, with sessile glands and sparse multicellular hairs. Achenes brown, terete, oblong, ca. 1 mm, sparsely hirsute. Pappus reddish, 4–6 mm. Fl. year-round. $2n = 18$.

Dry fields, thickets, grasslands, mountain slopes, riverbanks; below 1200 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam].

11. Blumea formosana Kitamura, Acta Phytotax. Geobot. 2: 38. 1933.

台北艾纳香 tai bei ai na xiang

Herbs, annual, erect, 70–90 cm tall. Stems pale, striate, densely white villous particularly in younger parts, somewhat woody at base, 0.4–0.7 cm in diam., branched above. Lower leaves larger, obovate-oblong to spatulate, 16–18 × 4–7 cm, papery, appressed white lanate abaxially, puberulent adaxially, base attenuate, margin regularly and remotely mucronulate, apex acute; veins 10–12 pairs. Capitula 8–10 × 4–5 mm, in lax panicles, pedunculate. Involucre globose-campanulate; phyllaries in 3 or 4 series, outer ones shorter, linear-lanceolate, 2–3 × 0.5–0.6 mm, outer surface with numerous sessile glands and multicellular hairs, inner ones linear, 6–7 × ca. 0.5 mm, margins ciliate. Receptacle slightly convex, 3–4 mm in diam., alveolate, glabrous. Marginal florets filiform, 5–6 mm, limbs 2- or 3-lobed. Central florets yellowish, tubular, 6–7 mm, with 5 broadly triangular lobes, lobes with sessile glands and sparse multicellular hairs. Achenes brownish, oblong, ca. 1 × 0.4 mm, ribbed, glandular hairy. Pappus brownish, 4–5 mm. Fl. Aug–Nov.

• Semishaded broad-leaved forests, plantation floors, forest margins, grassy slopes. Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Taiwan.

12. Blumea aromatica Candolle, Prodr. 5: 446. 1836.

馥芳艾纳香 fu fang ai na xiang

Blumea emeiensis Z. Y. Zhu; *B. leptophylla* Hayata; *Conyza setschwanica* Handel-Mazzetti; *Gynura taiwanensis* S. S. Ying.

Subshrubs, perennial, erect, 0.8–2.2 m tall. Stems green, striate, solid, usually woody at base, 0.5–2.5 cm in diam., branching apically; branches terete, viscid-tomentose particularly in synflorescence axes with intermixed glands and multicellular hairs. Lower leaves larger, narrowly oblong, 24–30 × 10–12 cm, villous abaxially, with multicellular hairs and numerous sessile glands (colleters), pilose adaxially, base attenuate, margin irregularly doubly dentate mucronulate, apex acuminate; veins 14–16 pairs. Capitula 8–12 × 8–15 mm, in large terminal and axillary lax panicles, pedunculate, viscid. Involucre globose-campanulate; phyllaries in 3 or 4 series, outer ones shorter, linear-lanceolate, acuminate, with numerous colleters and multicellular hairs on outer surface, reflexed, inner linear. Receptacle 2.5–3 mm in diam., slightly convex, alveolate, minutely fimbrillate. Marginal florets filiform, 6.5–7.5 mm, 2- or 3-lobed, generally glabrous. Central florets yellow, tubular, 7–8 mm, lobes 5, broadly triangular, pubescent, with colleters and sparse multicellular hairs. Achenes pale brown, oblong, 1–1.4 mm, 6–10-ribbed, hirsute. Pappus pale brown, 5–6 mm. Fl. Oct–Apr. $2n = 18$.

Forest margins, grassy slopes; 300–2400 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Myanmar, Nepal, Thailand, Vietnam].

13. Blumea conspicua Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 151. 1911.

大花艾纳香 da hua ai na xiang

Blumea fruticosa Koidzumi.

Subshrubs, perennial, erect, 2.5–3.5 m tall. Stems green, striate, terete, usually ligneous at base, 2–3.5 cm in diam. Leaves narrowly oblong, 30–45 × 10–15 cm, villous abaxially, sparsely pilose adaxially, base attenuate, margin doubly dentate, spinescent, apex acuminate; veins 11–13 pairs. Capitula 7–9 × 4–5 mm, in large, terminal and axillary lax panicles, pedunculate. Involucre globose-campanulate; phyllaries in 3 or 4 series, outer ones shorter, linear-lanceolate, 2–3 × 0.7–0.9 mm, with numerous sessile glands and multicellular hairs, inner linear, 6–7 × 0.6–0.8 mm, margins ciliate. Receptacle slightly convex, 2.5–3 mm in diam., alveolate, remotely pilose. Marginal florets filiform, 6–7 mm. Central florets yellow, 7–8 mm, with 5 triangular lobes, lobes with sessile glands and multicellular hairs. Achenes pale brown, oblong, terete, 1.2–1.4 × 0.4–0.5 mm, pilose, 10-ribbed. Pappus brownish, 5–6 mm. $2n = 54$.

Broad-leaved monsoon forests. Taiwan [Japan].

14. Blumea tenuifolia C. Y. Wu ex C. C. Chang & Y. Q. Tseng, Fl. Reipubl. Popularis Sin. 75: 44. 1979.

狭叶艾纳香 xia ye ai na xiang

Blumea gracilis Dunn, J. Linn. Soc., Bot. 35: 502. 1903, not Candolle (1836).

Perennials. Stems 45–85 cm tall, unbranched, pilose and glandular above. Lower leaves sessile, linear-lanceolate, 4–7.5 cm × 4–8 mm, abaxially densely pilose, adaxially scabrid or glabrescent, base decurrent, margin sparsely serrulate, apex obtuse. Capitula few, 6–8 mm in diam., in panicles. Involucre campanulate, 6–8 mm; phyllaries in 4 series, linear, outer ones leaflike, 2–3 mm, abaxially pilose and glandular, inner 6–8 mm, membranous, apex pubescent abaxially. Receptacle flat, ca. 2 mm in diam., glabrous. Corollas yellow; marginal florets numerous, 2–3 mm, limbs 3-dentate, glabrous; central florets few, corolla tubular, 3–3.5 mm, limbs 5-lobed, densely pubescent. Achenes columnar, pubescent, ca. 1 mm. Pappus white, ca. 4 mm. Fl. Nov.

● Evergreen forests, moist valleys; 900–1900 m. Yunnan.

15. Blumea oxyodonta Candolle in Wight, Contr. Bot. India, 15. 1834.

尖齿艾纳香 jian chi ai na xiang

Placus oxyodontus (Candolle) Kuntze.

Perennials, with short taproot. Stems usually numerous, prostrate or ascending, 15–30(–40) cm, finely pubescent. Leaves ± sessile, elliptic to obovate, 1–5 × 0.5–1.5 cm, both surfaces sparsely to densely villous and stipitate glandular, base cuneate, margin with a few sharp subspinose teeth, apex acute. Capitula few in terminal and axillary panicles. Involucre ca. 4-seriate; phyllaries lanceolate to linear, 2–6 mm, with long eglandular hairs and some stalked glands. Receptacle glabrous. Corollas yellow, ca. 4 mm; lobes of marginal florets with few eglandular hairs, lobes of central florets with dense minute glandular pubescence and some long eglandular hairs. Anthers white, unribbed, ca. 0.6 mm. Pappus white, 3–4 mm. Fl. Mar–Jul. $2n = 18$.

Grasslands, forests; 1200–1700 m. Yunnan [Bhutan, India, Myanmar, Nepal, Pakistan, Thailand, Vietnam].

16. Blumea lacera (N. L. Burman) Candolle in Wight, Contr. Bot. India, 14. 1834.

见霜黄 jian shuang huang

Conyza lacera N. L. Burman, Fl. Indica, 180. 1768; *Blumea bodinieri* Vaniot; *B. chevalieri* Gagnepain; *B. duclouxii* Vaniot; *B. glandulosa* Candolle; *B. subcapitata* Candolle; *B. velutina* (H. Léveillé & Vaniot) H. Léveillé & Vaniot; *C. velutina* (H. Léveillé & Vaniot) H. Léveillé; *Senecio velutinus* H. Léveillé & Vaniot.

Herbs, annual or biennial, erect, 20–100 cm tall. Stems simple or more often branched, terete, densely velutinous with silky hairs or glandular trichomes; branches sometimes ascending. Leaves sessile or petiolate, elliptic to oblong, 10–12 × 3.5–4.5 cm, lanate abaxially, tomentose adaxially, base attenuate, margin doubly serrate or sometimes slightly variously lyrately lobed, apex obtuse; veins 5–8 pairs. Capitula 7–8 × 2.5–3.5 mm, in axillary and terminal dense to lax panicles. Involucres campanulate; phyllaries in 2 or 3 series, outer ones shorter, linear-lanceolate, 1.5–2.5 × 0.2–0.3 mm, densely velutinous with multicellular and glandular hairs, inner linear, 4–5 × 0.2–0.3 mm, margins ciliate. Receptacle convex, alveolate, glabrous. Marginal florets ca. 5 mm, 2–5-lobed, limb glandular. Central florets yellowish, 6–7 mm, with 5 triangular lobes, lobes with sessile glands and multicellular hairs. Achenes oblong, sparsely hirsute. Pappus white, ca. 4 mm. Fl. Feb–Jun. $2n = 18$, 36.

Common, dry fields, grasslands, roadsides, forest margins; 100–800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bhutan, India, Japan, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Sri Lanka, Thailand, Vietnam; Africa, N Australia, Pacific islands (Guam)].

17. Blumea sessiliflora Decaisne, Nouv. Ann. Mus. Hist. Nat. 3: 410. 1834.

无梗艾纳香 wu geng ai na xiang

Herbs. Stems branched or simple, terete, 0.8–2 m tall, glabrate at base, tomentose above. Leaves sessile, 4–16 × 1.4–6 cm, oblanceolate, lower leaves usually lyrately lobed, upper leaves entire, all velutinous-pilose on both surfaces. Capitula 3–5, in spiciform panicle, sessile or sometimes pedunculate, 5–6 mm; peduncles when present up to 10 mm. Involucre columnar or campanulate, 4–6 × 1.5–6.5 mm, herbaceous; phyllaries in ca. 5 series, outer and middle ones lanceolate or linear-lanceolate, 2–4 mm, abaxially densely pubescent, margin dry membranous, inner linear, 4–6 mm, dry membranous, abaxially glabrous or sparsely pubescent, apex acuminate. Receptacle 1.5–3 mm in diam., slightly convex, alveolate, glabrous. Corollas yellow, tubular; marginal florets numerous, corolla filiform, 3.5–4 mm, limbs 3-dentate, glabrous; central florets few, corolla tubular, 4–5 mm, with 5 triangular, papillate and pubescent lobes. Achenes brown, puberulent, ca. 1 mm, 8–10-ribbed. Pappus white, 4–5 mm. Fl. Jun–Oct.

Grassy slopes; below 700 m. Guangdong, Hainan, Jiangxi [India, Indonesia, Myanmar, Thailand, Vietnam].

18. Blumea saussureoides C. C. Chang & Y. Q. Tseng, Acta Phytotax. Sin. 16(3): 84. 1978.

全裂艾纳香 quan lie ai na xiang

Herbs, perennial. Stems up to 1.5 m tall, ca. 1.2 mm in diam., branched above, pubescent, more densely so on young branches and peduncles. Middle leaves with 1–3 cm long petioles or sessile, blade oblong, 12–15 × 5–7 cm, pinnatisect, both surfaces sparsely pilose and densely tomentulose, base sheathed, amplexicaul, apex obtuse; lateral lobes 3 or 4 pairs, unequal, alternate or subopposite above, oblong or obovate-oblong, 1.2–4 × 0.3–2 cm, margin irregularly toothed, apex shortly acute or obtuse, terminal lobe large, ovate-triangular to ovate-oblong, 5–7.5 × 2.5–5 cm, apex obtuse; upper leaves smaller, pinnatisect, 4.5–7 × 2–3.5 cm, both surfaces densely pilose, terminal lobes ovate-oblong or elliptic, apex shortly

acute; lateral lobes small; uppermost leaves very small, dissected, toothed or sometimes entire, bractlike. Capitula ca. 10 mm in diam., without or with 5–10 mm long peduncles, in terminal panicles. Involucre hemispheric, ca. 6 mm; phyllaries in 5 series, linear, apex light red, outer ones very small, 2–3 × 0.25–0.33 mm, abaxially densely pilose, apex acute, middle and inner ones 4–5 mm, abaxially pubescent, apex shortly acute. Receptacle 4–5 mm in diam., alveolate, pubescent. Corollas yellow; marginal florets filiform, 3–4 mm, limbs 3-lobed, glabrous; central florets few, corolla tubular, limbs 5-lobed, densely pubescent. Achenes ca. 0.8 mm, 6-ribbed, puberulent. Pappus white, ca. 3 mm. Fl. Mar–Apr.

● Riversides, roadsides; ca. 1600 m. Yunnan (Shuangbai).

19. Blumea sinuata (Loureiro) Merrill, Trans. Amer. Philos. Soc., ser. 2, 24(2): 388. 1935.

六耳铃 liu er ling

Gnaphalium sinuatum Loureiro, Fl. Cochinch. 2: 497. 1790; *Blumea glandulosa* Bentham (1861), not Candolle (1834); *B. laciniata* Candolle; *B. okinawensis* Hayata; *B. onnaensis* Hayata.

Herbs, annual or biennial, erect, 0.5–1.5 m tall. Stems striate, often branched from base, pilose with multicellular hairs and stipitate glands; branches sometimes ascending. Leaves membranous, 12–20 × 6–8 cm, pilose on both surfaces, base attenuate into petiole, margin often runcinate-lyrate and distantly dentate, teeth apiculate, apex obtuse; veins 8–10 pairs. Capitula numerous in terminal, dense to lax panicles, pedunculate; peduncles villous, glandular. Phyllaries in 2 or 3 series, outer ones shorter, linear-lanceolate, 2–3 × ca. 0.6 mm, villous on outer surface, inner longer, linear, 7–8 × ca. 0.6 mm, margins ciliate. Receptacle convex, 3–4 mm in diam., alveolate, pilose around alveolae or sometimes glabrous. Marginal florets ca. 7 mm, 3–5-lobed, glabrous. Central florets yellow, 7–8 mm, with 5 broadly triangular lobes, lobes with sessile glands and remote multicellular hairs. Achenes brown, oblong, ca. 1 × 0.3 mm, 10-ribbed, sparsely hirsute. Pappus white, 3–4 mm. Fl. Oct–May. $2n = 18$.

Waste fields, thickets; 200–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Sri Lanka, Vietnam; Pacific islands (Hawaii, Solomon Islands)].

20. Blumea virens Candolle in Wight, Contr. Bot. India, 14. 1834.

绿艾纳香 lü ai na xiang

Herbs, 10–180 cm tall. Rhizome fibrous. Stems simple or branched, quite glabrous or rarely sparingly pilose. Leaves sessile, 3–22 × 0.7–10 cm; lower ones oblanceolate, lyrately lobed with terminal lobe obovate and lateral lobes broadly triangular to oblong, margin serrate with apiculate teeth, apex apiculate; upper ones obovate to oblanceolate, lobed or not, apiculate-serrate with minute teeth, both surfaces glabrate or sparingly pilose. Capitula usually in large, spreading, lax, terminal, leafy panicles, pedunculate, 5–7 mm in diam.; ultimate peduncles ca. 3 cm, bracteate, glabrous. Involucre columnar, 6–7 mm; phyllaries in 5 or 6 series, herbaceous, entirely reflexed at maturity, linear, 1–7.5 mm, sparsely pilose on abaxial surface with white, spreading hairs and colleters, apex mucronate, inner series with prominent scarious margins. Receptacle 2–2.5 mm in diam., convex, alveolate, glabrous. Corollas yellow, tubular; marginal florets filiform, 4–4.5 mm, 2- or 3-lobed, glabrous; central florets 4.5–5 mm, with 5 triangular, papillate lobes. Achenes oblong-columnar, ribbed, sparsely hairy. Pappus white, up to 4 mm. Fl. Feb–Apr. $2n = 18$.

Dry places, open thickets; ca. 1400 m. Yunnan [Bhutan, Cambodia, India (including Andaman Islands), Laos, Malaysia, Myanmar, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam].

This species is similar to *Blumea membranacea* but differs in the plant entirely lacking glandular hairs except on bisexual corolla lobes; stems and synflorescence axes glabrous or sparsely pilose; and leaves membranous, usually more regularly serrate, glabrescent or sparsely pilose on both surfaces.

21. Blumea napifolia Candolle, Prodr. 5: 440. 1836.

芜菁叶艾纳香 wu jing ye ai na xiang

Herbs, 15–70 cm tall. Stems subglabrous at base, densely puberulent with numerous colleters above, especially on synflorescence axes. Leaves 1–12 × 0.5–5.6 cm, lower ones distinctly petiolate, upper ones subsessile, obovate, upper leaves entire, lower leaves lyrately lobed with terminal lobe ± orbicular, lateral lobes smaller, linear-oblong, all puberulent abaxially, sparsely pilose adaxially, margin dentate with broadly triangular, apiculate teeth, apex obtuse. Capitula at ends of axillary branches, clustered, ultimately disposed into a lax panicle, pedunculate, 3–5 mm in diam.; peduncles up to 15 mm, densely glandular, elongating in fruit. Involucre with phyllaries longer than florets, entirely reflexed at maturity, 1–5 mm, linear, tapering, with broad, scarious margins. Receptacle 1–2 mm in diam., flat, glabrous. Corollas orange-yellow, tubular; corollas of marginal florets filiform, 2–3 mm, 2- or 3-lobed, glabrous; those of central florets pubescent with colleters. Anther tails shorter than thickened portion of filament. Achenes brown, oblong, sparsely pubescent, 5-ribbed. Pappus white, up to 3 mm. Fl. Jan–Mar.

Fields, grasslands, open hillslopes. Yunnan (Yangbi) [India, Laos, Malaysia, Myanmar, Thailand, Vietnam].

22. Blumea membranacea Candolle, Prodr. 5: 440. 1836.

长柄艾纳香 chang bing ai na xiang

Blumea balansae Gagnepain.

Annuals, 7–100 cm. Stems usually simple, glandular-pubescent, sometimes with few longer eglandular hairs above. Leaves simple; petiole to 3 cm; blade obovate or lyrate, often oblanceolate in outline, with 1 or 2(or 3) pairs of lateral lobes, 2–13 × 1–5 cm, thinly herbaceous, pubescent on both surfaces, sometimes stipitate glandular adaxially at least in synflorescence, base narrowly attenuate, usually petiolate, margin denticulate (to shallowly dentate), apex acute or obtuse. Capitula rather few in narrow terminal panicles. Involucre ca. 4 mm in diam.; phyllaries purplish tinged, 6-seriate, 2–6.5 mm, glandular-pubescent, sometimes with few eglandular hairs, outermost

lanceolate, inner ones linear. Receptacle glabrous. Corollas yellow; marginal florets 3.5–4.5 mm; central florets 4.5–5.5 mm, lobes with glandular hairs and sometimes very reduced eglandular ones. Pappus white. Fl. Feb–Jun.

Forests, valleys along streams; 300–1400 m. Guangdong, Guangxi, Hainan, Yunnan [India, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam].

23. Blumea clarkei J. D. Hooker, Fl. Brit. India 3: 267. 1881.

七里明 qi li ming

Blumea hongkongensis Vaniot; *B. hirsuta* King-Jones, nom. illeg. superfl.; *B. lessingii* Merrill; *B. malabarica* J. D. Hooker.

Perennials, 1.2–1.4 m tall. Stems erect, pubescent at least above. Leaves subsessile or sometimes petiolate up to 5 mm, elliptic or oblanceolate, 4.5–12 × 0.7–2.5 cm, grayish abaxially, sparsely pubescent on both surfaces, base attenuate, margin remotely serrulate, apex briefly acuminate. Capitula in narrow often spicate panicles; peduncles 5–10(–20) mm. Involucre ca. 5-seriate, ca. 6 mm in diam.; phyllaries linear, 2.5–8 mm, appressed pubescent and sparsely glandular. Receptacle densely pilose. Corollas yellow, 5.5–7 mm, lobes of central florets with few glandular and eglandular hairs. Pappus white, ca. 7 mm. Fl. Oct–May. $2n = 20$.

Grasslands, thickets; below 1000 m. Fujian, Guangdong, Guangxi, Hainan, Jiangxi [India, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

24. Blumea oblongifolia Kitamura, Acta Phytotax. Geobot. 2: 37. 1933.

长圆叶艾纳香 chang yuan ye ai na xiang

Herbs, erect, 0.8–1.2 m tall, rootstock fibrous. Stems terete, striate, usually unbranched except in synflorescence, velutinous particularly on younger parts, terete. Leaves subsessile or shortly petiolate, oblong-lanceolate, 11–13 × 3–5 cm, velutinous, hairs with prominent base adaxially, ± villous abaxially, base attenuate, margin distantly serrate with mucronate teeth, apex acute; veins 5 or 6 pairs. Capitula 10–12 × 6–8 mm, in terminal and axillary panicles; peduncles to 20 mm. Involucre globose-campanulate; phyllaries in 2–4 series, sometimes purple tipped, outer ones linear-lanceolate, 3–4 × 0.5–0.6 mm, margins ciliate. Receptacle slightly convex, 4–5 mm in diam., alveolate, remotely pilose. Corollas yellowish, tubular; marginal florets filiform, 7–8 mm, with 3–5 lobes; central florets 8–9 mm, with 5 triangular lobes, lobes with sessile glands and multicellular hairs. Achenes pale brown, oblong, sparsely hirsute, ribbed. Pappus white, 5–6 mm. Fl. Aug–Apr.

Fields, grassy slopes, streamsides, roadsides. Fujian, Guangdong, Jiangxi, Taiwan, Zhejiang [India, Myanmar, Vietnam].

25. Blumea adenophora Franchet, J. Bot. (Morot) 10: 382. 1896.

具腺艾纳香 ju xian ai na xiang

Herbs, slender, 20–40 cm tall. Stems branched from base, terete, pubescent with white hairs and stipitate glands. Leaves sessile, lanceolate, 2–4 × 0.5–1 cm, pubescent on both surfaces with stipitate hairs, clavate glands, and short whitish hairs, base tapering, margin distantly serrate with 2–4 teeth, apex apiculate. Capitula axillary and terminal, in short, dense, racemose panicles, subsessile to shortly pedunculate, 4–6 mm in diam. Involucre campanulate or columnar; phyllaries in 3 or 4 series, linear, purple red adaxially, outer ones ca. 3 mm, abaxially densely pubescent, apex shortly acute, middle and inner ones dry membranous, 6–7 mm, abaxially densely pubescent. Receptacle 2–3 mm in diam., alveolate, slightly pilose. Corollas yellow; marginal florets numerous, corolla tubular, 3–4 mm, limbs 2- or 3-dentate, glabrous; central florets 4–5 mm, with 5 ovate, acute, papillate and densely pubescent lobes. Achenes brown, oblong, puberulent, 10-ribbed. Pappus white, 3–4 mm. Fl. Apr–May.

Mountain slopes, fields; ca. 1800 m. Yunnan [Vietnam].

26. Blumea fistulosa (Roxburgh) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 46: 187. 1877.

节节红 jie jie hong

Conyza fistulosa Roxburgh, Fl. Ind., ed. 1832, 3: 429. 1832; *Blumea amethystina* Hance; *B. glomerata* Candolle; *B. purpurea* Candolle; *B. racemosa* Candolle; *B. vaniotiana* H. Léveillé.

Herbs, annual. Stems simple, erect, 15–100 cm, shaggily pubescent above. Leaves oblanceolate to obovate, 3–15 × 0.5–5 cm, pubescent (rarely sparsely pilose) on both surfaces, base narrowly long attenuate, margin bidentate (sometimes sublobulate), apex acute. Capitula in small ± sessile clusters arranged in interrupted spikelike terminal racemes or sparsely branched panicles. Involucres 4- or 5-seriate, ca. 3.5 mm in diam.; phyllaries purplish adaxially, mostly recurved from middle by anthesis, 2.5–6 mm, pubescent, sparsely glandular, outer series ± lanceolate, remainder linear. Receptacle sparsely shortly pubescent. Corollas yellow, 4.2–5 mm, lobes of central florets with glandular and few eglandular hairs. Pappus white. Fl. Oct–Apr. $2n = 18, 30$.

Grasslands, sparse forests; 300–1900 m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand, Vietnam].

27. Blumea axillaris (Lamarck) Candolle, Prodr. 5: 434. 1836.

柔毛艾纳香 rou mao ai na xiang

Conyza axillaris Lamarck, Encycl. 2: 84. 1786; *Blumea mollis* (D. Don) Merrill; *B. wightiana* Candolle; *Erigeron mollis* D. Don.

Herbs, annual or biennial, erect, 5–120 cm tall, with a taproot. Stems terete, softly pilose with spreading hairs and glands, viscid-tomentose particularly on younger parts and on synflorescence axes. Leaves ovate-oblong, 9–11 × 3.5–4 cm, papery, densely silky-villous on both surfaces with soft multicellular hairs and glands, base attenuate, margin closely doubly serrate, apex obtuse to apiculate; veins 5–7 pairs. Capitula in terminal, narrow, compact, spiciform panicle, subsessile to pedunculate. Involucre campanulate; phyllaries in 3 or 4 series, outer ones shorter, linear-lanceolate, 3–4 × 0.6–0.8 mm, densely softly villous and with multicellular hairs and glands, inner linear, 5–6 × 0.2–0.3 mm, margins scarious, ciliate. Marginal florets 3.5–4.5 mm, 2- or 3-lobed, glandular. Central florets pinkish purple

apically, whitish or yellowish at base, 3.5–4.5 mm, with 5 triangular lobes, lobes pubescent and with sessile glands. Receptacle convex, 1.8–2 mm in diam., alveolate, glabrous. Achenes oblong, ca. 0.8 × 0.2–0.3 mm, pubescent. Pappus white, 3–4 mm. Fl. year-round. $2n = 18, 36$.

Open waste fields, hillslopes, roadsides; below 1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Afghanistan, Bhutan, Cambodia, India, Indonesia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australia, Pacific islands (New Caledonia)].

28. Blumea hieraciifolia (Sprengel) Candolle in Wight, Contr. Bot. India, 15. 1834 [*"hieracifolia"*].

毛毡草 mao zhan cao

Conyza hieraciifolia Sprengel, Syst. Veg. 3: 514. 1826 [*"hieracifolia"*], based on *Erigeron hieraciifolius* D. Don, Prodr. Fl. Nepal. 172. 1825 [*"hieracifolium"*], not Poiret (1808); *Blumea chinensis* Walpers (1843), not (Linnaeus) Candolle (1836), nor Hooker & Arnott (1837); *B. hieraciifolia* var. *macrostachya* (Candolle) J. D. Hooker; *B. macrostachya* Candolle.

Herbs, perennial, erect, 50–120 cm tall, with a fibrous rootstock. Stems terete, usually unbranched or sometimes branched from base, densely silky-villous to lanate particularly on younger shoots. Leaves elliptic, 12–14 × 4–5 cm, densely sericeous to lanate abaxially, silky-villous adaxially, base attenuate into petiole, margin minutely denticulate to nearly doubly denticulate, apex obtuse or acute; veins 5 or 6 pairs. Capitula 9–11 × 5–6 mm, in crowded axillary and terminal clusters, forming dense interrupted spicate synflorescences, sessile. Involucre globose-lanceolate, 3–4 × 0.6–0.7 mm, densely silky villous abaxially; phyllaries linear, 6–7 × 0.5–0.6 mm, margins ciliate. Receptacle convex, 2–4 mm in diam., alveolate, glabrous. Marginal florets 6–7 mm, 2- or 3-lobed. Central florets yellow, 7–8 mm, with 5 broadly triangular lobes, lobes with colleters and sparse multicellular hairs. Achenes oblong, 1–1.2 × ca. 0.25 mm, ribbed, sparsely pubescent. Pappus white, 3–4 mm. Fl. Sep–Mar. $2n = 48$.

Fields, grasslands; 300–1200 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Indonesia, Japan, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Thailand].

29. Blumea sericans (Kurz) J. D. Hooker, Fl. Brit. India 3: 262. 1881.

拟毛毡草 ni mao zhan cao

Blumea barbata Candolle var. *sericans* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 46: 188. 1877; *B. cavaleriei* H. Léveillé & Vaniot; *B. gnaphalioides* Hayata; *B. hamiltonii* Candolle; *B. hieraciifolia* (Sprengel) Candolle var. *hamiltonii* (Candolle) C. B. Clarke.

Herbs. Stems 60–100 cm tall, not branched or branched, white sericeous, more densely so in upper part. Leaves mostly basal, nearly in rosette; basal leaves obovate-spatulate, or oblanceolate, 6–12 × 2.5–3.5 cm, abaxially sericeous, adaxially white tomentose, later glabrescent, base decurrent into petioles forming wings, margin irregularly serrulate, apex obtuse; lateral veins 5 or 6 pairs, prominent; cauline leaves sparse, smaller upward, spatulate, spatulate-oblong, rarely oblong, 6–12 × 1.5–3 cm, surfaces densely sericeous or lanate, sessile or with winged petioles, margin regularly serrulate, apex rounded. Capitula 2–7 in spicate panicles, 6–10 mm in diam., sessile or with ca. 3 mm long peduncles. Involucre campanulate, ca. 8 mm; phyllaries in 4 series, outer ones 3–4 mm, abaxially densely white tomentose, apex shortly acute, middle and inner ones 5–8 mm, abaxially tomentose, margin membranous, apex acute to acuminate. Receptacle 2–4 mm in diam., glabrous, bullate. Corollas yellow; marginal florets numerous, corolla tubular, 6–7 mm, limbs shallowly 5-dentate, glabrous; central florets tubular, subequal to marginal ones in length, limbs 5-dentate, sparsely pubescent and papillary. Achenes columnar, 10–12 mm, pubescent, 4–10-ribbed. Pappus white, ca. 6 mm, scabrid. Fl. Apr–Aug.

Waste fields, grassy slopes. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Taiwan, Zhejiang [India, Indonesia, Myanmar, Philippines, Vietnam].

30. Blumea veronicifolia Franchet, J. Bot. (Morot) 10: 382. 1896.

纤枝艾纳香 xian zhi ai na xiang

Herbs, 20–30 cm tall. Stems branched from base, pubescent. Leaves shortly petiolate, mostly radical and a few cauline, lanceolate to obovate, 1.5–5 × 0.3–1 cm, both surfaces pubescent, base tapering into petiole, margin with multicellular hairs and serrate-dentate, apex obtuse or apiculate. Capitula few, crowded in terminal globose panicles, 3–5 mm in diam.; peduncles densely villous with stipitate glands, up to 5 mm. Involucre columnar, ca. 12 mm; phyllaries in 4 series, subequal in length, purple adaxially, lanceolate, outer ones abaxially densely hairy with glands, inner ones with scarious margins. Receptacle ca. 2 mm in diam., convex, alveolate, glabrous. Corollas rose-colored; marginal florets filiform, ca. 4 mm, usually 2-lobed, glabrous; central florets ca. 5 mm, with 5 triangular papillate lobes. Anther tails almost equal in length to thickened portion of filament. Achenes dark brown, columnar, sparsely pubescent, 5-ribbed. Pappus white, 3–4 mm. Fl. Apr–May.

• Waste fields; 600–1200 m. Sichuan, Yunnan.

192. INULA Linnaeus, Sp. Pl. 2: 881. 1753.

旋覆花属 xuan fu hua shu

Corvisartia Mérat.

Perennials or annuals. Stems not winged, sometimes with decurrent leaves, with or more frequently without resin canals. Leaves basal and cauline, alternate, simple, usually sessile, sometimes in a basal rosette, margins usually serrate to dentate, sometimes entire. Capitula heterogamous radiate to miniradiate, heterogamous disciform, or homogamous discoid, borne singly or in open, corymbiform arrays. Involucres hemispheric or campanulate, [5–]10–40 mm in diam.; phyllaries persistent, in 4–7+ series. Receptacles flat

or convex, smooth or alveolate, epaleate. Ray florets (15–)50–150+, female, fertile; corolla yellow to orange, lamina 10–30+ mm. Disk florets bisexual, mostly (50–)100–250+; corolla yellow, lobes 5; epidermis with straight cell walls, without needlelike crystals. Anthers ecalcarate, with branched tails; endothecial tissue radial; cells of antheropodium generally longer than wide. Pollen spines with a cavity. Style branches with acute sweeping hairs, not reaching furcation. Achenes ellipsoid or cylindric, ribbed; epidermis with elongated crystals. Pappus persistent, of basally connate, barbellate bristles or setiform scales usually in 1 series. $x = 8, 9, 10$.

About 100 species: Africa, Asia, Europe; 14 species (two endemic) in China.

Inula taiwanensis S. S. Ying (Mem. Coll. Agric. Natl. Taiwan Univ. 29(1): 78. 1989) could not be treated here because no material was seen by the present authors.

1a. Plants acaulescent; basal leaves rosette, obovate-spatulate; capitula densely congested, encircled by rosette of leaves ..... 1. *I. rhizocephala*

1b. Stems erect, leafy; capitula terminal on stems or branches, solitary or in corymbs.

2a. Capitula 5–8 cm in diam.; involucre 2.5–4.5 cm in diam.; outer phyllaries broadly ovate, herbaceous; perennial herbs; achenes glabrous, 4- or 5-angled; leaves abaxially densely white lanate.

3a. Peduncles 6–12 cm, capitula in loose corymb ..... 2. *I. helenium*

3b. Peduncles 0–4 cm, capitula in raceme ..... 3. *I. racemosa*

2b. Capitula generally less than 5 cm in diam., rarely up to 6–10 cm; outer phyllaries narrowly linear or lanceolate, herbaceous or dry membranous; herbs or shrubs; achenes pubescent or glabrous; leaves abaxially glabrous or pubescent or sericeous.

4a. Subshrubs; phyllaries unequal, innermost ones more than 2 × as long as outer, outer ones linear or subulate, dry membranous; leaves short, triangular ..... 4. *I. salsoloides*

4b. Perennial herbs; phyllaries subequal, rarely inner ones longer, outer ones linear, herbaceous; leaves not short and triangular.

5a. Capitula 6–10 cm in diam.; involucre 1.8–4 cm in diam.; outer phyllaries narrowly linear, usually reflexed, with long spreading purplish brown hairs; ray floret lamina 2–3 × as long as involucre, abaxially pilose; pappus white, achenes glabrous ..... 5. *I. hookeri*

5b. Capitula 1–5 cm in diam.; involucre 0.5–2 cm in diam.; outer phyllaries similar to inner ones, erect, pubescent or glandular; ray floret lamina abaxially glabrous; pappus white, slightly yellow, or red.

6a. Stems profusely branched from a woody rootstock ..... 6. *I. obtusifolia*

6b. Stems simple or corymbosely branched above.

7a. Basal and lower cauline leaves larger than upper leaves, decurrent to long petioles, persistent at anthesis; upper leaves erect; blade abaxially white lanate; achenes glabrous .... 7. *I. sericophylla*

7b. Basal and lower cauline leaves similar to upper cauline leaves, withering at anthesis; leaves spreading, abaxially glabrous or subglabrous; achenes pubescent, pilose, or glabrous.

8a. Leaf blade elliptic or oblong-lanceolate; involucre densely surrounded by bracteal leaves; outer phyllaries lanceolate-oblong; achenes glabrous ..... 8. *I. salicina*

8b. Leaf blade ovate, elliptic, lanceolate, or linear-lanceolate; involucre not surrounded by bracteal leaves; outer phyllaries linear, spatulate-linear, or linear-lanceolate; achenes pubescent, pilose, or glabrous.

9a. Leaves abaxially glabrous or pubescent on veins; pappus shorter than disk corolla; achenes glabrous.

10a. Leaf blade ovate or ovate-lanceolate, base rounded, cuneate, or auriculate, semiamplexicaul; pappus of 10 or 11 bristles ..... 9. *I. helianthus-aquatilis*

10b. Leaf blade elliptic-lanceolate, base rounded-auriculate; pappus of 5 or 6 bristles ..... 10. *I. hupehensis*

9b. Leaves abaxially sparsely pubescent; pappus as long as disk corolla; achenes pubescent or pilose.

11a. Capitula 2–3.5 cm in diam.; outer phyllaries shorter than inner ones; upper stems, peduncles, and leaves abaxially scabrid pubescent; biennials ..... 11. *I. caspica*

11b. Capitula 2.5–5 cm in diam.; phyllaries subequal or outer ones slightly shorter than inner ones; upper stems, peduncles, and leaves abaxially pubescent; perennials.

12a. Leaves linear-lanceolate, margin reflexed, base not auriculate; capitula 1–2.8 cm in diam.; outer phyllaries abaxially glandular ..... 12. *I. linariifolia*

12b. Leaves oblong, elliptic-lanceolate, or elliptic, margin not reflexed, base auriculate or not; capitula 2.5–5 cm in diam.; outer phyllaries abaxially glandular or not.

13a. Leaf base cordate, auriculate, semiamplexicaul ..... 13. *I. britannica*

13b. Leaf base narrower and not auriculate ..... 14. *I. japonica*

1. Inula rhizocephala Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 51. 1841.

羊眼花 yang yan hua

Conyza rhizocephala (Schrenk ex Fischer & C. A. Meyer) Ruprecht; *Inula rhizocephala* var. *intermedia* Kitamura; *I. rhizocephala* var. *rhizocephaloides* (C. B. Clarke) Kitamura; *I. rhizocephaloides* C. B. Clarke.

Perennials or biennials. Plants acaulescent. Leaves numerous, all radical, arranged in rosette, (5–)8–25(–35) cm in diam.; blade oblong or oblong-ovate, (2.5–)4–16 cm (together with petiole), (2–)2.5–3.5 cm wide, longer than synflorescence, both surfaces sparsely covered, but densely along prominent midvein abaxially, with long white multicellular appressed and sparse fine glandular hairs, base narrowed into winged petiole 2–3.5 cm, margin indistinctly and widely sinuate-dentate and densely ciliate, apex obtuse. Capitula numerous (8–20), 1.5–3 cm in diam., sessile or on densely pubescent peduncles 2–3 cm, arranged in dense semispherical sessile subcapitate synflorescences. Involucre 1.2–2 cm in diam., polyphyllous, multiseriate; phyllaries acute, violet and shortly ciliate distally, outer ones lanceolate-linear, 7–9 × 1–1.1 mm, unbent above, covered with hairs, inner ones linear or narrowly linear, ca. 1.2 cm × 0.8–1 mm, membranous, straight, finely glandular-pubescent. Ray florets yellow, ca. 1.5 cm, slightly longer than phyllaries, smooth; tube small, ca. 7 mm, almost 1/2 as long as pappus; lamina linear, as long as small tube, shortly tridentate. Disk florets yellow, ca. 9 mm, slightly shorter than pappus, with 5 smooth teeth. Achenes brown, terete, 1.5–2 × ca. 0.3 mm, longitudinally finely ribbed, covered with appressed short fox-red hairs or glabrous. Pappus 6–7 × as long as achene, with numerous bristles. Fl. Jun–Aug. $2n = 16$.

Conifer forests, meadows, thickets; 1700–3800 m. Xinjiang, Xizang [Afghanistan, India, Kazakhstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia (Iran)].

2. Inula helenium Linnaeus, Sp. Pl. 2: 881. 1753.

土木香 tu mu xiang

Aster helenium (Linnaeus) Scopoli; *Corvisartia helenium* (Linnaeus) Mérat.

Herbs, perennial. Stems 60–150(–250) cm tall, pubescent. Basal leaves ± elliptic, mostly 15–40 × 10–20 cm, abaxially velvety lanate, adaxially thinly hairy, bases decurrent to strongly ribbed petioles, margins callose-denticulate, otherwise entire; cauline leaves ovate or elliptic to lanceolate, 10–30 × 4.5–12 cm, bases cordate, clasping, margins serrate. Involucre (20–)30–40 mm in diam.; outer phyllaries ovate, oblong, or deltate to lanceolate, 12–20(–25) × 6–8(–20) mm, abaxially velvety hairy, inner ones progressively narrower, less hairy, more scarious. Ray florets (15–)50–100; corolla lamina (10–)20–30+ mm. Disk corollas 9–11 mm. Achenes 3–4 mm, glabrous. Pappus of (40–)50–60 basally connate, barbellate bristles or setiform scales 6–10 mm. Fl. Jun–Sep. $2n = 20$.

Roadsides, wastelands, streamsides; below 2000 m. Xinjiang; widely cultivated in China [Russia, Tajikistan, Uzbekistan; SW Asia, Europe, North America].

Inula grandis Schrenk ex Fischer & C. A. Meyer (Enum. Pl. Nov. 1: 50. 1841) was recorded from Xinjiang by Fl. URSS (25: 441–442. 1959) and Fl. Kazakhst. (8: 391. 1965). It is similar to *I. helenium* but distinct in having capitula numerous; outer phyllaries glabrous, ovate-lanceolate, middle phyllaries linear, apex acute; and stem and leaves glabrous. We have not seen any specimens, and its distribution in China requires confirmation.

3. Inula racemosa J. D. Hooker, Fl. Brit. India 3: 292. 1881.

总状土木香 zong zhuang tu mu xiang

Inula royleana C. B. Clarke.

Herbs, perennial. Rhizome tuberous. Stems 60–200 cm tall, grooved, densely pubescent. Leaves leathery; radical leaves elliptic-lanceolate, 20–50 × 10–20 cm, narrowed into petiole; cauline leaves oblong or ovate-lanceolate, often deeply lobed at base, semiamplexicaul; leaf blade densely tomentose abaxially, scabrid adaxially, margin crenate. Capitula 4–8 cm in diam., in raceme. Phyllaries in 5 or 6 series; inner phyllaries linear, apex acute. Achenes ca. 4 mm, glabrous. Pappus white, of ca. 40 bristles 9–10 cm. Fl. Aug–Sep. $2n = 20$.

River beaches, grasslands; 1500–3100 m. Xinjiang [Afghanistan, Kashmir, Nepal, Pakistan].

4. Inula salsoloides (Turczaninow) Ostenfeld in Hedin, S. Tibet 6(3): 39. 1922.

蓼子朴 liao zi pu

Conyza salsoloides Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 197. 1832; *Inula ammophila* Bunge ex Candolle; *I. schugnanica* C. Winkler.

Perennials. Stems up to 35 cm tall, lower part covered with white straight hairs, upper almost smooth, with numerous long, thin, spreading, thinly angulate, densely leaved branches. Leaves sessile, lanceolate or lanceolate-linear, lower ones 5–9 × 5–6 mm, upper ones 3–6 × 1.8–3 mm, all leaves thick, pubescent abaxially with white, long, straight hairs and dispersed golden, sessile glands, base almost cordate, margin entire, involute, apex acuminate, spreading. Capitula numerous, ca. 1.5 cm in diam., solitary at ends of sprigs. Involucre ca. 0.8 cm in diam., polyphyllous, multiseriate and with appressed phyllaries; phyllaries acute, upper part shortly pilose, external surface sparsely golden glandular and ciliate at margins, outer ones oblong-lanceolate or lanceolate, ca. 3 × 1.2 mm, median linear, ca. 2 × as long as outer, ca. 0.4 mm wide, inner narrowly linear, 7–9 × ca. 0.3 mm. Ray florets yellow, 1.1–1.3 cm, longer than phyllaries by ca. 1/3; tube small, ca. 5 mm, shorter than pappus; lamina narrowly linear, 6–8 × 1–1.2 mm, 3- or 4-veined, tridentate, teeth ca. 0.8 mm. Disk florets yellow, as long as or slightly longer than pappus, 5-dentate, teeth smooth. Achenes brown, cylindric, 1.2–2 × ca. 0.2 mm, longitudinally finely ribbed, covered with dispersed golden, orbicular, sessile glands. Pappus 6–8 mm, with numerous bristles. Fl. May–Aug, fr. Jul–Sep.

Dry grasslands, sand banks, alluvium; 500–2000 m. Gansu, Hebei, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Xinjiang [Afghanistan, Mongolia, Russia].

5. Inula hookeri C. B. Clarke, Compos. Ind. 122. 1876.

锈毛旋覆花 xiu mao xuan fu hua

Herbs, perennial, 60–150 cm tall. Stems loosely lanate at

first. Leaves elliptic-lanceolate, 7–17 × 2.5–4 cm, pubescent and shortly glandular on surfaces but more sparsely so adaxially, base attenuate to petiole ca. 5 mm, margin minutely denticulate, apex acuminate. Capitula 6–10 cm in diam., solitary on top of stem or branchlet. Involucre hemispheric, 18–40 mm in diam.; phyllaries persistent and reflexed in fruiting, in 3 or 4+ series, to ca. 15 × 1 cm, brown villous. Receptacles flat, smooth or minutely alveolate, epaleate. Ray florets 20–30(–50+); corolla yellow, tube 5–7 mm, lamina linear, 18–45 × ca. 1 mm. Disk florets 40–100(–150); corolla yellow, 5–6.5 mm, 5-lobed. Achenes ellipsoid, ca. 1.5 mm, glabrous, with 12 sulci. Pappus white, subequal to disk corollas. Fl. Jul–Oct, fr. Oct. $2n = 20$.

Mountain slopes, shrublands, sparse forests, grasslands; 2400–3600 m. SE Xizang, NW Yunnan [Bhutan, India (Sikkim), Myanmar, Nepal].

6. Inula obtusifolia A. Kerner, Ber. Naturwiss.-Med. Vereins Innsbruck 1: 111. 1870.

钝叶旋覆花 dun ye xuan fu hua

Herbs, perennial, with a woody rootstock. Stems many from woody rootstock, 12–30 cm tall, densely papillate-glandular and long pilose. Leaves sessile, elliptic-lanceolate, 3–7 × 2–2.5(–4) cm, pilose and papillate-glandular, margin entire to obscurely dentate, apex acute-obtuse. Capitula usually solitary, terminal, 1.5–3 cm in diam. Involucre depressed semiglobose; phyllaries 4- or 5-seriate, regularly imbricate, outermost herbaceous-leaflike, lanceolate-oblanceolate, 4–6 × 2–3 mm, apex acute-obtuse, inner membranous, acuminate. Marginal florets radiate, 1–2 cm. Disk florets tubular, 6–7 mm. Achenes 2–3 mm, sericeous-villous. Pappus setae uniseriate, 20–22, pale reddish, 5–6 mm. Fl. Jun–Aug.

Rock crevices, dry cliffs, slopes, stony places; 2000–4500 m. W Xizang [E Afghanistan, India, Kashmir, Pakistan].

According to Fl. India (13: 20. 1995) and Fl. Pakistan (210: 21. 2003), *Inula obtusifolia* is fairly common in the Himalaya. J. D. Hooker and T. Thomson collected this species in W Xizang.

7. Inula sericophylla Franchet, J. Bot. (Morot) 10: 383. 1896.

绢叶旋覆花 juan ye xuan fu hua

Herbs, perennial. Stems 30–60 cm tall, usually simple, white lanate above, sparsely leafy. Radical leaves persistent at anthesis, ovate, elliptic, or oblong-oblanceolate, 4–7 × 1.5–2 cm, abaxially densely sericeous, adaxially pubescent or glabrescent, base decurrent to petiole, margin serrulate, apex obtuse or rounded; lower leaves nearly similar to radical leaves in shape, or spatulate or oblong, smaller; upper leaves oblong-lanceolate to linear, base semiamplexicaul, apex acute. Capitula solitary on top of stems and branches, ca. 3 mm in diam. Involucre broadly campanulate or hemispheric, ca. 10 mm, white lanate outside; phyllaries in numerous series, subequal, outer ones linear-lanceolate, herbaceous or basally leathery, apex acute, inner linear-lanceolate, dry membranous, margin ciliate, apex acuminate. Ray florets yellow; lamina linear, ca. 15 × 1.5 mm. Disk florets yellow; corolla ca. 4 mm. Achenes 10-striped, ca. 1.5 mm, glabrous, apex truncate. Pappus white, later light brown, of ca. 20 bristles, ca. 4 mm. Fl. May–Jun, fr. Jun–Jul.

Grassy slopes; 1500–3000 m. Yunnan [Vietnam].

8. Inula salicina Linnaeus, Sp. Pl. 2: 882. 1753.

柳叶旋覆花 liu ye xuan fu hua

Aster salicinus (Linnaeus) Scopoli; *Conyza salicina* (Linnaeus) Ruprecht; *Inula salicina* subsp. *asiatica* (Kitamura) Kitagawa; *I. salicina* var. *asiatica* Kitamura.

Herbs, perennial. Stems 20–80 cm tall, densely leafy; internodes 1–2.5 cm. Basal leaves lanceolate, 2–6 cm × 5–15(–30) mm; cauline leaves broadly elliptic to lanceolate, (3–)5–8 × 1–2 cm, both surfaces usually glabrous, adaxial venation raised, reticulation prominent, base cordate, clasping, apex acute. Capitula solitary on top of stems and branches, densely surrounded by bractlike leaves. Involucre hemispheric, 10–15(–20) mm in diam.; phyllaries in 4 or 5 series; outer ones lanceolate or spatulate-oblong, 5–7 × 1.5–2.5 mm, abaxially densely pubescent, apex obtuse or acute, inner linear-lanceolate, abaxially densely pubescent, apex acuminate. Ray florets 35–70; lamina linear, 10–15 mm. Disk corollas 5–9 mm. Achenes 1.5–2 mm, glabrous. Pappus white, of 30–40 distinct or basally connate, barbellate bristles 7–8 mm. Fl. Jun–Sep, fr. Sep–Oct. $2n = 16$.

Roadsides, wastelands; 200–1000 m. Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia, Uzbekistan; Europe].

9. Inula helianthus-aquatilis C. Y. Wu ex Y. Ling, Acta Phytotax. Sin. 10: 178. 1965.

水朝阳旋覆花 shui chao yang xuan fu hua

Inula serrata Bureau & Franchet, J. Bot. (Morot) 5: 50. 1891, not Persoon (1807).

Herbs, perennial. Rhizome long, usually with scalelike leaves and stolons. Stems 30–80 cm tall, pubescent and glandular. Leaves ovate-lanceolate or lanceolate, rarely ovate, 4–10 × 1.4–4 cm, abaxially yellow glandular, pubescent on abaxial veins, adaxially glabrous, margin densely toothed, apex acute or acuminate; bases of lower leaves usually gradually narrower to petioles; upper leaves sessile, base rounded or cuneate, or auriculate, semiamplexicaul; lateral veins 7 or 8 pairs, abaxially prominent. Capitula solitary on top of stems and branches, 2.5–4.5 cm in diam. Involucre hemispheric, 7–9 mm × 1–1.5 cm; phyllaries in 4 or 5 series, subequal, outer ones linear-lanceolate, leaflike adaxially, pubescent, inner linear-lanceolate, abaxially glabrous, margin membranous and ciliate. Ray florets yellow; lamina linear, ca. 15 mm. Disk florets yellow; corolla ca. 3 mm, with lanceolate lobes. Achenes cylindric, 10-striped, glabrous. Pappus white, of 10 or 11 bristles, ca. 2 mm. Fl. Jun–Oct, fr. Sep–Oct.

• Grassy slopes, fields, shrublands; 1200–3000 m. Gansu, Guizhou, Sichuan, Yunnan.

Inula helianthus-aquatilis f. *rotundifolia* Y. Ling (Acta Phytotax. Sin. 10: 178. 1965; 圆叶旋覆花 yuan ye xuan fu hua), described from NW Yunnan (Lijiang; 2600–2700 m, marshy grasslands), has stems densely leafy and middle leaves ovate, 2.5–4.5 × 2–3 cm, with base cordate and amplexicaul, margin coarsely serrate, and apex rounded.

10. Inula hupehensis (Y. Ling) Y. Ling, Acta Phytotax. Sin. 16(3): 82. 1978.

湖北旋覆花 hu bei xuan fu hua

Inula helianthus-aquatilis C. Y. Wu subsp. *hupehensis* Y. Ling, Acta Phytotax. Sin. 10: 178. 1965.

Herbs, perennial. Rhizome prostrate. Stems 30–50 cm tall, densely pubescent above, glabrescent below. Leaves oblong-lanceolate to lanceolate, 6–10 × 1.5–2.5 cm; upper leaves sessile, abaxially yellow glandular, pubescent on veins, adaxially glabrous, base amplexicaul, margin sparsely serrulate, apex acuminate; lateral veins 7 or 8 pairs, abaxially prominent. Capitula solitary, 2.5–3.5 cm in diam. Involucre subglobose, 5–7 mm × 1–1.3 cm; phyllaries subequal in length, outer ones leaflike, linear-lanceolate, glandular, pubescent, inner linear-lanceolate, glabrous, margin membranous and ciliate. Ray florets yellow; lamina linear, ca. 15 mm, apex 3-dentate. Disk floret corollas ca. 3 mm, with lanceolate lobes. Achenes subcylindric, 10-striped, glabrous, apex truncate. Pappus white, of 5 or 6 bristles. Fl. Jun–Aug, fr. Aug–Sep.

• Grassy slopes, forests; 1300–1900 m. Hubei, Sichuan.

11. Inula caspica Ledebour, Index Sem. Horti Dorpat. 1822: 10. 1822.

里海旋覆花 li hai xuan fu hua

Inula caspica var. *paniculata* C. H. An; *I. falconeri* J. D. Hooker.

Herbs, biennial. Plants bluish green, 30–50(–70) cm tall; stems mostly solitary, sometimes a few woody at base, smooth, reddish, or ± scabrid, squarrose white pilose in upper part, thinly ribbed, erect, rarely corymbiform-branched, branches rod-shaped, straight. Lower leaves narrowly oblong or lanceolate, 7–17 × 0.8–2.5 cm, narrowed at base into a petiole ca. 1 cm; upper leaves sessile, linear-lanceolate to linear, 5–10 × 0.5–0.6 cm, glabrous, sometimes covered with fine rigid bristles at margins and abaxially, verruculose, prominently 1-veined abaxially in middle, base subauriculate, slightly cordate-semiamplexicaul, margin entire, apex acute. Capitula 2–3.5 cm in diam., numerous, arranged in loose corymbiform synflorescences, on peduncles (0.3–)1.5–4(–6) cm, densely covered with rigid, tuberculate bristles and white multicellular long hairs. Involucre 1.5–2 cm in diam.; phyllaries acute, 1-veined, margins covered with short rigid, tuberculate squarrose cilia, sometimes in upper part reddish and unbent, outer phyllaries lanceolate-linear or linear, 5–6(–8) × 1–1.3 mm, leathery, inner ones narrowly linear, 7–10 × ca. 1 mm, membranous. Ray florets yellow, 9–10(–14) mm, exceeding phyllaries by ca. 1/3; tube small, 3–4 mm, as long as or slightly shorter than pappus; lamina linear, ca. 7 × 1 mm, unbent, 3- or 4-veined, lower part covered outside with yellow, sessile glands, tridentate, teeth deltate, equal, obtuse. Disk florets yellow, obconical, ca. 6 mm, slightly longer than pappus, 5-dentate, teeth equal, acute, glandular outside. Achenes brown, linear-oblong, 1.2–1.5 × ca. 0.5 mm, ribbed, pubescent with white long appressed hairs, 3–4 × as long as achenes. Pappus of 20–25 straight bristles. Fl. Jul–Sep.

Streamsides or riverbanks in deserts; 200–2400 m. Xinjiang, Xizang [India, Kazakhstan, Pakistan, Russia (Siberia), Turkmenistan, Uzbekistan; SW Asia].

Inula falconeri was described based on specimens from W Xizang. According to Fl. India (13: 17. 1995) and Fl. Pakistan (210: 24. 2003), it is also distributed in India and Pakistan. Its descriptions and illustrations are comparable with those of *I. caspica*, and it appears to be a synonym of the latter, which is widely distributed.

12. Inula linariifolia Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 10(7): 154. 1837 [*"linariaefolia"*].

线叶旋覆花 xian ye xuan fu hua

Inula britannica Linnaeus subsp. *linariifolia* (Turczaninow) Kitamura; *I. britannica* var. *linariifolia* (Turczaninow) Regel; *I. britannica* var. *maximowiczii* Regel; *I. linariifolia* var. *intermedia* Regel.

Herbs, perennial. Plants 30–80 cm tall; stems simple or branched, covered with white sparse multicellular appressed hairs. Leaves linear-lanceolate, acuminate, sparsely pilose abaxially, glabrous adaxially, margin entire or with fine rare denticles; lower leaves ca. 10 × 1 cm, petioles ca. 3 cm; upper leaves sessile, 6–10 × 0.5–1 cm; floral leaves 1–4 cm × 1.5–5 mm. Capitula 1–2.8 cm in diam., 5–25 in corymbiform synflorescences and borne on glandular-pubescent peduncles 0.6–3 cm. Involucre 1–1.3 cm in diam.; phyllaries straight, in 4 series, gland-dotted abaxially, sometimes outer ones unbent, acute, margin with golden, appressed, elliptic, sessile or shortly stalked glands, outer phyllaries lanceolate, 3–3.5 × ca. 0.8 mm, leathery at base, herbaceous, pilose adaxially, median membranous, 4–5 × ca. 0.6 mm, upper part sometimes reddish, inner linear, membranous, as long as median ones, ca. 0.3 mm wide, glabrous. Ray florets yellow, 0.7–1.2 cm, 2–3 × as long as phyllaries, covered outside with sparse golden glands, tube small, 2–2.5 mm, slightly shorter than pappus; lamina linear, 4–7.5 × ca. 0.8 mm, 3- or 4-veined and with 3 denticles above. Disk florets as long as pappus, yellow, with 5 acute glandular denticles at margin. Achenes brown, cylindric, longitudinally ribbed, 1–1.2 × 0.2–0.4 mm, pubescent with sparse appressed hairs. Pappus ca. 3 mm, with ca. 25 bristles. Fl. Jul–Aug, fr. Aug–Oct. $2n = 24$.

Riverbanks, meadows, grassy slopes, waste fields; below 1800 m. Anhui, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Zhejiang [Japan, Korea, Mongolia, Russia].

13. Inula britannica Linnaeus, Sp. Pl. 2: 882. 1753.

欧亚旋覆花 ou ya xuan fu hua

Herbs, perennial, 10–40(–75) cm tall. Stems erect, villous. Leaves sessile; basal blades lanceolate, (3–)6–7 cm × 8–20(–30) mm; cauline blades lanceolate-elliptic to lanceolate-linear, 2–5+ cm × 5–12(–20) mm, abaxially usually densely villous and glandular, adaxially sparsely strigillose to glabrate, bases cordate or auriculate, clasping, margins entire or serrulate. Capitula 1–8, 2.5–5 cm in diam.; peduncles 1–4 cm, densely villous. Involucre (7–)15–22 mm in diam.; phyllaries in 4 or 5 series, outer ones lanceolate-linear, 4–6 × 0.5–0.8 mm, bases sericeous, inner similar, more scarious. Ray florets 40–70+;

lamina 10–15(–20) mm. Disk floret corollas 4–6 mm, 5-lobed. Achenes cylindric, 1–1.2 mm, puberulent. Pappus white, of 20–25 distinct or basally connate bristles 4–6 mm. Fl. Jun–Sep. 2*n* = 16, 32.

Roadsides, wastelands, fields, sandy places; 300–1700 m. Hebei, Heilongjiang, Nei Mongol, Xinjiang [Russia, Tajikistan, Turkmenistan, Uzbekistan; Europe].

1a. Stems, peduncles, abaxial surface of leaves, and involucre densely lanate-villous ..... 13d. var. *sublanata*
1b. Stems, peduncles, abaxial surface of leaves, and involucre glabrous, or sometimes shortly pubescent.
2a. Capitula sparsely arranged ..... 13a. var. *britannica*
2b. Capitula densely arranged.
3a. Leaves narrowly linear, 3–10 × 0.3–1 cm ..... 13b. var. *angustifolia*
3b. Leaves broader than 1 cm ..... 13c. var. *ramosissima*

13a. Inula britannica var. **britannica**

欧亚旋覆花(原变种) ou ya xuan fu hua (yuan bian zhong)

Conyza britannica (Linnaeus) Ruprecht.

Capitula usually sparsely arranged.

Roadsides, wastelands; 300–1700 m. Hebei, Nei Mongol, Xinjiang [Russia; Europe].

13b. Inula britannica var. **angustifolia** Beck, Denkschr. Kaiserl. Akad. Wiss., Wien. Math.-Naturwiss. Kl. 44(2): 318. 1882.

狭叶欧亚旋覆花 xia ye ou ya xuan fu hua

Leaves narrowly linear, 3–10 × 0.3–1 cm. Capitula densely arranged.

Fields, sandy places. Xinjiang [Russia; Europe].

13c. Inula britannica var. **ramosissima** Ledebour, Fl. Ross. 2: 506. 1845.

多枝欧亚旋覆花 duo zhi ou ya xuan fu hua

Stems strongly branched in upper part. Leaves broader than 1 cm, pubescent on both surfaces or only abaxially. Capitula numerous, smaller, 2–3 cm in diam., usually densely arranged. Involucre 7–10 mm in diam.

Xinjiang [Russia].

13d. Inula britannica var. **sublanata** Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 25: 626. 1907.

棉毛欧亚旋覆花 mian mao ou ya xuan fu hua

Inula britannica f. *sublanata* (Komarov) Kitagawa.

Stems, peduncles, abaxial surface of leaves, and involucre densely lanate-villous.

Heilongjiang, Nei Mongol, Xinjiang [Russia].

14. Inula japonica Thunberg, Nova Acta Regiae Soc. Sci. Upsal. 4: 39. 1783.

旋覆花 xuan fu hua

Herbs, perennial, from short rhizomes. Stems 15–100 cm tall, striate, appressed pilose, sometimes glabrescent, simple, branched up to synflorescence. Leaves radical and cauline; radical and lower cauline leaves smaller than median leaves, withering before flowering; median leaves lanceolate, oblong, or ovate, appressed pilose or subglabrous on both surfaces, base abruptly narrowed, sessile or semiclasping, apex subacute; upper leaves gradually smaller, 10–25 mm. Capitula usually few or solitary, radiate, ca. 3.5 cm in diam., sometimes with subtending bracteal leaves. Involucre subglobose, 7–8 mm tall; phyllaries in 5 series, subequal, outer ones lanceolate, apex acuminate, inner narrow, scarious, ciliolate. Marginal florets in 1 series; lamina yellow, 16–19 × 1.5–2 mm. Disk 1.5–1.7 cm in diam.; corollas ca. 3 mm. Achenes cylindric, ca. 1 mm, 10-ribbed, pilose. Pappus of capillary bristles, sordid, ca. 5 mm, bristles minutely scabrid. Fl. Jun–Oct. 2*n* = 16, 24.

Montane slopes, grasslands, riverbanks, fields, broad-leaved forests, streamsides; 100–2400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Mongolia, Russia].

1a. Stems to 1 m tall, branched in upper part; capitula numerous ..... 14c. var. *ramosa*
1b. Stems 15–60 cm tall, usually simple; capitula usually 1–6.
2a. Leaves lanceolate to oblong, margin entire ..... 14a. var. *japonica*
2b. Leaves ovate, broadly ovate, or oblong-ovate, margin slightly serrulate ..... 14b. var. *ovata*

14a. Inula japonica var. **japonica**

旋覆花(原变种) xuan fu hua (yuan bian zhong)

Inula britannica Linnaeus var. *chinensis* (Ruprecht ex Maximowicz) Regel; *I. britannica* subsp. *japonica* (Thunberg) Kitamura; *I. britannica* var. *japonica* (Thunberg) Franchet & Savatier; *I. chinensis* Ruprecht ex Maximowicz; *I. giraldii* Diels; *I. japonica* f. *giraldii* (Diels) J. Q. Fu.

Stems 20–60 cm tall. Leaves lanceolate to oblong, 5–10 × 1–3 cm, margin entire. Capitula usually few or solitary.

Montane slopes, grasslands, riverbanks, fields; 100–2400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang [Japan, Korea, Mongolia, Russia].

14b. Inula japonica var. **ovata** C. Y. Li, Fl. Liaoning. 2: 1158. 1992.

卵叶旋覆花 luan ye xuan fu hua

Stems 15–30(–50) cm tall. Leaves ovate, broadly ovate, or oblong-ovate, 4–7(–13) × 2–4 cm, base cuneate, auriculate, semiamplexicaul, margin slightly serrulate, apex acute. Capitula 1–6.

• Fields, mountain slopes, riverbanks. Jilin, Liaoning, Nei Mongol.

14c. Inula japonica var. **ramosa** (Komarov) C. Y. Li in C. Y. Li & W. Cao, Fl. Pl. Herb. Chin. Bor.-Orient. 9: 83. 2004.

多枝旋覆花 duo zhi xuan fu hua

Inula britannica var. *ramosa* Komarov, Trudy Imp. S.-Peterburgsk. Bot. Sada 25: 626. 1907.

Stems to 1 m tall, branched in upper part. Median leaves lanceolate or linear-lanceolate, 10–15 × 1.5–2 cm, abaxially gland-dotted. Capitula numerous, in corymbs, ca. 3.5 cm in diam. Involucre subglobose, 5–7 mm; phyllaries in 4 or 5 series, nearly all alike, margin gland-dotted. Ray corollas ca. 10 mm, abaxially gland-dotted. Pappus ca. 3.5 mm. Fl. Aug–Sep.

Broad-leaved forests, mountain slopes, streamsides. Anhui, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi [Japan, Korea].

193. DUHALDEA Candolle, Prodr. 5: 366. 1836.

羊耳菊属 yang er ju shu

Shrubs or perennial herbs. Stems not winged, without resin canals. Leaves alternate, simple, small to very large, hairy. Capitula heterogamous, radiate or disciform, solitary, few together, or in dense terminal corymbs. Receptacle epaleate, with scalelike ridges. Marginal florets female; corolla yellow to white, radiate to miniradiate; epidermis not crested. Disk florets bisexual; corolla yellow or whitish; epidermis with straight cell walls, without needlelike crystals; corolla lobes short, smooth. Anthers ecalcarate, with branched tails; apical appendix truncate and almost emarginate; endothecial tissue polarized. Cells of antheropodium longer than wide. Pollen spines with a cavity. Style branches with acute sweeping hairs not reaching furcation. Achenes ellipsoid, hairy; epidermis with elongated crystals. Pappus of barbellate, capillary bristles in 1 row. $x = (9 \text{ or})10$.

About 15 species: C, E, and SE Asia; seven species (two endemic) in China.

1a. Perennial herbs; capitula 1.5–2.5 cm in diam.; phyllaries herbaceous; ray florets white, lamina distinct, 8–13.5 × 1.5–2.5 mm ..... 1. *D. nervosa*
1b. Shrubs or perennials; capitula 0.5–1.5(–2) cm in diam.; phyllaries dry membranous; ray florets yellow, lamina usually indistinct or distinct.
2a. Leaves thin, both surfaces glabrous; capitula 1.5–2 cm in diam., 1–5 axillary in short branches, forming cyme-panicles; ray floret lamina 6–8.5 mm ..... 2. *D. rubricaulis*
2b. Leaves thick, densely tomentose or lanate; capitula 0.5–1 cm in diam., terminal on stems or branches; ray floret lamina less than 6 mm or ray florets absent.
3a. Leaves decurrent along stems, forming wings; pappus light reddish brown ..... 3. *D. pterocaula*
3b. Stems wingless; pappus white or grayish white.
4a. Leaves persistently lanate abaxially; ray floret lamina to 1 mm or absent; involucre densely tomentose .. 4. *D. cappa*
4b. Leaves pubescent and scabrid abaxially; ray floret lamina at least 3 mm (rarely absent); involucre glandular or pubescent.
5a. Leaves lanceolate or oblanceolate, both surfaces with short glandular hairs, abaxially densely pubescent along veins; capitula few ..... 5. *D. forrestii*
5b. Leaves oblong, elliptic, or oblong-lanceolate, both surfaces scabrid; capitula numerous.
6a. Leaf blade ca. 10 × 3 cm, apex acute; involucre 7–8 mm, pubescent ..... 6. *D. wissmanniana*
6b. Leaf blade 10–18 × 4–6 cm, apex acuminate; involucre 4–5 mm, tomentose ..... 7. *D. eupatorioides*

1. Duhaldea nervosa (Wallich ex Candolle) Anderberg, Pl. Syst. Evol. 176: 104. 1991.

显脉旋覆花 xian mai xuan fu hua

Inula nervosa Wallich ex Candolle, Prodr. 5: 471. 1836; *I. asperrima* Edgeworth; *I. esquirolii* H. Léveillé; *I. verrucosa* Klatt.

Plants subherbaceous with tuberous roots. Stems often decumbent, 0.2–1 m, usually simple, sparsely long (2.5–3 mm) tawny pilose or strigose, sometimes with rounded densely softly hairy buds at base. Petiole 0–6 mm; leaf blade elliptic, 5–13 × 2–4.5 cm, sparsely spreading pilose on both surfaces, base narrowed and cuneate, margin distantly and shallowly serrate, apex acute or acuminate. Capitula 1 or few, loosely corymbose. Involucre 5(–8)-seriate; inner phyllaries linear-lanceolate, mainly scarious, 7–10 × 0.7–1.2 mm, pilose, tips sometimes purple, apex acute to acuminate, outer ones suberect, similar but smaller or herbaceous, dilated above, sometimes to 22 mm, apex obtuse. Ray floret corollas 3.5–4.7 mm; lamina white, 8–13.5 × 1.5–2.5 mm. Disk floret corollas yellow, 6–6.7 × 8–15 mm. Achenes 2–2.5 mm, sericeous. Pappus white, as long as disk floret, rarely shorter. Fl. Jul–Oct, fr. Sep–Dec.

Dry grassy slopes, thickets; 1000–2600 m. Guizhou, SW Sichuan, SE Xizang, Yunnan [Bhutan, India (Sikkim), Myanmar, Nepal, Thailand, Vietnam].

2. Duhaldea rubricaulis (Candolle) Anderberg, Pl. Syst. Evol. 176: 104. 1991.

赤茎羊耳菊 chi jing yang er ju

Amphirhapis rubricaulis Candolle, Prodr. 5: 343. 1836; *Inula rubricaulis* (Candolle) Bentham & J. D. Hooker.

Subshrubs, 1–2 m tall. Stems sparsely gray tomentose at first, later reddish, glabrous. Leaves sessile, elliptic-lanceolate, 6–19 × 1–4 cm, sparsely pubescent on both surfaces, base cuneate, margin serrulate, apex acuminate. Capitula radiate, 2–6 in small lateral racemes or corymbs. Involucre 5- or 6-seriate; phyllaries acuminate, outer ones spreading, lanceolate, inner

ones linear-lanceolate, to 8–9 mm. Ray florets few; corolla tube ca. 5 mm; lamina 6–8.5 × 1.7–2 mm. Disk florets ca. 7 mm in diam.; corollas 6–7 mm. Achenes oblong, ca. 2.5 mm, sericeous. Pappus white, 5–6 mm, of ca. 20 bristles. Fl. May–Aug, fr. Jul–Nov. $2n = 20$.

Slopes in valleys; 1000–2000 m. Yunnan [Bhutan, NE India, Myanmar, Nepal, Thailand, Vietnam].

3. Duhaldea pterocaula (Franchet) Anderberg, Pl. Syst. Evol. 176: 104. 1991.

翼茎羊耳菊 yi jing yang er ju

Inula pterocaula Franchet, J. Bot. (Morot) 10: 383. 1896.

Perennial herbs or subshrubs, with woody roots. Stems 60–100 cm tall, ca. 1.2 cm in diam., striped, densely reddish brown pubescent and glandular, branched. Lower leaves lanceolate to elliptic-lanceolate, 18–20 × 4–5 cm; upper leaves smaller, oblong-lanceolate to linear-lanceolate, 1–4 cm, glandular on both surfaces, abaxially reddish brown pubescent, adaxially densely pubescent, base gradually narrower, extending to stem and forming wings 1–10 mm wide, margin biserrate, apex acute; lateral veins 7–10 pairs and abaxially prominent, usually densely pubescent. Capitula 5–6 mm in diam., in thyrsoid or compound corymbose synflorescences; peduncles very short or up to 10 mm, slender, with filiform bracteal leaves. Involucre campanulate, ca. 7 × 5–6 mm; phyllaries in ca. 5 series, linear-lanceolate, outer ones shorter, abaxially densely pubescent. Corolla all tubular, ca. 4.5 mm, yellow glandular outside. Achenes cylindric, densely pubescent. Pappus in 1 series, light reddish brown, as long as corolla. Fl. Jul–Sep, fr. Sep–Oct.

• Thickets, grasslands; 2000–2800 m. SW Sichuan, Yunnan.

4. Duhaldea cappa (Buchanan-Hamilton ex D. Don) Pruski & Anderberg, Compositae Newslett. 40: 44. 2003.

羊耳菊 yang er ju

Conyza cappa Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 176. 1825; *Baccharis chinensis* Loureiro; *Blumea arnottiana* Steudel; *B. chinensis* Hooker & Arnott (1837), not (Linnaeus) Candolle (1836), nor Walpers (1843); *C. dentata* Blanco (1837), not Willdenow (1803); *Duhaldea chinensis* Candolle; *D. chinensis* var. *cappa* (Buchanan-Hamilton ex D. Don) Steetz; *D. lanuginosa* (C. C. Chang) Anderberg; *Inula cappa* (Buchanan-Hamilton ex D. Don) Candolle; *I. eriophora* Candolle; *I. intermedia* C. C. Chang & Y. C. Tseng (1974), not Steudel (1821); *I. lanuginosa* C. C. Chang; *I. oblonga* Candolle; *I. pseudocappa* Candolle; *Moquinia eriosematoides* (Walpers) Walpers; *Vernonia congesta* Bentham; *V. eriosematoides* Walpers.

Shrubs, 70–200 cm tall. Stems lanate-tomentose, branched. Petiole ca. 5 mm (rarely to 20 mm); leaf blade elliptic, lanceolate, or narrowly oblong, 8–23 × 2.5–5.5 cm, thick, rather papery, whitish lanate abaxially, obscuring minor veins, green and sparsely coarsely pubescent adaxially, base rounded (rarely tapered), margin remotely serrulate, apex acute or shortly acuminate. Capitula radiate or disciform, in dense corymbs. Involucre 6-seriate; phyllaries lanceolate, tomentose, inner ones 4.5–6 × ca. 0.7 mm. Ray florets few; corollas yellow, usually 4.5–5.3 mm, tubular and erect or curved outward or with short lamina to 1 × 1 mm, rarely tube 2.9–3.5 mm with lamina 2.3–2.9 mm. Disk floret corollas yellow, 4.7–6 × 4–6 mm. Achenes cylindric, ca. 1.8 mm, white tomentose. Pappus whitish, sometimes brownish tipped, 4–5 cm. Fl. Jun–Oct, fr. Aug–Dec. $2n = 20$.

Dry hills, waste fields, thickets, grasslands; 200–3200 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Yunnan, Zhejiang [Bhutan, India, Malaysia, Nepal, Pakistan, Thailand, Vietnam].

5. Duhaldea forrestii (J. Anthony) Anderberg, Pl. Syst. Evol. 176: 104. 1991.

拟羊耳菊 ni yang er ju

Inula forrestii J. Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 197. 1934.

Shrubs, 40–100 cm tall, multibranched; old branches gray or brownish gray, 3–4 mm, young branches reddish brown, pubescent, clustered with dense leaves. Leaves elliptic or oblanceolate, 2–7 × 0.7–3 cm, subleathery, abaxially densely pubescent, base cuneate, margin shallowly and sparsely serrulate, apex acute. Capitula obovoid, ca. 1 × 1–1.5 cm, single or several in racemes. Involucre campanulate, 8–10 mm; phyllaries 4- or 5-seriate, linear-lanceolate, pubescent, ciliate, outer ones shorter than inner ones. Marginal florets radiate; corollas ca. 9 mm; lamina linear-oblong, ca. 6 × 1.5 mm. Disk florets ca. 5 mm. Achenes narrowly terete, ca. 3 mm, whitish pubescent. Pappus whitish, nearly as long as disk florets, of ca. 20 bristles. Fl. Aug, fr. Nov.

• Open gravelly slopes, riversides; 2000–3000 m. SW Sichuan, NW Yunnan.

6. Duhaldea wissmanniana (Handel-Mazzetti) Anderberg, Pl. Syst. Evol. 176: 104. 1991.

滇南羊耳菊 dian nan yang er ju

Inula wissmanniana Handel-Mazzetti, Oesterr. Bot. Z. 87: 127. 1938.

Subshrubs. Stems erect, ca. 1 m tall, yellowish brown papillose or caducous villous; flowering branches densely pubescent. Leaves sessile or with petiole ca. 2 mm, oblong, ca. 10 × 3 cm, abaxially and margin strigillose or hirsute, adaxially sparsely strigillose, base narrowed, obtuse, or slightly rounded, margin sparsely serrulate, apex acute; lateral veins 7–10 pairs, abaxially prominent. Capitula obovoid, ca. 1 cm in diam., forming terminal corymbose panicles; peduncles slender, with oblong-linear to filiform bracteal leaves, densely pubescent. Involucre subcampanulate, 7–8 mm; phyllaries in 4 or 5 series, light yellowish, linear-lanceolate, subleathery, shortly glandular, apex acuminate, inner ones ciliate at apex, innermost ca. 5 × as long as outer. Ray florets in 1 series; lamina yellow, oblong, 2–3 mm. Disk florets yellow, cylindric; corolla ca. 5 mm. Achenes ca. 1.5 mm, white tomentose. Pappus in 1 series, white, ca. 5 mm, of ca. 20 bristles. Fl. Jul–Sep, fr. Oct.

Open slopes; 1200–1700 m. S Yunnan [Vietnam].

7. Duhaldea eupatorioides (Candolle) Steetz, Bonplandia 5: 308. 1857.

泽兰羊耳菊 ze lan yang er ju

Inula eupatorioides Candolle, Prodr. 5: 469. 1836.

Shrubs, 1–2 m tall. Stems lanate-tomentose. Leaves sessile or with petiole up to 5 mm, oblong or oblong-lanceolate, 10–18 × 4–6 cm, papery, densely pubescent at least on veins abaxially, green and sparsely scabridulous adaxially, minor veins prominent abaxially, base acute or obtuse, margin remotely serrulate, apex acuminate. Capitula 5–7 mm in diam., in dense corymbs. Involucre 4- or 5-seriate; phyllaries tomentose, inner ones linear-lanceolate, ca. 4 mm, outer oblong-lanceolate, ca. 1 mm. Ray florets female, yellow; corolla tube ca. 5 mm, usually ca. 3 mm in diam.; lamina 3–4 × 1–1.4 mm. Disk florets yellow, 4–6 mm in diam.; corollas ca. 5 mm. Achenes cylindric, ca. 2 mm, pubescent. Pappus whitish yellow, brownish tipped, slightly shorter than disk corollas, of ca. 20 bristles. Fl. Jul–Sep, fr. Dec. $2n = 20$.

Thickets, under *Pinus* forests; 1700–1800 m. SE Xizang [Bhutan, India, Laos, Myanmar, Nepal, Pakistan, N Thailand, Vietnam].

194. SPHAERANTHUS Linnaeus, Sp. Pl. 2: 927. 1753.

戴星草属 dai xing cao shu

Low erect annuals. Stems winged, branches spreading. Leaves alternate, obovate to oblong, mucronulate-serrulate to dentate, decurrent, gland-dotted. Capitula disciform, heterogamous, in terminal solitary, globose, or ovoid clusters, with or without bracts between capitula, clusters sessile on a common receptacle. Involucre campanulate, narrow; phyllaries narrow, dry, few seriate, unequal, scarious, acute or obtuse. Receptacles naked, commonly globose or disciform, with few bracts or not. Marginal florets female, few to many, fertile, slender, minutely 2- or 3-dentate. Disk florets bisexual, solitary or few, fertile or sterile, tube thickened, limb 4- or 5-dentate. Base of anthers obtuse to sagittate, auricles acute or tailed; endothecial tissue radial. Style of disk florets terete, style branches filiform or connate, with obtuse sweeping hairs reaching below furcation. Achenes oblong, somewhat flattened, truncate at apex, base contracted. Pappus absent. $x = 10$.

About 40 species: tropical and subtropical Africa and Asia, also in Australia; three species in China.

1a. Leaves shortly pubescent or glabrescent; stems and branches with usually entire wings; phyllaries glabrous or only outermost ones abaxially glandular; corolla grayish white adaxially ..... 1. *S. africanus*
1b. Leaves tomentose or lanate; stems and branches with densely dentate wings; phyllaries densely pubescent and ciliate on margin; corolla purplish red adaxially.
2a. Leaf margin biserrulate, with stipitate glands ..... 2. *S. indicus*
2b. Leaf margin long dentate, with sessile glands ..... 3. *S. senegalensis*

1. Sphaeranthus africanus Linnaeus, Sp. Pl., ed. 2, 2: 1314. 1763.

戴星草 dai xing cao

Sphaeranthus cochinchinensis Loureiro; *S. microcephalus* Willdenow; *S. suberiflorus* Hayata.

Stems 40–50 cm tall, usually robust, glabrous or pubescent, curved, ascending, branched, winged, wings entire. Cauline leaves obovate-oblong, 3–5 × 1.5–2.2 cm, shortly pubescent or glabrescent, base narrowed, apex rounded. Clusters of capitula globose or ovoid, ca. 8 mm in diam.; peduncle glabrous, winged, bracts slender, acuminate. Capitula campanulate, ca. 3 × 2.5 mm. Involucre ca. 3 × 2.5 mm; phyllaries subequal, oblanceolate, glabrous or only outermost ones abaxially glandular. Receptacle naked. Marginal florets numerous; corolla tubular, ca. 1.5 mm; style apex obtuse. Central florets ca. 3; corolla ca. 1.5 mm, 5-dentate; base of anthers entire, filaments dilated, glabrous; style cylindric, shortly bifid. Achenes cylindric, ca. 1 mm, gland-dotted, without pappus. Fl. Dec–May. $2n = 20$.

Waste fields, grassy slopes. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Cambodia, Malaysia, Myanmar, Thailand, Vietnam; tropical Africa, Australia].

2. Sphaeranthus indicus Linnaeus, Sp. Pl. 2: 927. 1753.

绒毛戴星草 rong mao dai xing cao

Sphaeranthus hirtus Willdenow; *S. mollis* Roxburgh.

Plants rank-smelling. Stems 10–45 cm tall with 4 irregularly and sharply toothed wings, minutely stipitate glandular and whitish pubescent. Leaves oblanceolate or spatulate, 2.5–6 × 0.8–2.5 cm, minutely stipitate glandular and white lanate on both surfaces, base semiamplexicaul and strongly decurrent, margin rather irregularly biserrate-dentate, apex obtuse or acute, apiculate, attenuate. Clusters of capitula ovoid-globose, ca. 12 × 10 mm; capitulum bracts linear-lanceolate, 4–5 mm, ciliate, hispid and stipitate glandular, apex finely acuminate. Phyllaries ca. 12, linear-oblong to linear-spatulate, more scarious and less glandular than bracts. Marginal florets 10–15; central florets 2 or 3; corollas purplish, ca. 2.4 mm. Achenes ca. 1 mm, puberulent. Fl. Dec–Apr. $2n = 20$.

Sandy banks along rivers, grasslands, thickets; 700–1000 m. Yunnan [Bhutan, Cambodia, India, Laos, Malaysia, Nepal, Thailand, Vietnam; Africa, Australia].

3. Sphaeranthus senegalensis Candolle, Prodr. 5: 370. 1836.

非洲戴星草 fei zhou dai xing cao

Sphaeranthus lecomteanus O. Hoffmann & Muschler.

Stems 20–90 cm tall, usually robust, densely pubescent, ascending, branched, winged, wings dentate. Cauline leaves usually oblong, 3–10 × 1–3.5 cm, both surfaces densely lanate,

base narrowed, margin with densely spinelike denticles, apex obtuse. Clusters of capitula globose or ovoid, 11–18 × 9–10 mm; peduncle pubescent. Capitula campanulate. Phyllaries 9–14, subequal, outer ones linear-lanceolate, 4–4.5 mm, densely pubescent. Receptacle naked. Marginal florets 7–12; corolla tubular, ca. 2.5 mm; style apex obtuse. Central florets 2–5; corolla 3–3.5 mm, 5-dentate; base of anthers entire, filaments dilated, glabrous; style cylindric, shortly bifid. Achenes cylindric, ca. 1 mm, gland-dotted, without pappus. Fl. Dec–Apr. $2n = 20$.

Roadsides, thickets, riverbanks; 600–1300 m. Yunnan [tropical Africa and Asia].

195. PTEROCAULON Elliott, Sketch Bot. S. Carolina 2: 323. 1823.

翼茎草属 yi jing cao shu

Herbs, perennial, usually rhizomatous and/or lignescent-tuberous-rooted. Stems erect, simple, internodes winged by decurrent leaf bases, lanate-tomentose and/or glandular. Leaves cauline, alternate, sessile; blade linear to elliptic or obovate, base decurrent, margin usually serrate to serrulate or denticulate, rarely entire. Capitula disciform, sessile, in spiciform arrays. Involucre cylindric-campanulate to campanulate; phyllaries persistent, in 4–6 series, distinct, narrowly lanceolate, unequal. Receptacles flat, epaleate. Ray florets absent. Marginal florets female, in 1–3+ series, fertile; corollas yellowish. Central florets bisexual, but functionally male, (1 or)2–15; corollas yellowish, lobes 5. Style with acute sweeping hairs reaching furcation. Achenes cylindric to fusiform, angled or slightly compressed, ribs 6–9, faces usually sparsely strigose to hispidulous, minutely sessile glandular between ribs. Pappus persistent, of distinct, scabrid bristles in 1 or 2 series. $x = 10$.

About 18 species: SE Asia, Australia, North and South America; one species in China.

1. Pterocaulon redolens (Willdenow) Fernández-Villar in Blanco, Fl. Filip., ed. 3, 4(13A–21A): 116. 1880.

翼茎草 yi jing cao

Conyza redolens Willdenow, Sp. Pl. 3: 1915. 1803; *Tessaria redolens* (Willdenow) Lessing.

Herbs, up to 1 m tall. Stems and branches winged, branched, lanate. Middle leaves sessile, obovate or obovate-oblong, 4–6 × 1.5–2 cm, both surfaces lanate, more densely so on abaxial surface, base decurrent, margin serrulate, apex obtuse; costa adaxially prominent, lateral veins 5–10 pairs, inconspicuous; upper leaves sessile, smaller, narrowly oblong or ovate-oblong, 15–25 × 4–6 mm, base gradually narrower, margin undulate, inconspicuously serrulate, apex acute or obtuse. Capitula 1.5–2 mm in diam., 2–7 in spikes 2–9 cm. Involucre campanulate, ca. 4 mm; phyllaries in 4 or 5 series, apex purplish red, outer ones spatulate or ovate-oblong, ca. 3 mm, abaxially densely lanate, apex 1–3-dentate or obtuse, middle narrowly oblong or linear, 3–3.5 mm, dry membranous, apex abaxially pubescent or glabrous, apex sometimes fimbriate, innermost linear or filiform, ca. 4 mm, glabrous, apex acute or acuminate. Marginal florets in numerous series, filiform, apex 3-dentate or truncate. Central florets 1 to several, tubular, 3–4 mm; limbs 5-dentate or rarely 6- or 7-dentate. Achenes ca. 0.5 mm, ribbed. Pappus in 1 series, white, ca. 3 mm, connate at base. Fl. Dec–Apr.

Waste fields; low elevations. Hainan [India, Indonesia, Laos, Philippines, Vietnam; Australia].

196. EPALTES Cassini, Bull. Sci. Soc. Philom. Paris 1818: 139. 1818.

鹅不食草属 e bu shi cao shu

Herbs, small, pubescent, branches spreading, prostrate, rather woody. Leaves alternate, obovate, dentate, sessile, not decurrent. Capitula axillary, solitary, shortly pedunculate, heterogamous, disciform, florets yellow. Involucre hemispheric; phyllaries 1- or 2-seriate, oblong, obtuse, scarious, entire, incurved in fruit. Receptacle naked. Marginal florets female, numerous, many seriate, fertile; corolla elongate, slender, tubular, inflated below. Central disk florets bisexual, fewer, functionally male, tubular, 4- or 5-dentate. Anthers sagittate at base; endothecial tissue radial. Style of female and bisexual florets bifid; style branches with obtuse sweeping hairs reaching below furcation. Achenes cylindric, slender, broadly 10-ribbed, hairy at base. Pappus absent. $x = 10$.

About 14 species: Africa, Asia, Australia, Central and South America; two species in China.

1a. Leaves obovate or obovate-oblong, margin distinctly and coarsely dentate; stems and branches not winged ..... 1. *E. australis*
1b. Leaves linear or linear-oblong, margin entire or inconspicuously serrulate; stems and branches winged ..... 2. *E. divaricata*

1. Epaltes australis Lessing, Linnaea 5: 148. 1830.

鹅不食草 e bu shi cao

Sphaeromorphaea australis (Lessing) Kitamura.

Herbs, annual. Stems much branched, branches straggling, flexuous, woody toward base. Cauline leaves oblanceolate-oblong, 3.5–4 × 1–1.8 cm, sparsely pilose on both surfaces, base narrowed into petiole, margin irregularly toothed or lyrate-pinnatilobed, lobes often obtuse, mucronulate and irregularly mucronulate-dentate, apex obtuse or rounded; upper leaves ± same size as median ones. Capitula globose, 4–6 mm in diam., shortly pedunculate; peduncle 3–12 mm, few bracteate or not. Involucre depressed hemispheric, ca. 6 × 1 mm; phyllaries in 1 or 2 series, outer ones shorter, ovate, apex acute, others oblong, scarious, apex obtuse. Corolla of marginal florets ca. 0.7 mm; corolla of central florets ca. 1.3 mm, 5-dentate. Achenes cylindric, ca. 0.5 mm, gland-dotted. Fl. Mar–Jun and Sep–Nov.

Fields, roadsides; low elevations. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [India, Malaysia, Thailand, Vietnam; Australia].

2. Epaltes divaricata (Linnaeus) Cassini, Bull. Sci. Soc. Philom. Paris 1818: 139. 1818.

翅柄球菊 chi bing qiu ju

Ethulia divaricata Linnaeus, Syst. Nat., ed. 12, 2: 536; Mant. Pl. 1: 110. 1767; *Poilania laggeroides* Gagnepain.

Herbs, annual. Stems 10–20 cm tall, branched, glabrous, winged; wings entire. Leaves sessile, linear or linear-oblong, 20–65 × 2–7 mm, both surfaces glabrous, base narrowed into petiole, margin entire or inconspicuously serrulate, apex obtuse. Capitula solitary or 3–6, 6–8 mm in diam., in sparse corymbs; peduncles 5–17 mm, narrowly winged. Involucre ca. 5 × 7 mm; phyllaries in 4 or 5 series, longer than corollas, apex purplish red, outer ones ovate, ca. 3.5 mm, membranous or margin dry membranous, glabrous, margin serrulate, apex acuminate, inner ones ovate-oblong, ca. 5 mm, dry membranous, glabrous. Corollas of marginal florets tubular, 2–2.5 mm, 3-lobed; corollas of central florets 3–3.5 mm, 5-lobed. Achenes oblong or obovate, ca. 1 mm, gland-dotted. Fl. Dec–Feb.

Waste fields, farmlands; low elevations. Hainan [India, Indonesia, Sri Lanka, Vietnam].

197. PLUCHEA Cassini, Bull. Sci. Soc. Philom. Paris 1817: 31. 1817.

阔苞菊属 kuo bao ju shu

Shrubs or herbs, ± aromatic. Leaves alternate, simple. Synflorescences elongate panicles or flat-topped. Capitula many flowered, disciform, usually numerous. Phyllaries imbricate. Marginal florets numerous, in several rows, filiform, female, fertile; achenes 4- or 5-angled, longitudinally grooved. Central florets far fewer than marginal ones, tubular, bisexual, functionally male; anthers obtuse at apex, tailed at base. Style entire, sometimes divided, style branches with obtuse sweeping hairs reaching below furcation; achenes often indistinct or vestigial as a small ring of basal sclerenchymatous cells of carpopodium. Pappus of basally connate, barbellate bristles in 1 row. $x = 10$.

About 80 species: Africa, SE Asia, Australia, Caribbean, North and South America, Pacific islands; five species (two introduced) in China.

1a. Plants decumbent-ascending, herbaceous, slightly woody at base; branches glabrous or sparingly puberulent; peduncles and involucres glabrous ..... 1. *P. pteropoda*
1b. Plants erect, shrubby; branches densely pubescent; peduncles and involucres tomentose.
2a. Stems and branches conspicuously winged by decurrent leaves; capitula hemispheric (when fresh); central florets 50–60 ..... 2. *P. sagittalis*
2b. Stems and branches not winged; capitula campanulate (when fresh); central florets usually less than 25.
3a. Leaves linear ..... 3. *P. eupatorioides*
3b. Leaves obovate to elliptic.
4a. Branches densely tomentose; leaves thinly papery, petiolate, margins subentire; central florets 20–25; receptacle glabrous ..... 4. *P. carolinensis*
4b. Branches finely crisp hairy; leaves thickly papery, subsessile, margins dentate; central florets 2–7; receptacle densely hirsutulous ..... 5. *P. indica*

1. Pluchea pteropoda Hemsley ex Forbes & Hemsley, J. Linn. Soc., Bot. 23: 422. 1888.

光梗阔苞菊 guang geng kuo bao ju

Herbs or subshrubs, procumbent to ascending. Stems well branched, sulcate-striate, glabrous, rarely sparingly puberulent. Leaves sessile, obovate to oblanceolate, 3–5 × 0.7–1.7 cm, glabrous on both surfaces, base gradually narrowed, margin irregularly and sparsely dentate, apex obtuse to rounded; upper leaves smaller and narrower. Capitula 6–8 mm in diam. when fresh, to 10 mm in diam. when dried, ca. 7 mm, shortly pedunculate or sessile, densely congested in terminal corymbs. Involucre ovoid to broadly campanulate; phyllaries 5- or 6-seriate, glabrous, outer ones broadly ovate, 2.5–4 × 2–3 mm, subentire, apex obtuse to rounded, inner linear to lanceolate, 4–5 × 0.5–1 mm, margin subentire, apex acute. Receptacle flat, foveolate. Marginal florets numerous; corolla filiform, narrowed apically, 3.5–4 mm, glandular; achenes reddish brown, with pale ribs, cylindric, 1–1.4 × 0.2–0.3 mm, appressed strigillose and glandular; pappus nearly as long as corolla. Central florets 18–22; corolla 4–5 mm, 5-lobed, lobes triangular, glandular; achenes yellowish, cylindric, grooved, 0.8–1.2 × 0.4–0.5 mm, strigillose; pappus shorter than corolla. $2n = 40$.

Coastal brackish areas and tidal flats, often associated with mangroves and near graveyards on seashores. Guangdong, Guangxi, Hainan, Taiwan [Vietnam].

2. Pluchea sagittalis (Lamarck) Cabrera, Bol. Soc. Argent. Bot. 3: 36. 1949.

翼茎阔苞菊 yi jing kuo bao ju

Conyza sagittalis Lamarck, Encycl. 2: 94. 1786; *Gnaphalium suaveolens* Vellozo; *Pluchea suaveolens* (Vellozo) Kuntze.

Herbs, perennial, erect, aromatic, coarse, 1–1.5 m tall, ca. 1.5 cm in diam. at base, much branched, branches densely tomentose. Stems conspicuously winged by decurrent leaves. Median leaves sessile, lanceolate to broadly lanceolate, 6–12 × 2.5–4 cm, thinly tomentose with viscid glands on surfaces, base attenuate, margin serrate, apex acuminate. Capitula 7–8 mm in diam. when fresh, to ca. 10 mm in diam. when dried, 4–5 mm,

in compound terminal and axillary corymbs; peduncle 5–25 mm. Involucre hemispheric; phyllaries greenish brown, 4- or 5-seriate, outer ones widely elliptic to widely obovate, 1–2 × 1–1.5 mm, tomentose abaxially, margins ciliate, apex acuminate, inner lanceolate to linear-lanceolate, 3–4 × 0.4–0.6 mm, grading to glabrous. Receptacle flat, glabrous. Marginal florets numerous; corolla white, 3–3.5 mm, 3-lobed; achenes brown, cylindric, with 5 pale ribs, 0.6–0.8 × ca. 0.2 mm, with viscid glands; pappus white, slightly longer than corolla. Central florets 50–60; corolla white, purplish toward summit, 2.5–3 mm, sparingly glandular hairy at base; anthers acute at apex, shortly tailed at base; anthers and style exserted; achenes vestigial. Fl. and fr. Mar–Oct. $2n = 20$.

Exposed flat areas, riverbeds, and swamps, often in large numbers in abandoned rice paddies and grassy fields. Naturalized in Taiwan [native to North and South America].

3. Pluchea eupatorioides Kurz, Forest Fl. Burma 2: 575. 1877.

长叶阔苞菊 chang ye kuo bao ju

Herbs or subshrubs. Stems 1–2 m tall, 4–7 mm in diam., branched; young branches densely powdery puberulent, later glabrescent. Middle leaves subsessile or with petiole ca. 4 mm, blade broadly linear, 7–10 × 1.2–2 cm, both surfaces densely powdery puberulent, abaxially more densely so, base decurrent, margin sparsely serrulate, apex acuminate; upper leaves subsessile, linear, 5–7 × 0.7–1 cm. Capitula numerous, ca. 5 mm in diam., in terminal corymbs; peduncles slender, 1–5 mm, densely powdery puberulent. Involucre campanulate, 5–6 mm; phyllaries in 5 or 6 series, outer ones ovate or broadly ovate, 1.5–3 mm, apex acute. Marginal florets numerous; corolla filiform, 4–5 mm, limbs 3- or 4-dentate. Central florets fewer; corolla tubular, ca. 5 mm, limbs 5-dentate. Achenes 5-ribbed, ca. 0.8 mm, white pubescent. Pappus white, persistent, ca. 5 mm, connate at base in central florets. Fl. Apr–Jun.

Fields, roadsides. Guangxi, Yunnan [Cambodia, Laos, Myanmar, Thailand, Vietnam].

4. Pluchea carolinensis (Jacquin) G. Don in Sweet, Hort. Brit., ed. 3, 350. 1839.

美洲阔苞菊 mei zhou kuo bao ju

Conyza carolinensis Jacquin, Collectanea 2: 271. 1789.

Shrubs, erect, 1–2.5 m tall, much branched, branches densely tomentose. Petiole 1–2.5 cm; leaf blade oblong-ovate to elliptic, 6–15 × 2–6 cm, thinly tomentose and glandular on both surfaces, abaxially grayish, adaxially green, base attenuate, margin entire or nearly so, apex mucronulate-obtuse. Capitula 5–7 mm in diam. when fresh, ca. 10 mm in diam. in dried specimen, ca. 6 mm, in dense terminal and axillary corymbs; peduncle 3–8 mm. Involucre ovate to campanulate; phyllaries greenish purplish, 4- or 5-seriate, outer ones very widely elliptic to very widely obovate, 2–4 × 1.5–2 mm, tomentose abaxially, margins ciliate, apex rounded, inner lanceolate to linear-lanceolate, 4–5 × 0.5–1 mm, less pubescent to glabrous, apex acute. Receptacle flat, glabrous. Marginal florets numerous; corolla pale greenish white, pinkish toward summit, filiform, 3.5–4 mm, 3-lobed; mature achenes not seen; pappus white, slightly shorter than corolla. Central florets 20–25; corolla whitish, pinkish toward summit, 4–5 mm, sparingly glandular hairy at base; anthers obtuse at apex, shortly tailed at base; anthers and style exserted; achenes vestigial. $2n = 20$.

Naturalized in disturbed ruderal sites, often on barren mudstone slopes or associated with scrubby vegetation along roads; below 100–200 m. Taiwan [native to warmer regions of the New World and W Africa].

5. Pluchea indica (Linnaeus) Lessing, Linnaea 6: 150. 1831.

阔苞菊 kuo bao ju

Baccharis indica Linnaeus, Sp. Pl. 2: 861. 1753.

Shrubs, erect, to 2 m tall, sulcate-striate, much branched, branches finely shortly crisp hairy, later glabrate. Leaves sessile or very shortly petiolate, obovate, 2.3–8 × 1–4 cm, thickly papery, abaxially loosely puberulent to subglabrous, adaxially minutely puberulent, veinlets distinct, base attenuate, margin acutely dentate, apex acute to mucronate. Capitula narrowly cylindric to campanulate, 5–6 mm in diam. when fresh, to 9–10 mm in diam. in dried specimen, 6–7 mm, in dense terminal and axillary corymbs; peduncle 0–10 mm. Involucre ovate, 4–6 mm; phyllaries 6- or 7-seriate, outer ones 2–2.5 × ca. 1.5 mm, margins ciliolate, apex obtuse, inner lanceolate to linear, 4–6 × 0.25–1 mm, margins entire, apex obtuse. Receptacle densely hirsutulous. Marginal florets numerous; corolla 3–5 mm; style greatly exserted; achenes brown, cylindric, with 5–7 pale ribs, slightly curved, ca. 1 × 0.3 mm, subglabrous; pappus white, ca. 5 mm, slightly exceeding corolla. Central florets 2–7; corolla 4.5–5.5 mm, 5-lobed, lobes glandular; anthers and style greatly exserted; achenes vestigial; pappus white, as long as corolla. $2n = 20, 60$.

Brackish marshes and other saline habitats widespread along the W coast; low elevations. Guangdong, Hainan, Taiwan [Cambodia, India, Japan, Laos, Malaysia, Philippines, Singapore, Thailand, Vietnam; N Australia, Pacific islands (Hawaii)].

198. KARELINIA Lessing, Linnaea 9: 187. 1834.

花花柴属 hua hua chai shu

Herbs, perennial. Stem without resin canals and fibers in phloem. Leaves alternate, elliptic-oblong, entire, not decurrent, sparsely hairy. Capitula heterogamous, disciform, solitary, terminal. Phyllaries broadly oblong, hard. Receptacle epaleate. Marginal florets female; corolla filiform, 3-lobed. Disk florets functionally male. Style bifid; cells of antheropodium mammillate; endothecial tissue radial. Style branches with obtuse sweeping hairs reaching below furcation. Achenes stout, without resin ducts, hairy with straight hairs. Pappus of free, barbellate, capillary bristles, in 1 row; each bristle with patent teeth. $x = 10$.

One species: C and SW Asia, Caspian region.

1. Karelinia caspia (Pallas) Lessing, Linnaea 9: 187. 1834.

花花柴 hua hua chai

Serratula caspia Pallas, Reise Russ. Reich. 2: 743. 1773; *Karelinia caspia* f. *angustifolia* Smoljaninova; *K. caspia* f. *ovalifolia* Smoljaninova; *Pluchea caspia* (Pallas) O. Hoffmann ex Paulsen.

Perennials. Stems to 1.5 m tall, erect, terete, ribbed, leafy up to synflorescences, mainly in upper portion, corymbosely branched, gray-blue, glabrous or shortly pubescent, branches alternate, almost of equal height, scabrid. Leaves alternate, simple, sessile, oblong, 2–6 × 0.5–1.5 cm, glabrous, scabrid, uneven at margin, apex acuminate, upper leaves basally cordate, semiamplexicaul-auriculate. Capitula 1.3–2 × 0.8–2 cm, many flowered, arranged in terminal corymbiform synflorescences, 2–9; peduncles 7–25 × ca. 1 mm, scabrid. Involucre cylindric-campanulate, 13–15 × 7–10 mm; phyllaries 6- or 7-seriate, light brown, sometimes reddish at apex, imbricate, rigid (subleathery), appressed, glabrous inside, with strong short appressed gray pubescence outside, margin with ciliate hairs, longer in inner phyllaries, outer ones ovate or ovate-oblong, 5–8 × 3–4 mm, middle lanceolate, ca. 10 × 2 mm, inner sublinear, 10–15 × ca. 1 mm, acuminate. Receptacle flat, with long hairs. Marginal florets multiseriate, carpogenous, reddish, 10–12 mm, with filiform, ± heteromerous, 4-dentate corolla; tube ca. 10 × 0.5 mm in upper portion. Style as long as tube, thin, flat, glabrous, with 2-lobed stigma, lobes reddish, thin, flat, 3–5 mm, ascending, slightly divergent, glabrous. Disk florets sterile, 10–20, reddish, with 5-dentate corolla, 10–12 × ca. 1 mm in upper portion, denticles ca. 1 mm, lanceolate, acuminate. Anthers oblong, ca. 2 × 0.3 mm, glabrous, united in a tube, surrounding style, basally with short entire appendages, filaments 5–6 × ca. 0.25 mm, flat, glabrous, attached to base of corolla tube. Style ca. 15 mm, filiform, ca. 0.3 mm wide, with closely arranged fine mammillae up to half of length, stigma bipartite with short (ca. 0.5 mm) upright reddish lobes, covered with mammillae; ovary cylindric, ca. 1.5 × 0.3 mm, slightly flattened, smooth, glabrous. Achenes dark brown, cylindric, slightly recurved, 1.5–2 × ca. 0.3 mm, narrowed to base, triquetrous, with a ring at base, glabrous. Pappus white, 9–14 mm, sinuate at base, monostichous; in female florets consisting of numerous very thin, fine, often crenate hairs; in bisexual florets of finely crenate, slightly barbate-thickened hairs at apex. Fl. Jul–Sep, fr. Sep–Oct.

Gobi Desert, dunes, saline meadows; 900–1300 m. Gansu, Nei Mongol, Qinghai, Xinjiang [Kazakhstan, Mongolia, Russia, Turkmenistan; SW Asia (Iran, Turkey)].

199. LAGGERA Schultz Bipontinus ex Bentham & J. D. Hooker, Gen. Pl. 2: 290. 1873.

六棱菊属 liu leng ju shu

Herbs, annual to perennial. Stems with resin canals, but without fibers in phloem. Leaves dentate, long decurrent, hairy, sessile or petiolate. Capitula heterogamous, disciform, few to many, terminal in large open leafy panicles. Involucre campanulate; phyllaries 4–8-seriate, imbricate, narrow, usually squarrose. Receptacle naked. Marginal florets female, corolla filiform, 3-lobed; disk florets bisexual, few, tubular. Corolla pink or mauve. Anthers with sagittate bases, without tails; cells of antheropodium flattened; endothecial tissue radical. Style branches with obtuse sweeping hairs reaching below furcation. Achenes oblong-ellipsoid, without resin ducts, sparsely hairy with straight hairs. Pappus of free, barbellate, capillary bristles in 1 row; each bristle with adpressed teeth. $x = 10$.

About 17 species: tropical Africa, Arabia, and Asia; two species in China.

The two species in China are often synonymized. If treated as separate species, the correct name for the species *Laggera pterodonta* is *L. crispata*, based on *Conyza crispata* Vahl (1790), which antedates Candolle's name *Blumea pterodonta* from 1834.

1a. Stems bearing entire herbaceous wings 1–5 mm deep ..... 1. *L. alata*
1b. Stems bearing lines of narrow uneven herbaceous teeth 2–16 mm deep, usually joined by a narrow wing ..... 2. *L. crispata*

1. Laggera alata (D. Don) Schultz Bipontinus ex Oliver, Trans. Linn. Soc. London 29: 94. 1873.

六棱菊 liu leng ju

Erigeron alatus D. Don, Prodr. Fl. Nepal. 171. 1825; *Blumea alata* (D. Don) Candolle; *Conyza alata* (D. Don) Roxburgh; *Inula exsiccata* H. Léveillé; *Laggera angustifolia* Hayata; *Triplostegia epilobiifolia* H. Léveillé.

Herbs, robust, much branched, up to 60(–75) cm tall, glandular pubescent. Stems winged, wings 1–5 mm deep, herbaceous, entire, rarely somewhat denticulate, continuous. Leaves oblong, 2–8(–10) × 0.7–1.5 cm, densely covered with long multiseptate hairs, base decurrent, margin denticulate, apex acute to subobtuse. Capitula 1–1.3 cm in diam., arranged in leafy racemes, on short axillary winged branches. Involucre ovoid, ca. 9 mm in diam.; phyllaries 4- or 5-seriate, outer lanceolate, ca. 9 × 1 mm, inner longer, up to 10 mm, green at apex, glandular pubescent on outer side. Corolla of marginal florets ca. 6 mm, minutely toothed; corolla of disk florets 7–8 mm, 5-lobed. Style with obtuse sweeping hairs reaching below furcation. Achenes dark brown, ca. 1 mm. Pappus setae white, 6–7 mm, bristles equal, minutely scabrid. Fl. Mar–Oct. $2n = 20$.

Wastelands and sunny meadows; below 2300 m. Fujian, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Taiwan, Yunnan, Zhejiang [Bhutan, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; E Africa, Madagascar].

2. Laggera crispata (Vahl) Hepper & J. R. I. Wood, Kew Bull. 38: 83. 1983.

翼齿六棱菊 yi chi liu leng ju

Conyza crispata Vahl, Symb. Bot. 1: 71. 1790; *Blumea*

pterodonta Candolle; *Laggera intermedia* C. B. Clarke; *L. pterodonta* (Candolle) Schultz Bipontinus ex Oliver; *L. purpurascens* Schultz Bipontinus ex Hochstetter.

Herbs. Stems much branched, 40–100 cm tall, stems and branches narrowly winged with irregular deeply toothed lobes or interrupted wing; stem teeth and leaves densely pubescent, mainly with short erect glandular hairs. Lower leaves sessile or sometimes with winged, deeply toothed petiole to 15 mm, blade narrowly obovate, 5–17 × 1.5–6 cm, base long attenuate, margin subentire to serrate-dentate, apex acute; upper leaves narrower, slightly tapered below, oblong, sometimes subobtuse. Capitula terminal, pink to purple, 10–15 mm in diam.; peduncles slender. Involucre ca. 7 mm in diam.; phyllaries 4.5–9 mm, at least outer ones glandular-pubescent. Corolla 6.5–8 mm. Achenes ca. 1 mm. Pappus ca. 6 mm. Fl. Jan–Jul. $2n = 20$.

Strongly aromatic glandular weedy herbs on dry hill slopes, old clearings, upland rice fields, and wastelands; below 2000 m. Guangxi, Guizhou, Hubei, Sichuan, SE Xizang, Yunnan [Bhutan, India, Thailand, Vietnam; tropical Africa].

200. PSEUDOCONYZA Cuatrecasas, Ciencia 21: 30. 1961.

假飞蓬属 jia fei peng shu

Herbs, perennial. Leaves alternate, entire or pinnatisect, serrate to dentate or basally shallowly lobed, sometimes petiolate, amplexicaul, decurrent on stem as 1 or 2(or 3) pairs of lobes. Capitula disciform in small, loose corymbs on leafy branches. Phyllaries 5- or 6-seriate, imbricate, lanceolate to linear. Marginal florets female, filiform, many. Disk florets few, bisexual. Anthers tailed; endothecial tissue radial. Achenes oblong-ellipsoid with straight hairs. Pappus uniseriate of free barbellate bristles with appressed teeth.

One species: Africa, Asia, Central America.

1. Pseudoconyza viscosa (Miller) D'Arcy, Phytologia 25: 281. 1973.

假飞蓬 jia fei peng

Conyza viscosa Miller, Gard. Dict., ed. 8, *Conyza* no. 8. 1768.

Herbs, to 1 m tall, erect, sometimes branched at base, usually branched on upper part of stem; culms cylindric, villous and glandular. Leaves alternate, sessile, oblanceolate-ovate to obovate, 1–8 cm, both surfaces villous, parted or not, base cuneate to attenuate, margin serrate to doubly serrate, apex rounded to acute. Capitula terminal and axillary, 8–9 × 4–6 mm, in lax corymbs or cymose panicles, branches leafy. Involucre 4-seriate, margin entire or pilose, apex acuminate; outer phyllaries lanceolate, 2.5–5 mm, abaxially villous and glandular, adaxially glabrous to sparsely villous, innermost linear, central part glabrous to sparsely villous, margin membranous, 1-veined, ca. 8 mm. Receptacle concave, glabrous. Marginal disk florets numerous, female and fertile; corolla whitish to pale purplish, filiform, 3.5–4.5 mm; stigma exposed, 0.5–1 mm. Central disk florets fewer than 10 per capitulum, bisexual and fertile; corolla whitish to pale purplish, tubular, ca. 4.5 mm, 5-lobed, lobes ca. 0.5 mm; anthers obtuse at apex, shortly tailed at base; style sparsely pilose, stigma bifid, extracted. Achenes cylindric, 10-ribbed, sparsely pilose; carpopodium a broad circle, conspicuous. Pappus white, 4–5 mm. Fl. Jan–Apr.

Grows as a weed and also in disturbed lowland habitat. Taiwan [India, Pakistan; Africa, SW Asia, Central America].

13. Tribe **ATHROISMEAE**

山黄菊族 shan huang ju zu

Chen Yousheng (陈又生); Arne A. Anderberg

Annual or perennial herbs, shrubs, or small trees, sometimes aromatic. Leaves simple, alternate or fasciculate, petiolate or sessile, abaxial surface with or without sessile-glandular trichomes. Capitula terminal, in corymbiform cymes, or solitary, sometimes congested, glomerule-like or in rounded secondary capitula, pedunculate, sometimes sessile, radiate, disciform, or discoid. Phyllaries 1–4-seriate, sometimes much reduced or absent, herbaceous, subequal or gradate. Receptacles convex to conical, sometimes subglobose to globose, paleate or epaleate. Ray florets when present female; corollas yellow or white. Anthers usually ecalcarate, shortly caudate or not caudate, rarely tails well developed and branched; endothecium with polarized thickenings. Achenes brown or black, obcompressed to subterete, sometimes with thickened striations or ribs, sometimes with a proliferation of spongy cells apically, glabrous or with ciliate lateral ridges and glandular trichomes, sometimes with apically arcuate twin trichomes. Pappus of awns or variously lacerate scales, a crown of twin trichomes, sometimes with 2 awns, or absent.

Six genera and ca. 59 species: mostly in E Africa, a few species in W Africa, S and SE Asia, and Madagascar; one species in China.

201. **ANISOPAPPUS** Hooker & Arnott, Bot. Beechey Voy. 196. 1837.

山黄菊属 shan huang ju shu

Herbs, annual or perennial. Stems not winged, without resin canals. Leaves simple, entire to dentate or pinnatifid or deeply lobed, hairy. Capitula large or small, solitary or clustered, heterogamous, radiate. Receptacle paleate; paleae folded. Marginal florets female, in ca. 1 row; corolla yellow, radiate; epidermis not crested. Disk florets bisexual; corolla yellow with straight epidermis cell walls, without needle-shaped crystals; corolla lobes short, smooth, without spiny hairs apically. Anthers minutely calcarate, with long or very short tails; endothecial tissue polarized; cells of antheropodium wider than long. Pollen spines with a cavity. Style with obtuse, rarely acute, sweeping hairs not reaching furcation, without star-shaped crystals. Achenes ellipsoid or with obtuse indistinct edges, without crystals in epidermis. Pappus of short acute or obtuse scales, or sometimes missing. $x = 7$.

About 40 species: mostly in S and tropical Africa, Madagascar; one species in China.

That *Anisopappus* is a member of the Athroismeae, the closest relatives of the Heliantheae s.l., has received robust support from DNA analyses (Eldenäs et al., Pl. Syst. Evol. 210: 159–170. 2005).

1. Anisopappus chinensis Hooker & Arnott, Bot. Beechey Voy. 196. 1837.

山黄菊 shan huang ju

Inula yunnanensis J. Anthony; *Verbesina chinensis* Linnaeus.

Herbs, annual. Rhizome stout, 5–12 mm in diam. Stems erect, 40–100 cm tall, 2–4(–6) mm in diam., simple or rarely caespitose, with slender stripes, subwoody at base, densely rusty pubescent or sparsely pubescent in lower part during anthesis. Cauline leaves ovate-lanceolate or narrowly oblong, 3–6 × 1–2 cm, papery, both surfaces slightly pubescent, more densely so along veins, base truncate or broadly cuneate, margin obtusely serrate, apex obtuse. Capitula solitary or several in terminal corymbs; peduncles densely pubescent. Involucre hemispheric, 6–10 mm; phyllaries in 3 series, narrowly lanceolate or broadly linear, 3–5 × ca. 1.5 mm, dorsally densely pubescent, margin membranous, apex obtuse. Paleae keeled, membranous, ca. 5 mm. Marginal florets female; corolla yellow; lamina obtriangular, ca. 6.5 × 2 mm, apex truncate, 3-dentate. Disk florets bisexual; corolla tubular, ca. 3 mm, with short triangular lobes. Achenes columnar, sparsely pubescent, apex truncate, slightly narrower to base, ca. 2 mm in female florets and ca. 1.5 mm in bisexual florets, with 4 ribs. Pappus grayish white, chaffy, of 4 or 5 bristles. Fl. Aug–Nov.

Grassy slopes, waste fields, forest margins; below 2400 m. S Fujian, Guangdong, Guangxi, Jiangxi, S Sichuan, Yunnan [India, Myanmar, N Thailand; tropical Africa, Madagascar].

In the protologue of *Anisopappus chinensis*, Hooker and Arnott referred to "*Verbesina chinensis* Linn. ?" The expression of doubt in this citation prevented *A. chinensis* from being validly published as a new combination based on *V. chinensis*. The latter name was subsequently recognized as a heterotypic synonym of *A. chinensis*.

14. Tribe **HELIANTHEAE**

向日葵族 xiang ri kui zu

Chen Yousheng (陈又生); D. J. Nicholas Hind

Annual or perennial herbs, subshrubs, or shrubs. Rootstock fibrous, tuberous, or woody in form of a xylopodium. Leaves mostly opposite or mostly alternate, rarely whorled, petiolate or sessile, entire, lobed or rarely pinnatisect. Synflorescences of scapose capitula, or capitula arranged in axillary or terminal cymes, corymbs, or panicles, rarely with synflorescences with secondary or tertiary aggregation of capitula. Capitula either heterogamous radiate, heterochromous or homochromous, rarely disciform, or homogamous, discoid, homochromous, florets usually bisexual, rarely unisexual; involucres cylindric to hemispheric or rotate; phyllaries persistent, herbaceous, rarely membranous, 1–6-seriate, when 1-seriate sometimes with oil glands; receptacles usually flat or convex, sometimes hemispheric or conical, usually paleate; paleae usually deciduous, sometimes persistent, distinct or rarely connate, herbaceous to scarious, apices sometimes 3-lobed or -toothed. Ray florets neuter, or female and fertile; lamina entire or 2- or 3-toothed. Disk florets bisexual, fertile or sterile, 4- or 5-lobed; style branches truncate or appendiculate; anther thecae dark or pale, anther tails obtuse and entire, or sagittate, auriculate. Achenes often compressed or angled, usually black or blackish; pappus absent, or usually of (1 or)2(–8) scales and/or awns, sometimes coroniform.

About 210 genera and ca. 3,330 species: mostly in America; 34 genera (25 introduced) and 64 species (one endemic, 43 introduced) in China.

Many species of this tribe are widely cultivated in China. They include *Dahlia pinnata* Cavanilles, *Dyssodia tenuiloba* (Candolle) B. L. Robinson, *Helenium autumnale* Linnaeus, *Heliopsis helianthoides* (Linnaeus) Sweet, *Melampodium divaricatum* (Richard) Candolle, *Ratibida columnifera* (Nuttall) Wooton & Standley, *Sanvitalia procumbens* Lamarck, and *Silphium perfoliatum* Linnaeus.

1a. Plant generally wind-pollinated or self-pollinated, capitula small and not showy; all florets unisexual, or if bisexual then capitula aggregated into glomerules; ray florets absent.
2a. Florets all bisexual; capitula aggregated into glomerules surrounded by leaflike bracts; achenes free and not surrounded by modified phyllaries into a bur or into spiny, tuberculate, or winged coat ..... 228. *Lagascea*
2b. Florets unisexual; capitula not aggregated into glomerules and lacking any outer leaflike bracts; achenes surrounded by modified phyllaries into a prickly bur or spines, tubercles, or wings.
3a. Phyllaries in male capitula 1- or 2-seriate, free to base; phyllaries in female capitula 6–12-seriate, their distinct tips mostly ± hooked (distal 1–3 usually longer, stouter, and not hooked), whole becoming a hard, prickly perigynium or bur; florets 2 ..... 232. *Xanthium*
3b. Phyllaries in male capitula 1-seriate, connate; phyllaries in female capitula 1–8-seriate, usually with free tips forming tubercles, spines, or wings; florets 1(–5) ..... 233. *Ambrosia*
1b. Plant generally adapted for attracting pollinating insects, capitula colorful and attractive; some or all florets bisexual; ray florets present, sometimes inconspicuous, rarely absent.
4a. Leaves and phyllaries with obvious oil glands.
5a. Phyllaries connate into a tube, sometimes splitting with age; style arms relatively long, spreading or arcuate; leaves lacking basal cilia ..... 202. *Tagetes*
5b. Phyllaries free; style arms minute, scarcely bifurcated; leaf bases distinctly ciliate ..... 203. *Pectis*
4b. Leaves and phyllaries lacking oil glands.
6a. Only ray florets fertile, ray achenes much longer than those of sterile disk florets.
7a. Leaves alternate; ray achenes strongly flattened, each achene ± enclosed by and often attached to subtending phyllary and 2 adjacent paleae, all falling as a unit ..... 234. *Parthenium*
7b. Leaves opposite; ray achenes thick, rounded or weakly compressed, without wings; achenes thick, not obviously flattened, not falling as unit with adjacent paleae.
8a. Achenes enveloped and enclosed by prickly inner phyllaries ..... 214. *Acanthospermum*
8b. Achenes merely subtended by unarmed phyllaries ..... 217. *Smallanthus*
6b. Disk florets fertile; ray florets present and fertile or sterile or absent.
9a. Ray florets with or without short tubes, persistent with corollas fused to apex of achene ..... 211. *Zinnia*
9b. Ray florets deciduous, of if ray florets absent (i.e., capitula disciform or discoid) then corollas not fused to apex of achene.
10a. Pappus of subulate to acerose scales, or spatulate, entire to erose, fimbriate, or laciniate, sometimes aristate, scales 1-seriate, or plumose, setiform scales (or flattened bristles) 1-seriate, or an apical peg.
11a. Pappus of plumose setae ..... 212. *Tridax*
11b. Pappus of aristate or linear scales with erose or fimbriate margins, or absent.
12a. Pappus of 6–12 aristate, rarely linear scales with erose margins; capitula > 10 mm in diam. ..... 235. *Gaillardia*
12b. Pappus absent or of fimbriate, sometimes aristate scales; capitula 3–5 mm in diam. ..... 213. *Galinsoga*

10b. Pappus absent, or awned.
13a. Achenes compressed.
14a. Pappus of retrorsely barbed awns; leaves opposite or upper alternate.
15a. Style branches with long hairs; pappus of 2 scabrid awns ..... 205. *Glossocardia*
15b. Style branches with short minute papillae; pappus of 2–4 scabrid awns.
16a. Anther filaments pubescent; achene apex beaked ..... 206. *Cosmos*
16b. Anther filaments glabrous; achene apex narrow, not beaked ..... 207. *Bidens*
14b. Pappus absent, or persistent, of 2 bristly cusps or scales; leaves opposite.
17a. Phyllaries 2-seriate, outer few and smaller, inner membranous, connate at base; pappus of 2–4 awns or scales or absent ..... 208. *Coreopsis*
17b. Phyllaries free, outer leathery, subequal, inner shorter, similar with paleae; ray achenes narrowly oval and winged, with 2 triangular scales.
18a. Achenes markedly dimorphic, those of ray florets with conspicuous, lacerate winged margin, others wingless ..... 219. *Synedrella*
18b. Achenes all ± alike, wingless or somewhat thickly winged distally, not lacerate.
19a. Shrubs or small trees; synflorescence of numerous capitula in congested panicles or corymbs; achenes wingless ..... 223. *Clibadium*
19b. Annual or perennial herbs; synflorescence of solitary capitula or capitula several in dense clusters; achenes winged or angled.
20a. Capitula radiate; pappus of 2 stout awns ..... 220. *Calyptocarpus*
20b. Capitula discoid; pappus peglike ..... 221. *Eleutheranthera*
13b. Achenes all relatively plump, or 3–5-angled in ray florets and compressed in disk florets.
21a. Achenes enclosed by inner phyllaries or outer paleae.
22a. Capitula tightly or loosely aggregated on short peduncles in corymbose panicles ..... 204. *Flaveria*
22b. Capitula axillary or in sparse cymes or panicles.
23a. Female florets 1-seriate; phyllaries 5, spreading; capitula in sparse panicles, peduncles long ..... 216. *Sigesbeckia*
23b. Female florets multiseriate; phyllaries 4, broad, in 2 pairs; capitula axillary, peduncles very short ..... 209. *Enydra*
21b. Achenes not enclosed by inner phyllaries.
24a. Paleae narrow, long, flat; ray florets 2-seriate, lamina small; pappus absent or of 2 short awns.
25a. Ray floret lamina white; achene body tuberculate ..... 222. *Eclipta*
25b. Ray floret lamina yellow; achene body striate ..... 215. *Guizotia*
24b. Paleae concave or folded, ± enclosing florets.
26a. Achenes in ray florets broadly ovate or elliptic, 3-angled; disk achenes ellipsoid, strongly compressed; pappus absent or of up to 10 awnlike bristles ..... 210. *Acmella*
26b. Achenes in bisexual florets 4- or 5-angled, or compressed.
27a. Ray florets sterile.
28a. Paleae completely investing and falling with accompanying achene, each forming a hardened perigynium ..... 227. *Sclerocarpus*
28b. Paleae sometimes conduplicate, ± enfolding achenes, not forming perigynium.
29a. Pappus absent, a small crown of minute scales, or of 2–4 small scales; receptacles conical to columnar ... 229. *Rudbeckia*
29b. Pappus of 2 awns sometimes with a few scales, or a crown of fused scales, or of 2 awns with fused scales, or absent; receptacles flat to shallowly convex.
30a. Peduncles usually distally dilated, always fistulose; pappus absent or coroniform, of connate scales, 1 or 2 scales sometimes subulate to aristate ..... 230. *Tithonia*
30b. Peduncles never fistulose; pappus absent or readily deciduous, of 2(or 3) usually lanceolate, aristate, or erose scales, plus 0–8 usually shorter scales ..... 231. *Helianthus*

27b. Ray florets fertile.
31a. Pappus elements 2–5, unequal, spinelike or squamalike, persistent, base connate; ray florets female, ray floret lamina short or very short, apex 2–4-dentate; capitula small ..... 218. *Blainvillea*
31b. Pappus absent, or scalelike, cyathiform, coroniform, or of 1 or 2 setae; capitula relatively large.
32a. Corollas orange to yellow; outer phyllaries herbaceous and larger than inner; leaves sessile or very shortly petiolate; plants mainly prostrate; achenes triangular (ray) or compressed (disk); capitula always solitary, terminal (but appearing axillary) on erect peduncles; achene beak and pappus obscured at maturity by corky collar ..... 224. *Sphagneticola*
32b. Corollas white or yellow; outer phyllaries ± equal in size to inner; leaves usually conspicuously petiolate; plants mostly erect or ascending [sometimes vines or subshrubs outside of our area]; synflorescence of 1–3(–6) capitula, terminal or axillary; pappus of obvious setae (rarely absent).
33a. Ray florets female and sterile or neuter; pappus awns caducous ..... 225. *Melanthera*
33b. Ray florets female and fertile; pappus absent or single awn persistent ..... 226. *Wollastonia*

202. TAGETES Linnaeus, Sp. Pl. 2: 887. 1753.

万寿菊属 wan shou ju shu

Annual or perennial herbs, subshrubs, or shrubs. Stems erect, branched distally or throughout. Leaves cauline, mostly opposite (distal sometimes alternate), petiolate or sessile; blades mostly lanceolate to oblanceolate overall, usually pinnately 1–3-lobed or -pinnatisect, ultimate margin toothed or entire, both surfaces glabrous or hairy. Synflorescence of solitary capitula or of sometimes dense, many-headed corymbs. Capitula radiate or discoid; calyculus absent; involucres narrowly cylindric or fusiform to turbinate or broadly campanulate, 1–12+ mm in diam.; phyllaries persistent, 1- or 2-seriate (connate to 7/8+ their lengths, usually streaked and/or dotted with oil glands); receptacle convex to conical, smooth or finely pitted, epaleate. Ray florets female, fertile (except "double" cultivars); lamina yellow or orange, red-brown, or white. Disk florets bisexual, fertile; corollas greenish yellow to orange, sometimes tipped with red or red-brown, tubes much longer than or ± equaling funnelform throats, lobes 5, deltate to linear-lanceolate. Achenes narrowly obpyramidal or fusiform-terete, sometimes weakly flattened, glabrous or hairy; pappus persistent, of 2–5(–10) dissimilar, distinct or connate, 1-seriate scales: 0–5+ oblong to lanceolate, erose-truncate or laciniate, 0–2(–5) longer, subulate to aristate. $x = 12$.

About 40 species: tropical and warm-temperate America, especially Mexico; two species (both introduced) in China.

1a. Synflorescence of solitary terminal capitula; ray limb yellow to orange or reddish brown, rarely white (in cultivars); disk florets (10–)50–120 ..... 1. *T. erecta*
1b. Synflorescence of dense terminal corymbs of numerous capitula; ray limb pale yellow to cream; disk florets 4–7 ..... 2. *T. minuta*

1. Tagetes erecta Linnaeus, Sp. Pl. 2: 887. 1753.

万寿菊 wan shou ju

Tagetes patula Linnaeus; *T. tenuifolia* Cavanilles.

Annuals, 10–120 cm. Leaf blades 30–120(–250) mm overall, principal lobes/leaflets 9–25, lanceolate to linear-lanceolate, 15–25(–45) × 3–8(–12) mm. Capitula solitary; peduncles 30–100(–150) mm; involucres 10–22+ × (3–)5–12 mm; phyllaries 5–8. Ray florets (3–)5–8(–100 in "double" cultivars); lamina yellow to orange, red-brown (sometimes bi-colored: yellow/red-brown), or white (some cultivars), flabellate to ovate-quadrate, (2–)12–18(–25) mm. Disk florets (10–)50–120; corollas 7–12 mm. Achenes 6–11 mm; pappus of 0–2 subulate-aristate scales 6–12 mm and 2–4 distinct or connate, linear-oblong, erose scales 2–6+ mm. Fl. Jun–Oct. $2n = 24, 48$.

Widely cultivated in China [native to North America].

Cultivars of *Tagetes erecta* are widely grown in gardens and, commercially, for cut flowers. They often persist after plantings are abandoned. Tetraploid plants ($2n = 48$) with smaller involucres and wholly or partially red-brown corollas included here in *T. erecta* have been called *T. patula* by some botanists.

2. Tagetes minuta Linnaeus, Sp. Pl. 2: 887. 1753.

印加孔雀草 yin jia kong que cao

Tagetes bonariensis Persoon; *T. glandulifera* Schrank; *T. porophyllum* Vellozo; *T. riojana* M. Ferraro.

Annual herbs, 10–250 cm, plant aromatic. Stems much branched in larger plants and almost woody, ribbed, glabrous, glandular. Leaves mostly opposite, often alternate in upper part, dark green, pinnatisect, elliptic in outline, 3–30 × 0.7–8 cm, rachis narrowly winged, lobes up to 17, linear-oblong, to 11 × 1 cm, with orange glands. Synflorescence a dense terminal corymb. Capitula narrowly cylindric; involucre 8–12 mm; phyllaries 3 or 4, yellow-green, fused, glabrous, with brown or orange linear glands. Ray florets 2 or 3, pale yellow to cream, lamina 2–3.5 mm. Disk florets 4–7, yellow to dark yellow, 4–5 mm. Achenes black, narrowly ellipsoid, 6–7 mm, pilose; pappus of 1 or 2 setae to 3 mm and 3 or 4 scales to 1 mm, apices ciliate.

Recently naturalized in Taiwan [widespread in Central and South America; naturalized in Africa (Kenya, South Africa) and Australia].

The occurrence of this species in Taiwan was first reported by C. M. Wang and Chih H. Chen (Taiwania 51: 32–35. 2006).

203. PECTIS Linnaeus, Syst. Nat., ed. 10, 2: 1189, 1221, 1376. 1759.

香檬菊属 xiang meng ju shu

Lorentea Lagasca (1816), not Ortega (1797).

Annual or perennial herbs, often strongly scented, sparsely to densely branched. Stems slender, terete to slightly angled, glabrous or hirtellous, or puberulent with retrorsely curved hairs. Leaves opposite, sessile, simple, glandular punctate with glandular oil pits, margin entire or rarely toothed or lobed, ciliate with slender bristles mostly toward base; midvein strong, without prominent secondary veins. Inflorescences terminal on stems or branches, in loose to dense cymose clusters or with solitary capitula; peduncles with or without bracteoles. Capitula heterogamous, radiate; involucre cylindric to campanulate; phyllaries uniseriate, subequal, abaxially variously glandular punctate with glandular pits, margins thin, narrowly to broadly overlapping, median keel narrow to strong, bases projecting outward, apex slightly to strongly apiculate; receptacle slightly convex, naked, epaleate. Ray florets inserted in basal pockets of phyllaries, equal in number to phyllaries, uniseriate, fertile; corolla yellow to reddish, with distinct limb, apex minutely 3-lobed. Disk florets 3 to ca. 40, fertile, bisexual; corolla yellow, sometimes drying purplish, glabrous or puberulent with blunt hairs, throat funnelform, lobes 5, equal or unequal, sometimes weakly bilabiate, lanceolate to broadly linear, with or without oil gland in tip; anther thecae pale, shortly pointed at base, apical anther appendages ovate to truncate; style shaft with brush of short hairs; style arms narrow or short and broad. Achenes black, narrowly cylindric or fusiform, weakly ribbed, glabrous or setuliferous; carpopodium a short cap; pappus of scabrid bristles, of a few stout awns, bristles, or scales, or only of scales. $x = 12$.

About 85 species: tropical and subtropical America, especially Mexico; one species (introduced) in China.

1. Pectis prostrata Cavanilles, Icon. 4: 12. 1797.

伏生香檬菊 fu sheng xiang meng ju

Lorentea prostrata (Cavanilles) Lagasca; *Pectis costata* Seringe & P. Mercier ex Candolle, nom. illeg. superfl.; *P. multisetosa* Rydberg; *P. prostrata* var. *urceolata* Fernald; *P. urceolata* (Fernald) Rydberg.

Annual herbs. Stems prostrate or ascending, 1–30 cm, puberulent, hairs in 2 rows. Leaves linear to narrowly oblanceolate, 10–30 × 1.5–7 mm, abaxially densely pubescent and dotted with conspicuous orbicular oil glands, adaxially glabrous, margin with conspicuous, spreading basal cilia or bristles ca. 1–3 mm. Inflorescences of solitary terminal capitula or capitula in groups of 2 or 3; peduncles 1–2 mm, bracteolate. Capitula radiate, heterogamous; involucre campanulate to cylindric, appearing almost urceolate; phyllaries 5 or 6, uniseriate, oblong to obovate, 5–7 × 1–3 mm, glabrous, apex truncate. Ray florets 5, female; ray limb bright yellow, 3.5–4 mm, scarcely exceeding involucre, apex scarcely shortly lobed. Disk florets 6–15 (but reported as 10–18 in Taiwan), bisexual; corolla yellow, ca. 2.5 mm. Achenes fusiform, 3–3.7 mm; body weakly many ribbed, sparsely to densely setuliferous; pappus of 3–5 stout, whitish, lanceolate scales 1.5–2.5 mm with margin laciniate. Fl. probably year-round. $2n = 24$ (from Mexican material).

Newly introduced weed cultivated and now naturalized in grassland and along some riverbanks. Taiwan [native to Caribbean region, Central America, Mexico, and S United States].

204. FLAVERIA Jussieu, Gen. Pl. 186. 1789.

黄顶菊属 huang ding ju shu

Annuals, perennials, or subshrubs. Stems erect or decumbent, branched. Leaves cauline, opposite, petiolate or sessile; blade oblong-ovate to lanceolate or linear, both surfaces glabrous or shortly pubescent, margin entire or serrate, or spinulose-serrate. Synflorescences of lax or dense aggregations of capitula in corymbose panicles or glomerules. Capitula radiate or discoid; involucres oblong, urceolate, cylindric, or turbinate, 0.5–2 mm in diam.; phyllaries persistent, 2–6(–9), 1-seriate; receptacle small, convex, epaleate. Ray florets 0 or 1(or 2), female, fertile, when present external to clusters of capitula; corollas yellow or whitish. Disk florets 1–15, bisexual, fertile; corollas yellow, tubes shorter than to ± equaling funnelform to campanulate throats, lobes 5, ± deltate. Achenes black, weakly compressed, narrowly oblanceolate or linear-oblong, ribbed, glabrous; pappus usually absent, or sometimes persistent, of 2–4 hyaline scales, or coroniform, or of connate scales. $x = 18$.

About 21 species: India, Mexico, United States; Africa, Australia, Caribbean, Central and South America; one species (introduced) in China.

See the revision of *Flaveria* by Powell (Ann. Missouri Bot. Gard. 65: 590–636. 1978).

1. Flaveria bidentis (Linnaeus) Kuntze, Revis. Gen. Pl. 3(3): 148. 1898.

黄顶菊 huang ding ju

Ethulia bidentis Linnaeus, Syst. Nat., ed. 12, 2: 536; Mant. Pl. 1: 110. 1767.

Annuals. Stems erect, to 100 cm tall, sparsely villous. Leaves petiolate (proximal, petioles 3–15 mm) or sessile (distal); blades lanceolate-elliptic, 50–120(–180) × 10–25(–70) mm, bases (distal) connate, margins serrate or spinulose serrate. Capitula 20–100+ in tight subglomerules in scorpioid cymes; calycular bracts 1 or 2, 1–2 mm; involucres oblong-angular, ca. 5 mm; phyllaries 3(or 4), oblong. Ray florets 0 or 1; lamina pale yellow, obliquely ovate, to 1 mm (not or barely surpassing phyllaries). Disk florets (2 or)3–8; corolla tubes ca. 0.8 mm, throats funnelform, ca. 0.8 mm. Achenes oblanceolate or subclavate, 2–2.5 mm (those of ray florets longer); pappus absent. Fl. Jul–Nov. $2n = 36$.

A newly introduced weed of moist places, wastelands or disturbed sites, clay, gravel, or sands. Hebei [native to South America].

205. GLOSSOCARDIA Cassini, Bull. Sci. Soc. Philom. Paris 1817: 138. 1817.

鹿角草属 lu jiao cao shu

Herbs, perennial, glabrous, with a thick caudex. Stems erect, branched; leaves few. Radical leaves crowded, long petiolate, pinnately parted; cauline leaves alternate. Capitula small, solitary or few in corymbs, heterogamous; phyllaries 1–4-seriate, outer phyllaries and paleae oblong, slightly connate, somewhat inflated at base, inner palea narrowed, flat. Ray florets 1-seriate, female, fertile; corollas spreading, 3-lobed. Disk florets tubular, bisexual; corollas 4-lobed; anthers obtuse at base. Achenes glabrous, flattened dorsally, linear, truncate; pappus of 2 retrorsely scabrid awns.

Eleven species: N Africa, tropical Asia to S Australia and the Pacific islands; one species in China.

1. Glossocardia bidens (Retzius) Veldkamp, Blumea 35: 468. 1991.

鹿角草 lu jiao cao

Zinnia bidens Retzius, Observ. Bot. 5: 28. 1788; *Bidens meyeniana* Walpers; *B. tenuifolia* Labillardière; *Glossogyne bidens* (Retzius) Alston; *G. oluanpiensis* S. S. Ying; *G. tenuifolia* (Labillardière) Cassini.

Herbs, perennial. Stems woody at base, 20–30 cm, somewhat tufted. Radical leaves persistent, 4.5–9 cm, glabrous, sometimes undivided and linear, usually pinnately parted, segments 2 or 3 pairs, remote, spreading, linear, 1.8–2 mm wide, obtuse, lower segments 8–20 mm, petiole 2.7–6 cm; median leaves few, remote, petiolate, 3–4 cm, pinnately parted or linear; upper leaves smaller, linear. Capitula ca. 7 mm in diam., solitary, basal bracteoles ca. 1.5 mm; phyllaries and paleae ca. 7, oblong, ca. 3 mm. Ray florets few, 1-seriate, fertile; corolla ca. 3.5 mm, lip 3-lobed. Disk florets: corolla ca. 2.5 mm, apex 4-lobed. Pappus awns erect, 1.5–2 cm. $2n = 24$.

Exposed coastal areas, sometimes on raised coral reefs; low elevations. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Xizang [Bangladesh, India, Indonesia, Malaysia, Papua New Guinea, Philippines, Thailand, Vietnam; Australia, Pacific islands (New Caledonia)].

206. COSMOS Cavanilles, Icon. 1: 9. 1791.

秋英属 qiu ying shu

Annuals, perennials, or subshrubs. Stems usually 1, erect or ascending, branched distally or ± throughout. Leaves mostly cauline, opposite, petiolate or sessile; blades usually pinnately 1–3-lobed or undivided, ultimate margin usually entire, both surfaces usually glabrous, sometimes glabrate, hispid, puberulent, or scabridulous. Synflorescence of solitary capitula or corymbose. Capitula radiate, borne singly or in corymbiform arrays; calycular bracts (5–)8, basally connate, ± linear to subulate, herbaceous; involucres hemispheric or subhemispheric, 3–15 mm in diam.; phyllaries persistent, (5–)8, ± 2-seriate, distinct, lanceolate, oblong-lanceolate, ovate-lanceolate, or oblong, ± equal, membranous or herbaceous, margin ± scarious; receptacles flat, paleate; paleae deciduous, linear, flat or slightly concave-convex, scarious or entire. Ray florets neuter; corollas white to pink or purple, or yellow to red-orange. Disk florets bisexual, fertile; corollas yellow or orange, tubes shorter than funnelform throats, lobes 5, ± deltate. Achenes relatively slender, quadrangular-cylindric or -fusiform, sometimes slightly arcuate, attenuate-beaked, wingless [or winged], faces glabrous or hispid to scabridulous or ± setose, sometimes papillate, usually with 1 groove; pappus of 2–4(–8) retrorsely barbed awns, sometimes absent. $x = 12$.

About 26 species: tropical and subtropical America, especially Mexico, widely introduced elsewhere; two species (both introduced) in China.

See Sherff, Publ. Field Mus. Nat. Hist., Bot. Ser. 8(6): 401–447. 1932.

1a. Ray floret lamina pink, purple, purplish, rose-pink, violet, or white ..... 1. *C. bipinnatus*
1b. Ray floret lamina yellow to red-orange ..... 2. *C. sulphureus*

1. Cosmos bipinnatus Cavanilles, Icon. 1: 10. 1791.

秋英 qiu ying

Plants 30–200 cm tall, glabrous or sparsely puberulent, sometimes scabridulous. Leaves sessile or with petioles up to 1 cm; blade 6–11 cm, ultimate lobes to 1.5 mm wide, margin entire, apex acute. Capitula solitary, 3–6 cm in diam.; peduncles 10–20 cm; calycular bracts spreading, linear to lanceolate, 6–13

mm, apices acuminate; involucre 7–15 mm in diam.; phyllaries erect, lanceolate to ovate-lanceolate, 7–13 mm, apices rounded or obtuse. Ray corollas white, pink, or purplish, lamina obovate to oblanceolate, 15–50 mm, apices ± truncate, dentate. Disk corollas 5–7 mm. Achenes 7–16 mm, glabrous, papillose; pappus absent, or of 2 or 3 ascending to erect awns 1–3 mm. Fl. Jun–Aug. $2n = 24$.

Widely introduced in China [native to Mexico and SW United States].

A favorite garden plant, this species has escaped and naturalized widely in warm climates almost worldwide.

2. Cosmos sulphureus Cavanilles, Icon. 1: 56. 1791.

硫磺菊 liu huang ju

Plants 30–200 cm tall, glabrous or sparsely pilose to hispid. Leaves petiolate; petiole 1–7 cm; blade 5–12(–25) cm, ultimate lobes 2–5 mm wide, margin sparsely spinulose-ciliate, apex apiculate. Peduncles 10–20 cm; calycular bracts spreading-ascending, linear-subulate, 5–7(–10) mm, apices acute; involucre 6–10 mm in diam.; phyllaries erect, oblong-lanceolate, 9–13(–18) mm, apices acute to rounded-obtuse. Ray corollas intensely yellow to red-orange, lamina obovate, 18–30 mm, apices ± truncate, denticulate. Disk corollas 6–7 mm. Achenes 15–30 mm, usually hispidulous, rarely glabrous; pappus absent, or of 2 or 3 widely divergent awns 1–7 mm. Fl. Jun–Sep. $2n = 24, 48$.

Introduced in Beijing, Guangdong, and Yunnan [native to Mexico].

207. BIDENS Linnaeus, Sp. Pl. 2: 831. 1753.

鬼针草属 gui zhen cao shu

Kerneria Moench.

Annuals or perennials. Stems usually erect, branched distally or throughout. Leaves usually cauline, usually opposite, rarely whorled, distal sometimes alternate, petiolate or sessile; blades simple, compound (leaflets petiolulate), or 1–3-pinnatisect or -pinnately lobed, ultimate margin entire, dentate, laciniate, serrate, or toothed, both surfaces usually glabrous, sometimes hirtellous, hispidulous, pilosulose, puberulent, scaberulose, or strigillose. Synflorescence of corymbs, sometimes capitula in 2s or 3s or solitary. Capitula usually radiate or discoid, sometimes disciform; calycular bracts erect to spreading or reflexed, herbaceous; involucres mostly hemispheric or campanulate to cylindric; phyllaries persistent, mostly 2-seriate, usually distinct, sometimes partially connate 0.05–0.1 × their lengths, mostly oblong or ovate to oblong-lanceolate, papery to membranous or scarious, usually striate with brownish veins, margin usually hyaline; receptacles flat or slightly convex, paleate; paleae usually deciduous, usually straw-colored, sometimes yellow to orange, with darker striae, flat to slightly navicular. Ray florets usually 1-seriate, usually neuter, sometimes female and sterile; corollas usually yellow, sometimes white or pinkish. Disk florets bisexual, fertile; corollas usually yellow to orange, sometimes whitish or purplish, tubes shorter than throats, lobes (3 -)5, deltate; staminal filaments glabrous; style branch tips deltate or lanceolate to subulate. Achenes usually obcompressed to flat, unequally 3- or 4-angled, and cuneate to oblanceolate or obovate, sometimes (all or inner) equally 4-angled and linear-fusiform, rarely subterete, faces smooth, striate, or tuberculate, glabrous or hairy, each sometimes with 2 grooves, margin usually retrorsely, sometimes patently or antrorsely, barbed or ciliate, apices sometimes attenuate, not beaked; pappus absent, or persistent, of (1 or)2–4(–8) usually retrorsely, sometimes antrorsely, barbellate or ciliate, rarely smooth, awns. $x = 12$.

About 150–250 species: widespread, especially in subtropical, tropical, and warm-temperate North and South America; ten species (one endemic, one introduced) in China.

See Sherff, Publ. Field Mus. Nat. Hist., Bot. Ser. 16: 1–709. 1937.

1a. Achenes linear, apex gradually narrower.
2a. Achenes with 2 barbed awns; disk corollas 4-lobed ..... 7. *B. parviflora*
2b. Achenes with 3 or 4 barbed awns; disk corollas 5-lobed.
3a. Phyllaries spatulate, dilated toward apex; achenes numerous, 50–70 ..... 8. *B. pilosa*
3b. Phyllaries linear, not dilated toward apex; achenes fewer than 50.
4a. Leaflet margin entire, sometimes ciliolate; leaves 2- or 3-pinnatisect, terminal leaflet narrow ..... 9. *B. bipinnata*
4b. Leaflet margin prominently serrate; leaves subpinnately divided, terminal leaflet broad, ovate ..... 10. *B. biternata*
1b. Achenes broad, cuneate or obovate-cuneate, apex truncate.
5a. Achenes 4-angled, barbed awns usually 4; disk floret corolla 5-dentate; ray florets present ..... 1. *B. cernua*
5b. Achenes compressed, barbed awns usually 2; disk floret corolla 4- or 5-dentate; ray florets absent.
6a. Median cauline leaves of pinnate compound leaves ..... 2. *B. frondosa*
6b. Median cauline leaves of dissected simple leaves, rarely entire leaves.
7a. Leaves deeply dissected.
8a. Capitula subequal in length and diam.; outer phyllaries 5–9; achenes 6–11 mm ..... 3. *B. tripartita*
8b. Capitula unequal in length and diam.; outer phyllaries 9–14; achenes 3–4.5 mm ..... 4. *B. maximowicziana*
7b. Leaves not dissected or 3-lobed.
9a. Outer phyllaries 9–12(–14), oblong-linear or lanceolate-linear, 8–20 mm; corolla 4-toothed ..... 5. *B. radiata*
9b. Outer phyllaries usually 4, elliptic, oblong, or linear, 1.5–3.8 cm; corolla 5-toothed ..... 6. *B. leptophylla*

1. Bidens cernua Linnaeus, Sp. Pl. 2: 832. 1753.

柳叶鬼针草 liu ye gui zhen cao

Bidens cernua var. *elliptica* Wiegand; *B. cernua* var. *integra* Wiegand; *B. cernua* var. *minima* (Hudson) Pursh; *B. cernua* var. *oligodonta* Fernald & H. St. John; *B. cernua* var. *radiata* Candolle; *B. filamentosa* Rydberg; *B. glaucescens* Greene; *B. gracilenta* Greene; *B. minima* Hudson; *B. prionophylla* Greene.

Annuals, 10–100 cm tall. Leaves sessile; blade ovate-lanceolate or oblanceolate to lanceolate or linear, 40–100(–200) × (2–)5–25(–45) mm, both surfaces glabrous, base cuneate to rounded, margin usually coarsely dentate to serrate, sometimes entire, sometimes ciliate, apex acute to acuminate. Capitula radiate, rarely discoid, solitary or in lax corymbs; peduncles 10–40(–100+) mm; calycular bracts (3–)5–8(–10), spreading to reflexed, oblong to linear-lanceolate, often ± leaflike, (3–)8–12(–25) mm, abaxially usually glabrous, bases sometimes hispidulous, margin usually ciliate; involucres hemispheric or broader, (3–)6–10 × (8–)12–20+ mm; phyllaries 6–8+, ovate or ovate-lanceolate to lanceolate, 2–10 mm. Ray florets usually 6–8, sometimes absent; lamina orange-yellow, 2–15(–18) mm. Disk florets (10–)40–100(–150+); corollas orange-yellow, 3–4 mm. Achenes blackish or brown, usually flattened, sometimes 4-angled, cuneate, outer (3–)5–6 mm, inner 4–8 mm, faces ± striate, glabrous or tuberculate-strigillose, margin thickened or winged, retrorsely ciliate, apices truncate to convex; pappus of (2–)4 retrorsely barbed awns (1–)2–4 mm. Fl. Aug–Oct. $2n$ = 24, 48.

Swamps, marshes, peat and sedge bogs, flood plains; sea level to 2300 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Sichuan, Xizang, Yunnan [Mongolia, Russia; Europe, North America].

2. Bidens frondosa Linnaeus, Sp. Pl. 2: 832. 1753.

大狼杷草 da lang pa cao

Bidens frondosa var. *anomala* Porter ex Fernald; *B. frondosa* var. *caudata* Sherff; *B. frondosa* var. *pallida* (Wiegand) Wiegand; *B. frondosa* var. *stenodonta* Fernald & H. St. John; *B. melanocarpa* Wiegand; *B. melanocarpa* var. *pallida* Wiegand.

Annuals, 20–120 cm tall. Leaves petiolate; petiole 10–40(–60) mm; blade deltate to ovate-lanceolate overall, 30–80(–150) × 20–60(–100) mm, 3(–5)-foliolate, leaflets petiolulate, lanceolate to ovate-lanceolate, (15–)35–60(–120) × (5–)10–20(–30) mm, both surfaces glabrous or hirtellous, bases cuneate, margins dentate to serrate, sometimes ciliate, apices acuminate to attenuate. Capitula radiate or discoid, usually solitary, sometimes in 2s or 3s or in lax corymbs; peduncles 10–40(–80) mm; calycular bracts (5–)8(–10), ascending to spreading, spatulate or oblanceolate to linear, sometimes ± leaflike, 5–20(–60) mm, abaxially glabrous or hirtellous, margins usually ciliate; involucres campanulate to hemispheric or broader, 6–9 × 7–12 mm; phyllaries 6–12, oblong or ovate to ovate-lanceolate, 5–9 mm. Ray florets 0 or 1–3+; lamina golden yellow, 2–3.5 mm. Disk florets 20–60(–120+); corollas ± orange, 2.5–3+ mm. Achenes blackish to brown or straw-colored, ± obcompressed, obovate to cuneate, outer 5–7 mm, inner 7–10 mm, faces usually 1-veined, sometimes tuberculate, glabrous or sparsely hirtellous, margin antrorsely or retrorsely barbed, apices ± truncate to concave; pappus of 2 ± erect to spreading, antrorsely or retrorsely barbed awns 2–5 mm. Fl. Aug–Sep. $2n$ = 24, 48, 72.

A weed in moist woods, meadows, thickets, fields, roadsides, railroads, borders of streams, ponds, sloughs, swamps, ditches. Guangdong, Jiangsu, Jiangxi, Shanghai [native to North America].

3. Bidens tripartita Linnaeus, Sp. Pl. 2: 831. 1753.

狼杷草 lang pa cao

Bidens repens D. Don; *B. shimadae* Hayata; *B. tripartita* var. *quinqueloba* C. H. An; *B. tripartita* var. *repens* (D. Don) Sherff; *B. tripartita* var. *shimadae* (Hayata) Yamamoto.

Annuals, 10–150 cm tall. Leaves sessile or petiolate; petiole (0–)5–15(–35) mm (± winged); blade elliptic to ovate or lanceolate, 40–80(–150) × 15–40(–60) mm, sometimes laciniately 1-pinnatisect with 1–4+ lobes near base, both surfaces glabrous or hirtellous, base cuneate, margin entire or dentate to serrate, usually ciliate, apex acute to acuminate. Capitula radiate or discoid, solitary or in 2s or 3s; peduncles 10–40(–80) mm; calycular bracts (2–)6 or 7(–10), spreading, oblanceolate or lanceolate to linear, ± leaflike, 7–35(–60) mm, abaxially hispidulous near bases, distally glabrous, margins entire or serrate, sometimes sparsely ciliate; involucres campanulate to hemispheric or broader, (4–)5–7(–12) × (3–)6–12(–15) mm; phyllaries (6 or)7 or 8(–13), elliptic-ovate to ovate-lanceolate, (4–)6–9(–12) mm. Ray florets usually 0, sometimes 1–5; lamina orange yellowish, 4–8 mm. Disk florets (5–)20–60(–150); corollas pale yellow to orange, (2–)3–4 mm, apex 4- or 5-toothed. Achenes blackish to purplish or brown, ± flattened, sometimes weakly 3(or 4)-angled, usually cuneate to linear, outer (3–)6–7(–10) mm, inner (4–)6–9(–11) mm, faces ± 1-veined, usually smooth, seldom notably tuberculate, glabrous or sparsely strigillose, margin proximally antrorsely to patently, distally retrorsely, barbed, apices ± truncate to concave; pappus 0, or of 1–3(or 4) erect to spreading, retrorsely barbed awns (0.2–)2–3(–6) mm. Fl. Jul–Oct. $2n$ = 48.

Marshes and other wet sites, waste fields, roadsides. Anhui, Fujian, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Bhutan, India, Indonesia, Japan, Korea, Malaysia, Mongolia, Nepal, Philippines, Russia; N Africa, Australia, Europe, North America].

This is a worldwide weed.

4. Bidens maximowicziana Oettingen, Trudy Bot. Sada Imp. Yur'evsk. Univ. 6: 219. 1906.

羽叶鬼针草 yu ye gui zhen cao

Annuals. Stems 30–50(–80) cm tall, erect, simple or branched with obliquely upright branches, glabrous or sparsely and finely hairy mainly in upper part. Leaves petiolate, pinnatisect (rarely ternate); segments narrow and long, oblong to linear, laterals (1 or)2 or 3, 2–3 cm to 7–8 cm, apical segments usually larger than laterals, serrate-toothed, margins fine with appressed prickles. Capitula discoid, solitary or in groups of 2 or 3 at apex of stem and its branches, flat, wider than long and

measuring ca. 15 mm; outer phyllaries green, oblong, distinctly exceeding florets, inner brown-green, shorter, lanceolate, as long as achenes (including awns). Corollas tubular, yellow. Achenes cuneate, ca. 4 mm, laterally compressed, margin tuberculate and slightly hairy with relatively long and abundant retrorse bristly hairs; awns 2. Fl. Jul–Aug.

Riverbanks, wet places in meadows, humus-rich sandy soil. Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Russia].

5. Bidens radiata Thuillier, Fl. Env. Paris, ed. 2, 432. 1799.

大羽叶鬼针草 da yu ye gui zhen cao

Bidens radiata var. *microcephala* C. H. An.

Annuals. Stems (5–)15–60(–80) cm tall, erect, branched, in upper part simple, glabrous or indistinctly hairy. Leaves yellowish green, 3–5-parted or dissected, lateral parts lanceolate or ovate-rhombic, serrate-toothed, apical part much larger than laterals, glabrous or subglabrous, on rather long petiolules, sometimes entire, large toothed to parted (*Bidens radiata* f. *pseudocernua* Ganeschin). Capitula discoid, erect, 12–15(–20) mm wide, wider than long (sometimes almost 2 ×); calycular bracts narrowly linear, exceeding in length or equal to achenes (including awns); outer phyllaries (9 or)10–12(–14), oblong-linear or lanceolate-linear, 8–20 mm, leaflike, margin with fine prickles, considerably exceeding florets (sometimes almost 3 ×), inner shorter, oval. Florets tubular. Achenes cuneate, 3–4 mm, glabrous, compressed, with 2 awns, equal to or almost shorter than achenes, sometimes awns 4, but then 2 longer than other 2. Fl. Jun–Sep.

Riverbanks, lakes, marshes, wet meadows, wet ditches. Heilongjiang, Jilin, Nei Mongol, Xinjiang [Japan, Korea, Mongolia, Russia; Europe].

6. Bidens leptophylla C. H. An, Fl. Xinjiang. 5: 476. 1999.

薄叶鬼针草 bao ye gui zhen cao

Annuals, up to 25 cm tall. Leaves opposite; blade ovate-elliptic, ovate-rhombic, or oblong, 1.8–5.8 × 0.5–2 cm together with petiole, base decurrent to petiole, margin 1–3-toothed, sometimes with a pair of lobes from base, apex shortly acute; lobes oblong-linear. Capitula discoid, solitary, terminal or axillary; involucre 8–10 × 5–8 mm; outer phyllaries usually 4, leaflike, elliptic, oblong, or linear, 1.5–3.8 cm, margin entire or 1–3-toothed, apex acute, inner brown, leathery. Corollas yellow, 3–3.5 mm, apex 5-lobed. Achenes cuneate, ca. 6 × 2 mm, compressed, 2-ribbed; pappus of 2 barbed awns ca. 2.5 mm.

● Farmland. Xinjiang (Yiwu).

7. Bidens parviflora Willdenow, Enum. Pl. 2: 840. 1809.

小花鬼针草 xiao hua gui zhen cao

Annuals. Stems (10–)20–50(–80) cm tall, erect, branched, glabrous or bearing rarely indistinct hairs. Leaves bi- or tripinnatisect with narrow lanceolate or linear-lanceolate to linear segments, with small teeth and incisions on petioles, usually sparsely fine hairy to subglabrous. Capitula discoid, solitary (or 2 or 3) at stem and branch apices, on long peduncles, narrow, subcylindric; calycular bracts linear, shorter than achenes; outer phyllaries green, narrowly linear, herbaceous, finely hairy, shorter than inner ones, inner greenish brown, linear-lanceolate, bearing rarely short bristles only on margin. Florets all tubular, yellow, few. Achenes linear-tetragonal, ± compressed, beset with upright lucid bristles along ribs, otherwise glabrous or finely hairy, unequal in length; inner 15–20(–25) mm, outer shorter, 2 upright awns, 4–5 mm, at top of achenes. Fl. Jul–Sep.

Marshes, fields, streamsides. Anhui, Gansu, Guizhou, Hebei, Heilongjiang, Henan, Jiangsu, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan [Japan, Korea, Mongolia, Russia].

8. Bidens pilosa Linnaeus, Sp. Pl. 2: 832. 1753.

鬼针草 gui zhen cao

Bidens chilensis Candolle; *B. pilosa* var. *minor* (Blume) Sherff; *B. pilosa* f. *radiata* Schultz Bipontinus; *B. pilosa* var. *radiata* (Schultz Bipontinus) J. A. Schmidt; *B. pilosa* f. *rubiflora* S. S. Ying; *B. sundaica* Blume var. *minor* Blume; *Kerneria tetragona* Moench, nom. illeg. superfl.

Annuals. Stems 30–180 cm tall, glabrous or very sparsely pubescent in upper part. Petiole 10–30(–70) mm; leaf blade either ovate to lanceolate, 30–70(–120) × 12–18(–45) mm, or pinnately 1-lobed, primary lobes 3–7, ovate to lanceolate, (10–)25–80 × (5–)10–40 mm, both surfaces pilosulose to sparsely hirtellous or glabrate, bases truncate to cuneate, ultimate margin serrate or entire, usually ciliate, apices acute to attenuate. Synflorescence of solitary capitula or capitula in lax corymbs. Capitula radiate or discoid; peduncles 10–20(–90) mm; calycular bracts (6 or)7–9(–13), appressed, spatulate to linear, (3–)4–5 mm, abaxially usually hispidulous to puberulent, margins ciliate; involucres turbinate to campanulate, 5–6 × 6–8 mm; phyllaries (7 or)8 or 9(–13), lanceolate to oblanceolate, 4–6 mm. Ray florets absent or (3–)5–8; lamina whitish to pinkish, 5–15 mm. Disk florets 20–40(–80); corollas yellowish, (2–)3–5 mm. Outer achenes red-brown, ± flat, linear to narrowly cuneate, (3–)4–5 mm, faces obscurely 2-grooved, sometimes tuberculate-hispidulous, margin antrorsely hispidulous, apex truncate or somewhat attenuate; inner achenes blackish, ± equally 4-angled, linear-fusiform, 7–16 mm, faces 2-grooved, tuberculate-hispidulous to sparsely strigillose, margin antrorsely hispidulous, apex attenuate; pappus absent, or of 2 or 3(–5) erect to divergent, retrorsely barbed awns (0.5–)2–4 mm. Fl. year-round. $2n = 24, 36, 48, 72$.

Roadsides, fields, villages; below 2500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [tropical and subtropical regions].

9. Bidens bipinnata Linnaeus, Sp. Pl. 2: 832. 1753.

婆婆针 po po zhen

Bidens pilosa Linnaeus var. *bipinnata* (Linnaeus) J. D. Hooker.

Annual herbs, (15–)30–100(–150+) cm. Petioles 20–50 mm; leaf blade orbicular-deltate to ovate or lanceolate overall, (20–)30–70+ × (20–)30–60+ mm, (1 or)2(or 3)-pinnatisect, ultimate lobes obovate or lanceolate, 15–45+ × 10–25+ mm, both surfaces usually glabrous, sometimes hirtellous, bases truncate to cuneate, ultimate margin entire, sometimes ciliolate, apices

rounded to acute or attenuate. Synflorescences of solitary capitula or ± corymbose; peduncles (10–)20–50(–100) mm. Capitula radiate or discoid; calycular bracts (7 or)8(–10), linear, 3–5 mm, ± appressed, abaxially usually glabrous, margin ciliate; involucres ± campanulate, 5–7 × 3–4(–5) mm; phyllaries 8–12, lanceolate to linear, 4–6 mm. Ray florets absent or 3–5+; lamina yellowish or whitish, 1–2(–3) mm. Disk florets 10–20(–30+); corollas yellowish to whitish, 2–3 mm. Achenes red-brown, outer weakly obcompressed, 7–15 mm, inner ± 4-angled, linear to linear-fusiform, 12–18 mm, faces 2-grooved, often tuberculate-hispidulous, margin not ciliate, apex ± attenuate; pappus of (2 or)3 or 4 erect to divergent, retrorsely barbed awns 2–4 mm. Fl. Aug–Oct. $2n = 24, 72$.

Fields, forests, disturbed wettish sites; below 1800(–3000) m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Hebei, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, Korea, Laos, Nepal, Thailand, Vietnam; Europe, North and South America, Pacific islands].

10. Bidens biternata (Loureiro) Merrill & Sherff, Bot. Gaz. 88: 293. 1929.

金盏银盘 jin zhan yin pan

Coreopsis biternata Loureiro, Fl. Cochinch. 2: 508. 1790; *Bidens chinensis* Willdenow; *B. robertianifolia* H. Léveillé & Vaniot.

Annuals. Stems erect, 30–150 cm tall, subtetragonal, loosely crisp pilose, branched in upper portion. Leaves cauline; median leaves opposite, petiole 3–5 cm, blade 9–15 cm, prominently soft pubescent on both surfaces, once or twice divided into pinnate leaflets, terminal segment ovate, shortly acuminate, rather prominently toothed, lateral segments ovate, sometimes lower one pinnatifid; upper leaves gradually smaller, opposite or alternate, bipinnately parted. Capitula radiate or discoid, 7–10 mm in diam.; peduncle 1.5–5.5 cm; phyllaries 8–10, 1-seriate, herbaceous, linear, 3–6.5 mm, acute; outer chaff calycular bracts 5–6 mm, margin hyaline. Ray florets 0–5, sterile; lamina yellow, ca. 5.5 × 2.5–3 mm, tube 1.2–1.5 mm. Disk florets bisexual, fertile; corolla 4–5.5 mm, tube 1.2–2 mm. Achenes linear, 9–19 × ca. 1 mm, compressed, 4-angled, shortly strigose; pappus awns 3 or 4, 3–4 mm. Fl. Sep–Nov.

Roadsides, waste fields; below 1300 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangxi, Liaoning, Shaanxi, Shandong, Shanxi, Taiwan, Yunnan, Zhejiang [Africa, Asia, Oceania].

208. COREOPSIS Linnaeus, Sp. Pl. 2: 907. 1753.

金鸡菊属 jin ji ju shu

Annuals, perennials, subshrubs, or shrubs, often rhizomatous or with cormiform bases. Stems usually 1, erect, branched distally or ± throughout. Leaves basal, basal and cauline, or cauline, opposite or alternate or both, petiolate or sessile; blades simple and usually entire, or pinnately or pedately lobed, both surfaces glabrous or hairy. Synflorescence of solitary capitula or capitula in lax corymbs. Capitula radiate; calycular bracts (3–)8+, distinct, ± herbaceous; involucres ± globose to cylindric, 4–25+ mm in diam.; phyllaries usually ca. 8, ca. 2-seriate; receptacle flat to convex; paleae deciduous, ovate to linear or subulate, flat, scarious. Ray florets mostly (5–)8(–12+), neuter, or styliferous and sterile, or female and fertile; corollas usually yellow, sometimes red-brown to purple proximally, sometimes wholly purple or pink to white. Disk florets 8–150+, bisexual, fertile; corollas usually yellow, sometimes red-brown to purple at tips or throughout, tubes equaling or shorter than narrowly funnelform throats, lobes 4 or 5. Achenes obcompressed, ± orbicular to ovate, oblong, or linear, usually thin margined or winged, wings membranous to papery or corky, entire or lobed to toothed, sometimes ciliolate; faces smooth or ± papillate to tuberculate; pappus absent, or persistent, of 2 bristly cusps or scales, sometimes pappus absent and shoulders of achene wings bristly and pappuslike. $x = 14$.

About 35 species: mostly temperate North America, also tropical New World and Old World; three species (all introduced) in China.

Coreopsis verticillata Linnaeus is cultivated in China.

1a. Ray florets yellow above, base reddish brown; disk florets reddish brown; achenes wingless ..... 1. *C. tinctoria*
1b. Ray florets and disk florets yellow; achenes winged.
2a. Achenes broadly elliptic or subrounded; lower leaves pinnately dissected ..... 2. *C. grandiflora*
2b. Achenes rounded; lower leaves entire ..... 3. *C. lanceolata*

1. Coreopsis tinctoria Nuttall, J. Acad. Nat. Sci. Philadelphia 2: 114. 1821.

两色金鸡菊 liang se jin ji ju

Annuals, (10–)30–70(–150) cm. Leaves: proximal blades usually 1(–3)-pinnate, terminal lobes ovate-lanceolate to oblanceolate, 10–60 × 5–25 mm; cauline blades usually 1–3-pinnate, rarely simple, simple blades or terminal lobes linear-lanceolate to linear or filiform, 10–45 × 0.5–5 mm. Peduncles 1–15 cm; calycular bracts deltate-lanceolate, 1–3+ mm; phyllaries ± oblong-lanceolate to ovate-lanceolate, 4–9 mm. Ray limbs usually yellow with red-brown blotch, sometimes red-brown in proximal 1/3–9/10 and distally yellow, rarely yellow throughout, 12–18+ mm. Disk corollas 2.5–3+ mm. Achenes 1.5–4 mm, wings absent or 0.1–0.7 mm wide; pappus absent, or of 1 or 2 cusps or subulate scales 0.1–1 mm. Fl. Jun–Aug. $2n = 24$.

Moist sandy or clay soils, sometimes alkaline flats, prairies, ditches, disturbed sites. Widely cultivated and naturalized in China [native to North America].

Coreopsis tinctoria is widely grown in public and residential gardens, is grown commercially (for cut flowers), and has become widely established in the Flora area.

2. Coreopsis grandiflora Hogg ex Sweet, Brit. Fl. Gard. 2: t. 175. 1826.

大花金鸡菊 da hua jin ji ju

Perennials, 40–60 cm. Aerial nodes proximal to first peduncle usually 6–10+ cm, upper 1–3 internodes 4–7+ cm. Leaves mostly cauline on proximal 2/3–7/8 of plant height; petioles absent or 10–35+ mm; blades usually 1(or 2)-irregularly pinnately or ± pedately lobed with (3–)5–9+ lobes, rarely simple, simple blades or terminal lobes narrowly lanceolate to linear or filiform, 15–45(–90+) × (0.5–)2–8(–12+) mm. Peduncles 8–15(–25+) cm; calycular bracts lanceolate to linear, 3.5–9+ mm; phyllaries lanceolate-ovate, 7–9(–12) mm. Ray limbs yellow, 12–25+ mm. Disk corollas 3.3–4.8 mm, apices yellow. Achenes 2–3+ mm, wings spreading, ± papery, entire or irregularly toothed to pectinate. Fl. May–Aug. $2n = 26$.

Sandy soils, ditches and roadsides, other disturbed sites, granite and sandstone outcrops. Widely cultivated and naturalized in China [native to North America].

3. Coreopsis lanceolata Linnaeus, Sp. Pl. 2: 908. 1753.

剑叶金鸡菊 jian ye jin ji ju

Perennials, 10–30(–60+) cm. Aerial nodes proximal to first peduncle usually 1–3(–5+), distalmost 1–3 internodes 1–2(–8+) cm. Leaves: basal and cauline on proximal 1/4–1/3(–1/2) of plant height; petioles 1–5(–8+) cm; blades simple or with 1 or 2+ lateral lobes, simple blades or terminal lobes ovate-lanceolate or lanceolate to oblanceolate or linear-lanceolate, 5–12 cm × 8–15(–18+) mm. Peduncles (8–)12–20(–35+) cm; calycular bracts ovate-lanceolate to linear-lanceolate or linear, 4–8(–12) mm; phyllaries deltate to dentate-lanceolate, 8–12+ mm. Ray limbs yellow, 15–30+ mm. Disk corollas 6–7.5 mm, apices yellow. Achenes 2.6–4 mm, wings ± spreading, ± papery, entire. Fl. May–Jul. $2n = 26$.

Sandy soils, ditches and roadsides, other disturbed sites. Widely cultivated and naturalized in China [native to North America].

209. ENYDRA Loureiro, Fl. Cochinch. 2: 510. 1790.

沼菊属 zhao ju shu

Herbs. Leaves opposite, sessile, entire or toothed. Capitula subsessile, solitary, terminal or axillary; phyllaries 4, leaflike; receptacle convex to conical; paleae persistent, apex glandular. Ray florets female, fertile; lamina small, apex 3- or 4-toothed. Disk florets bisexual, tubular; limbs campanulate, 5- or 6-lobed; anther tails obtuse, entire, or inconspicuously auriculate. Achenes oblong, glabrous; pappus absent.

About five species, but usually reported as ten: tropical and subtropical regions; one species in China.

See Lack, Willdenowia 10: 3–12. 1980.

1. Enydra fluctuans Loureiro, Fl. Cochinch. 2: 511. 1790.

沼菊 zhao ju

Herbs. Stems stout, cylindric, slightly fleshy, prostrate in lower part, 50–80 cm. Leaves subsessile, oblong or linear-oblong, 2–6 cm × 4–14 mm, both surfaces glabrous, base amplexicaul, margin sparsely serrate, apex obtuse or acute. Capitula 8–10 mm in diam.; involucre of 4 phyllaries, dorsally glabrous, outer pair larger, ovate-oblong, 10–11 mm, apex rounded; receptacle ca. 3 mm in diam.; paleae rigid, ca. 5 mm, apex toothed and sparsely pubescent. Ray florets ca. 3 mm, lamina 3- or 4-lobed in apex. Disk florets 5-lobed; stamens 5, rarely 6. Achenes obovoid-cylindric, ca. 3.5 mm. Fl. Nov–Apr.

Marshes, streamsides. Hainan, Yunnan [India, Indonesia, Malaysia, Myanmar, Thailand, Vietnam; Australia].

210. ACMELLA Persoon, Syn. Pl. 2: 472. 1807.

金钮扣属 jin niu kou shu

Spilanthes sect. *Acmella* (Richard) Candolle.

Herbs, annual or perennial. Leaves opposite and/or basally rosulate. Capitula solitary or in few-headed cymes, radiate, disciform, or discoid. Involucres ± hemispheric to ovoid; phyllaries 1–3-seriate, subequal or with outer row spreading and longer, entire or irregularly dentate; receptacles conical; paleae falling with achene, ± navicular, membranous to scarious, each ± equaling subtended floret. Ray florets, when present, 2- or 3-lobed, variously colored. Disk florets: corolla yellow or orange, 4- or 5-lobed. Achene margin ciliate, glabrous, or sometimes corky; ray achenes broadly ovate or elliptic, 3-angled; disk achenes ellipsoid, strongly compressed; pappus absent or of up to 10 awnlike bristles. $x = 13$.

About 30 species: pantropical; six species (four introduced) in China.

See the monograph of *Acmella* by Jansen (Syst. Bot. Monogr. 8: 1–115. 1985).

The introduction of this genus in Taiwan was detailed by S. W. Chung et al. (Taiwania 52: 276–279. 2007) and K. F. Chung et al. (Bot. Stud. 49: 73–82. 2008).

1a. Capitula radiate.
2a. Leaf blade ovate to deltate, leaf bases broadly obtuse, truncate to slightly cordate; capitula ovoid; mature achenes with obvious corklike margin ..... 1. *A. ciliata*

2b. Leaf blade lanceolate, elliptic to narrowly ovate, leaf bases attenuate or cuneate; capitula cone-shaped; mature achenes without obvious corklike margin.
3a. Disk florets 4- or 5-lobed; corollas light yellow or greenish; ray florets relatively inconspicuous; phyllaries 7–11; disk floret achenes 1.5–3 mm ..... 6. *A. brachyglossa*
3b. Disk florets 4-lobed; corollas yellow to orange; ray florets conspicuous; phyllaries 5 or 6; disk floret achenes 1.2–1.8 mm ..... 3. *A. uliginosa*
1b. Capitula discoid.
4a. Pappus absent; achenes glabrous ..... 2. *A. calva*
4b. Pappus of 2 or 3 setae; achenes moderately to densely ciliate.
5a. Mature achenes with corklike margin ..... 5. *A. paniculata*
5b. Mature achenes without obvious corklike margin.
6a. Corollas 4-lobed; phyllaries 1-seriate; capitula 4–6 mm in diam. ..... 3. *A. uliginosa*
6b. Corollas 5-lobed; phyllaries 2- or 3-seriate; capitula > 10 mm in diam. ..... 4. *A. oleracea*

1. Acmella ciliata (Kunth) Cassini in F. Cuvier, Dict. Sci. Nat. 24: 331. 1822.

天文草 tian wen cao

Spilanthes ciliata Kunth in Humboldt et al., Nov. Gen. Sp. 4, ed. f°: 163. 1818.

Herbs, perennial, 30–80 cm tall. Stems usually decumbent to ascending, rooting at nodes, green to purple. Leaf blade ovate to broadly ovate, 2.3–7.5 × 1–5.9 cm, glabrous to sparsely pilose on both surfaces, base usually truncate or cordate, margin denticulate to coarsely dentate, apex acute. Capitula radiate, solitary or 2 or 3, terminal or axillary; peduncles 1–7.4 cm, sparsely to moderately pilose; phyllaries 7–10, 2-seriate, outer series 3–5, narrowly to broadly ovate or elliptic, 4–6.9 × 1–2.3 mm, inner series 3–6, lanceolate to ovate or elliptic, 2.8–6.1 × 1–2.9 mm; receptacle 3.8–7.4 × 0.8–1.9 mm; paleae straw-colored, 3–4.5 × 0.4–0.8 mm. Ray florets 5–10; corollas yellow-orange, 2.5–6.5 mm, tube 0.9–2 mm, lamina 1.2–4.7 × 1.1–3 mm. Disk florets 90–177, yellow-orange; corollas 5-lobed, 1.5–2 mm, tube 0.3–0.6 mm, throat 1–1.5 mm, lobes triangular, 0.2–0.4 × 0.2–0.3 mm. Achenes black, 1.4–2.2 × 0.5–1 mm, without shoulders, with obvious corklike margin, margin sparsely to moderately ciliate; pappus usually absent or sometimes of 2 very short subequal bristles, > 1 mm. Fl. year-round. $2n = 78$.

Naturalized in Taiwan [native to South America; widely naturalized in S and SE Asia].

2. Acmella calva (Candolle) R. K. Jansen, Syst. Bot. Monogr. 8: 41. 1985.

美形金钮扣 mei xing jin niu kou

Spilanthes calva Candolle in Wight, Contr. Bot. India, 19. 1834; *S. acmella* (Linnaeus) Murray var. *calva* (Candolle) C. B. Clarke ex J. D. Hooker; *S. callimorpha* A. H. Moore.

Herbs, perennial. Stems creeping or prostrate, 20–60 cm, glabrous, rooting at nodes, sparsely pilose. Petiole 5–8(–24) mm, pubescent; leaf blade lanceolate, 3–7 × 1–3 cm, abaxially subglabrous or only pubescent along veins, adaxially pubescent, base cuneate, margin peaked serrate, apex acuminate or caudate. Capitula ovoid-conical, 9–11(–14) × 6–8 mm; peduncles 3–14 cm; phyllaries ca. 8, 2-seriate, subequal, green, ovate-oblong, 3–3.5 mm, margin ciliate, apex acute or obtuse; receptacle columnar-conical, 4–8 mm; paleae oblong, navicular, membranous. Corollas yellow; ray florets female, ca. 4 mm, lamina short, obovate, apex shallowly 3-lobed; disk florets bisexual, tubular, ca. 2 mm, 4- or 5-toothed. Achenes brown, oblong, 1.5–2 mm, pubescent or glabrous; pappus 2, arista-like. Fl. May–Dec (often flowering year-round).

Streamsides, marshes, moist forest margins, fields; 1000–1900 m. Yunnan [India, Indonesia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand].

3. Acmella uliginosa (Swartz) Cassini in F. Cuvier, Dict. Sci. Nat. 24: 331. 1822.

沼生金纽扣 zhao sheng jin niu kou

Spilanthes uliginosa Swartz, Prodr. 110. 1788; *S. iabadicensis* A. H. Moore.

Herbs, annual, 10–30(–50) cm tall. Stems solitary or several from base, erect to ascending or occasionally decumbent, green to purple, glabrous to moderately pilose. Petiole 0.5–1.5 cm, sparsely to moderately pilose, wingless or narrowly winged; leaf blade lanceolate, narrowly ovate to ovate, 1.3–5 × 0.3–2.5 cm, glabrous to sparsely pilose on both surfaces, base attenuate to cuneate, margin sinuate to dentate, sparsely ciliate, apex acute to acuminate. Capitula radiate, solitary or 2 or 3, terminal, ovoid, 5–8 × 4–6 mm; peduncles 1.2–3 cm, sparsely pilose; receptacle 3–6 × 0.5–1 mm; paleae straw-colored or sometimes with purple tinge early in flowering, 2.5–3.5 × ca. 0.5 mm. Ray florets 4–7; corollas yellow to orange-yellow, 1.5–3.5 mm, tube 0.5–1.5 mm, lamina 3-toothed, 1–2 × 0.5–1.5 mm. Disk florets 68–148, yellow to orange-yellow, 4-merous; corollas 1–1.6 mm, tube 0.2–0.5 mm, throat 0.7–1.2 mm, lobes triangular, 0.2–0.3 × ca. 0.2 mm. Achenes black, 1.2–1.8 mm, moderately to densely ciliate with straight-tipped hairs; pappus of 2 subequal or unequal bristles, longer one 0.2–0.7 mm, shorter one 0.1–0.5 mm. Fl. year-round. $2n = 52$.

Naturalized in Hong Kong and Taiwan [native throughout the tropics in Africa, America, and Asia; naturalized in the Pacific islands].

4. Acmella oleracea (Linnaeus) R. K. Jansen, Syst. Bot. Monogr. 8: 65. 1985.

桂圆菊 gui yuan ju

Spilanthes oleracea Linnaeus, Syst. Nat., ed. 12, 2: 534. 1767.

Herbs, annual. Stems decumbent to usually erect, not rooting at nodes, green to red, glabrous. Petiole 2–6.4 cm, glabrous to very sparsely pilose, narrowly winged; leaf blade

broadly ovate to deltate, 5–10 × 4–8 cm, usually glabrous on both surfaces, base truncate to shortly attenuate, margin dentate, apex shortly acuminate to usually acute. Capitula discoid, 10.5–23.5 × 11–17 mm; peduncles 3.5–12.5 cm, glabrous to very sparsely pilose; phyllaries 15–18, 3-seriate, herbaceous, entire to sinuate, sparsely ciliate, those of outer series 5 or 6, 5.8–7.3 × 2.1–2.8 mm, usually narrowly ovate to lanceolate or sometimes ovate, acute; receptacle 8.3–21.5 × 3.5–8.5 mm. Florets 400–600; corollas 2.7–3.3 mm, yellow, 5-lobed; tube 0.5–0.7 × 0.2–0.4 mm; lobes 0.3–0.6 × 0.2–0.4 mm; stamens 1.4–1.7 mm. Achenes 2–2.5 × 0.9–1.1 mm, moderately to densely ciliate with straight-tipped hairs; pappus of 2 subequal bristles, longer one 0.5–1.5 mm, shorter one 0.3–1.3 mm. Fl. Apr–Jul. $2n = 52$, 60, 78.

Cultivated in S China, including Taiwan [originating in South America and known only from cultivation, but escaped in weedy habitats in many areas].

Acmella oleracea is cultivated for medicinal, insecticidal, and horticultural purposes.

5. Acmella paniculata (Wallich ex Candolle) R. K. Jansen, Syst. Bot. Monogr. 8: 67. 1985.

金钮扣 jin niu kou

Spilanthes paniculata Wallich ex Candolle, Prodr. 5: 625. 1836; *S. acmella* (Linnaeus) Murray var. *paniculata* (Wallich ex Candolle) C. B. Clarke ex J. D. Hooker.

Herbs, annual. Stems branched, erect or ascending, to 30 cm or more tall, rarely rooting at nodes. Petiole 1–2 cm; leaf blade ovate to ovate-lanceolate, 2–4 × 1–2.5 cm, 3-veined, base cuneate, margin entire or coarsely or crenately serrate, apex acute. Capitula discoid, solitary, terminal or axillary, 8.4–12.5 × 6.9–10 mm; peduncles 2.5–16 cm, sparsely pilose; phyllaries 9–12, 2-seriate, ovate-lanceolate, ca. 6 mm, herbaceous, glabrous; receptacle 5–8 × 1.1–3 mm, apex acuminate. Florets 90–200; corollas tubular, minute, 4- or 5-lobed. Achenes obovoid, 3-angled, ca. 3 mm, margin scabrid, apex slightly depressed; pappus of 2 subequal bristles, longer one 0.5–1.1 mm, shorter one 0.4–0.9 mm. Fl. Apr–Nov. $2n = 26$.

Fields, wastelands, roadsides, forest margins; 800–1900 m. Guangdong, Guangxi, Taiwan, Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

6. Acmella brachyglossa Cassini in F. Cuvier, Dict. Sci. Nat. 50: 258. 1827.

短舌花金纽扣 duan she hua jin niu kou

Herbs, annual, 10–30 cm tall. Stems usually erect, sometimes decumbent, occasionally rooting at nodes, green or red to dark purple, glabrous to moderately pilose. Petiole 5–37 mm, sparsely to moderately pilose, narrowly winged; leaf blade narrowly ovate to ovate, 1.8–10 × 0.8–6 cm, glabrous to sparsely pilose on both surfaces, base attenuate, margin sinuate to coarsely dentate, apex usually acuminate or acute. Capitula radiate, solitary, ovoid, 6.3–13 × 6.5–9.5 mm; peduncles 4–12.8 cm, sparsely pilose; receptacle 5–11 × 1–2 mm; paleae straw-colored or often with a purple-red tinge in early flowering stage, 3.5–4.6 × 0.5–0.9 mm. Ray florets 5–8; corollas pale yellow, 2–3.1 mm, tube 0.9–1.5 mm, lamina 0.5–1.7 × 0.5–1.5 mm. Disk florets 105–220, pale yellow; corollas 4- or 5-lobed, 1.5–2.1 mm, tube 0.4–0.7 mm, throat 1–1.5 mm, lobes triangular, 0.2–0.4 × 0.2–0.3 mm. Achenes dark brown to black, 1.8–2.3 mm, surface strigose, margin densely ciliate with straight-tipped hairs, without obvious corklike margin; pappus of 2 subequal bristles, longer one 0.5–1.1 mm, shorter one 0.3–1 mm. Fl. Mar–Oct. $2n = 78$.

Widely cultivated and naturalized in Taiwan [a weedy species in the Caribbean and Central and South America].

211. ZINNIA Linnaeus, Syst. Nat., ed. 10, 2: 1189, 1221, 1377. 1759, nom. cons.

百日菊属 bai ri ju shu

Annual or perennial herbs or subshrubs. Stems prostrate or erect. Leaves cauline, opposite or subopposite, sessile or shortly petiolate; blade acerose, elliptic, linear-lanceolate, lanceolate, linear, oblong, or ovate, both surfaces hairy, usually gland-dotted, base rounded to cuneate, sheathing stem, margin entire. Synflorescence of terminal solitary capitula. Capitula usually radiate; involucres campanulate, cylindric, to hemispheric; phyllaries persistent, 3- or 4-seriate; receptacle conical, paleate. Ray florets female, fertile; corollas yellow, orange, red, maroon, purple, or white. Disk florets bisexual, fertile; corollas usually yellow to reddish, sometimes purple tinged, tubes much shorter than cylindric throats, lobes 5, lanceolate-ovate. Achenes 3-angled or flattened, disk achenes wingless; pappus absent, or persistent, of 1–3(or 4) awns or toothlike scales.

About 25 species: Mexico, United States; Central and South America; one species (introduced) in China.

Zinnia angustifolia Kunth, *Z. elegans* Jacquin, nom. cons. (*Z. violacea* Cavanilles), and *Z. haageana* Regel are cultivated in China.

See Torres, Brittonia 15(1): 1–25. 1963.

1. Zinnia peruviana Linnaeus, Syst. Nat., ed. 10, 2: 1221. 1759.

多花百日菊 duo hua bai ri ju

Zinnia multiflora Linnaeus; *Z. pauciflora* Linnaeus.

Annuals, mostly 30–50(–100) cm. Stems greenish, becoming purplish or yellowish, unbranched or sparingly branched distal to bases, strigose. Leaf blade ovate to elliptic or broadly lanceolate, 25–70 × 8–35 mm, 3–5-veined, scaberulose. Peduncles 10–50(–70) mm; involucres narrowly to broadly campanulate, 9–18 × 10–20 mm; phyllaries obovate to oblong, becoming scarious, glabrous, margin usually entire or erose, sometimes ciliate, apex rounded; paleae red to purple or yellow,

margin erose or subentire, apex obtuse. Ray florets 6–15(–21); corollas usually scarlet red or maroon, sometimes yellow, lamina linear to spatulate, 8–25 mm. Disk florets 12–50; corollas yellow, 5–6 mm, lobes ca. 1 mm. Achenes 7–10 mm, ray achenes 3-angled, disk achenes compressed, ribbed, setuliferous; pappus usually of 1 stout awn 4–6 mm. Fl. Jun–Nov, fr. Jul–Nov. $2n = 24$.

Roadsides, grasslands, mountain slopes; below 1300 m. Introduced and naturalized in Gansu, Hebei, Henan, Sichuan, Yunnan [probably native to Mexico, but widespread in South America].

212. TRIDAX Linnaeus, Sp. Pl. 2: 900. 1753.

羽芒菊属 yu mang ju shu

Herbs, annual or perennial. Leaves opposite, petiolate or sessile; blade deltate, lanceolate, lanceolate-ovate, or ovate, often pinnately or palmately lobed, both surfaces glabrate, hirsute, scaberulose, or strigillose, ultimate margin coarsely toothed to subentire. Synflorescence of solitary capitula or cymose. Capitula radiate or discoid; involucres cylindric to hemispheric, 4–8 mm in diam.; phyllaries persistent, in 2 or 3+ series, outer usually shorter, more herbaceous, inner often scarious; receptacle convex to conical; paleae persistent, lanceolate-linear, scarious, weakly conduplicate, often apically toothed. Ray florets female, fertile; lamina pale yellow, white, or purplish. Disk florets bisexual, fertile; corollas yellowish, whitish, or purplish, tubes shorter than cylindric or funnelform throats, lobes 5, usually deltate, sometimes corollas of marginal florets bilabiate. Achenes obconical to obpyramidal, 3–5-angled, densely pilose-sericeous, glabrous, or villous; pappus persistent, of plumose or ciliate, setiform scales or bristles, rarely absent. $x = 10$.

About 26 species: tropical America and Asia; one species (introduced) in China.

See Powell, Brittonia 17(1): 47–96. 1965.

1. Tridax procumbens Linnaeus, Sp. Pl. 2: 900. 1753.

羽芒菊 yu mang ju

Herbs, annual to perennial, caulescent, decumbent. Stems procumbent, branched at base, branches slender, spreading or ascending, 20–50 cm, hirsute. Leaves few, shortly petiolate; blade ovate to ovate-lanceolate, 2.5–5 cm, base cuneate, margin deeply irregularly serrate, pinnatisect, segments few, narrow, apex acute or acuminate. Capitula solitary, 1–1.5 cm in diam.; peduncle 10–30 cm; involucre subcampanulate, 6–7 mm; phyllaries few seriate, hispid, outer densely grayish white, elliptic, ca. 5 mm, long hirsute, inner tinged purplish, narrower, ca. 6 mm. Ray florets 4, white. Disk florets yellow, tube ca. 5 mm, limb 5-lobed, lobes reflexed, hairy. Achenes brown, oblong, ca. 2 mm, densely silky pubescent; pappus setae 5–6 mm, shiny, plumose. Fl. Nov–Mar. $2n = 36$.

A widespread weed, along exposed dry roadsides, wastelands, lawns. Fujian, Hainan, Taiwan [native to tropical America; now a pantropical weed].

213. GALINSOGA Ruiz & Pavon, Fl. Peruv. Prodr. 110. 1794.

牛膝菊属 niu xi ju shu

Annuals, 2–62 cm. Stems erect. Leaves cauline, opposite, petiolate; blade lanceolate to broadly ovate, surfaces glabrate to densely pilose, 3-veined, margin entire or serrulate to serrate. Synflorescence cymose. Capitula radiate or discoid; involucres hemispheric to campanulate, 2.5–6 mm in diam.; phyllaries persistent or deciduous, 6–9[–16], in 2[or 3] series, elliptic, ovate-lanceolate, oblong, or ovate, outer shorter, herbaceous or scarious, margin entire or minutely laciniate; receptacles conical, paleaceous, paleae persistent or deciduous, scarious, proximal broadly elliptic to obovate, often connate at bases or nearly to apices, united in groups of 2 or 3 to adjacent proximal phyllary, each complex often enclosing and shed with a ray achene, distal persistent or deciduous, lanceolate to obovate, entire or 2- or 3-lobed, convex to conduplicate. Ray florets [0–](3–)5(–8)[–15], female, fertile; corollas white or dull white to pinkish [or purplish], tubes pilose, lamina quadrate-obovate to oblong, lobes 0–3. Disk florets 5–50[–150], bisexual, fertile; corollas yellow, tubes shorter than cylindric throats, pilose, 5-lobed, deltate; anthers yellow; style branch apices acute. Achenes obconical to obpyramidal, glabrous or strigose, ray achenes often shed with subtending phyllary plus 2 or 3 adjacent paleae; pappus absent or of (1–)14–20 white or gray, persistent, fimbriate, sometimes aristate, scales. $x = 8$.

About 15–33 species: Caribbean to Bermuda, Central, North, and South America; two species (both introduced) in China.

See Canne, Rhodora 79: 319–389. 1977.

1a. Phyllaries persistent, usually glabrous; inner paleae 3-lobed, lobes 1/3+ total lengths, acute; disk pappus absent or of 15–20 often gray, sometimes white, linear, fimbriate, obtuse scales 0.5–2 mm ..... 1. *G. parviflora*

1b. Phyllaries deciduous, usually with some stipitate glands; inner paleae entire or 2- or 3-lobed, lobes to 1/3 total lengths, blunt; disk pappus absent or of 1–5 or 14–20 white, lanceolate to oblanceolate, fimbriate, sometimes aristate, scales ..... 2. *G. quadriradiata*

1. Galinsoga parviflora Cavanilles, Icon. 3: 41. 1795.

牛膝菊 niu xi ju

Plants 4–60 cm. Leaf blade 7–110 × 3–70(–80) mm. Peduncles 1–40 mm; involucres campanulate, 2.5–5 mm in diam.; phyllaries persistent; outer paleae persistent with distal inner phyllaries or deciduous, elliptic to obovate, inner usually persistent, lanceolate to ovate or obovate, 2–3.5 mm, 3-lobed, lobes to 1/3+ total lengths, acute. Ray florets (3–)5(–8); corollas usually dull white or pink, lamina 0.5–1.8 × 0.7–1.5 mm. Disk florets 15–50. Ray achenes 1.5–2.5 mm; pappus absent or of 5–10 laciniate scales 0.5–1 mm; disk achenes 1.3–2.5 mm, glabrous or strigose; pappus absent or of 15–20 gray, sometimes white, linear, fimbriate, obtuse or acute scales 0.5–2 mm. Fl. Jul–Oct. $2n = 16$.

Fields, streamsides, sparse forests. A common weed widely distributed in China [native to South America].

2. Galinsoga quadriradiata Ruiz & Pavon, Syst. Veg. Fl. Peruv. Chil. 1: 198. 1798.

粗毛牛膝菊 cu mao niu xi ju

Adventina ciliata Rafinesque; *Galinsoga ciliata* (Rafinesque) S. F. Blake.

Plants 8–62 cm. Leaf blade 20–60 × 15–45 mm. Peduncles 5–20 mm; involucres hemispheric to campanulate, 3–6 mm in diam.; phyllaries deciduous; outer paleae deciduous, broadly elliptic to obovate, 2–3 mm, inner deciduous, linear to lanceolate, 2–3 mm, entire or 2- or 3-lobed, lobes to 1/3 total lengths, blunt. Ray florets (4 or)5(–8); corollas usually white, sometimes pink, lamina 0.9–2.5 × 0.9–2 mm. Disk florets 15–35. Ray achenes 1.5–2 mm; pappus of 6–15 fimbriate scales 0.5–1 mm; disk achenes 1.3–1.8 mm; pappus absent or of usually 14–20, rarely 1–5, white, lanceolate to oblanceolate, fimbriate, sometimes aristate, scales 0.2–1.7 mm. Fl. Jul–Oct. $2n = 32, 48, 64$.

Forests, roadsides. Jiangxi; recently naturalized in Taiwan [native to C Mexico but widespread naturally in South America].

The occurrence of this species in Taiwan was first reported by C. I Peng et al. (Taiwania 43: 320–329. 1998).

214. ACANTHOSPERMUM Schrank, Pl. Rar. Hort. Monac. 2: t. 53. 1820, nom. cons.

刺苞果属 ci bao guo shu

Annuals. Leaves cauline, opposite, petiolate or sessile; blade mostly elliptic to deltate, rhombic, or ovate, sometimes lyrate, both surfaces usually pilosulose to sericeous or scaberulose, sometimes glabrescent, usually gland-dotted, ultimate margin entire or toothed. Capitula radiate, 1(–3) in axils of leaves or in forks of branches; involucres hemispheric; phyllaries persistent (outer) or deciduous, 10–13, 2-seriate. Ray florets 5–8, female, fertile; corollas yellowish, tube shorter than to equaling lamina, lamina ovate to elliptic or linear. Disk florets 3–8(–12), functionally male; corollas yellowish, tubes shorter than funnelform or campanulate throats, lobes 5, deltate. Achenes each enclosed within and shed with an often hardened, prickly bur; pappus absent. $x = 11$.

About six species: mostly tropical to warm-temperate New World; one species (introduced) in China.

1. Acanthospermum hispidum Candolle, Prodr. 5: 522. 1836.

刺苞果 ci bao guo

Annual herbs, coarse, erect, to 1.3 m tall. Stems poorly branched, hispid. Leaves sessile or shortly petiolate; blade oblong or obovate, 10–100 × 5–40 mm, both surfaces hispid and gland-dotted, margin subentire and repand- or coarsely dentate. Capitula ± sessile. Achenes compressed and wedge-shaped, narrowing toward base, 5–6 mm with 2 divergent terminal spines 4–5 mm, straight or somewhat hooked; fruit body covered with shorter, hooked spines. Fl. Jun–Jul, fr. Aug–Oct.

A weed of streamsides, roadsides, and waste slopes; below 1900 m. Guangdong, Yunnan [native to South America; naturalized elsewhere].

In FRPS (75: 333. 1979) the name *Acanthospermum australe* (Loefling) Kuntze was misapplied to *A. hispidum*. True *A. australe* differs by having stems ascending or procumbent, capitula mostly pedunculate, and achenes oblong-fusiform and ribbed, with uniform-length hooked spines throughout. No Chinese material agreeing with *A. australe* has been seen by the present authors.

215. GUIZOTIA Cassini in F. Cuvier, Dict. Sci. Nat. 59: 237, 247, 248. 1829, nom. cons.

小葵子属 xiao kui zi shu

Annuals, perennials, subshrubs, or shrubs. Stems erect or creeping, branched. Leaves mostly cauline, opposite, sessile; blade rhombic to lanceolate or oblanceolate, both surfaces glabrous or puberulent to pilose, gland-dotted at least abaxially, margin entire or serrate. Synflorescence corymbiform or of solitary capitula. Capitula radiate; involucres campanulate or hemispheric; phyllaries persistent, 10–13, 2-seriate; receptacle conical to hemispheric; paleae oblong to lanceolate, membranous to scarious. Ray florets 6–18, female, fertile; corollas yellow. Disk florets numerous, bisexual, fertile; corollas yellow, tubes cylindric, hairy, shorter than campanulate throats, 5-lobed, deltate. Achenes weakly compressed, 3- or 4-angled, glabrous; pappus absent. $x = 15$.

Six species: Africa; one species (introduced) in China.

See Baagøe, Bot. Tidsskr. 69(1): 1–39. 1974.

1. Guizotia abyssinica (Linnaeus f.) Cassini in F. Cuvier, Dict. Sci. Nat. 59: 248. 1829.

小葵子 xiao kui zi

Polymnia abyssinica Linnaeus f., Suppl. Pl. 383. 1782.

Annuals. Stems 30–50 cm to 1–2 m tall, subglabrous, ± pilose above. Leaves sessile (lower petiolate), oblong-ovate or lanceolate, ± shortly hairy abaxially, especially along veins, glabrous adaxially, base semiamplexicaul, apex acuminate. Capitula 2–6 cm in diam., on long or sometimes short pubescent peduncles; outer phyllaries leaflike, ovate, herbaceous, inner narrower, paleaceous or scarious. Ray florets with short tube and 3-lobed lamina, pubescent or only at base of lamina and in lower part. Disk florets tubular, pubescent as in ray florets, 5-lobed. Outer achenes triquetrous, inner ± 4-angled, 3–6 × 1.5–3 mm, obpyramidal, in transverse section subrhombic or triangular, brown or black, with thin pericarp.

Cultivated in Fujian, Sichuan, and Yunnan [native to Africa (N Ethiopia); naturalized in India].

This species, originating in the Ethiopian highlands, is grown for its edible oil and seed.

216. SIGESBECKIA Linnaeus, Sp. Pl. 2: 900. 1753.

豨莶属 xi xian shu

Herbs, annual. Leaves opposite, petiolate, densely pubescent. Synflorescence of small terminal and axillary usually many-headed corymbs. Capitula pedunculate; involucre 2-seriate, campanulate; outer phyllaries 5, longer than inner, linear-spatulate, divaricate, with thick glandular hairs; receptacle flat with scarious paleae, enveloping achenes. Corollas yellow, marginal florets uniseriate, shortly limbed, female; disk florets tubular, bisexual. Achenes elongate-obovate, 4-angled, apex truncate; pappus absent. $x = 15$.

About four species: tropical and subtropical areas; three species in China.

See Humbles, Ci. Naturaleza Ci. Nat. 13: 2–19. 1972.

1a. Branches forked in upper part; leaves papery, irregularly lobulate ..... 1. *S. orientalis*
1b. Branches not forked; leaves thinly membranous, usually toothed.
2a. Stems and both surfaces of leaves uniformly soft pubescent; peduncle not glandular; achenes ca. 2 mm ..... 2. *S. glabrescens*
2b. Stems and lower surfaces of leaves densely white pubescent; peduncle usually glandular pilose; achenes 2.5–3.5 mm ..... 3. *S. pubescens*

1. Sigesbeckia orientalis Linnaeus, Sp. Pl. 2: 900. 1753.

豨莶 xi xian

Sigesbeckia brachiata Roxburgh; *S. caspia* Fischer & C. A. Meyer; *S. esquirolii* H. Léveillé & Vaniot; *S. gracilis* Candolle; *S. humilis* Koidzumi; *S. iberica* Willdenow; *S. microcephala* Candolle; *S. orientalis* var. *caspia* (Fischer & C. A. Meyer) Grossheim.

Annuals. Stems erect, simple or dichotomously branched, branches opposite, obtusely angulate, 30–75(–100) cm tall, ± crisp pubescent to densely pubescent, especially in upper part. Leaves ovate-triangular, ovate, or oblong-ovate, finely and appressed pilose, especially abaxially, sometimes with sparse small glands and hairs, base cuneate or rounded to subcordate, margin largely and usually unequally toothed to sinuate-dentate, sometimes resembling reduced leaves of sunflower, apex acute or acuminate. Capitula small, ca. 5 mm wide; outer phyllaries with dense stipitate-glandular hairs, oblong-obovate or linear-spatulate, considerably longer than inner, sometimes broader and with small number of glands or shorter. Achenes dark gray or dull black, obpyramidal, sometimes with sparse, more lucid, laevigate irregular tubercles, ca. 3 × 1.2 mm, with white annular groove at apex, marginal achenes slightly curved. Fl. Apr–Sep, fr. Jun–Nov. $2n = 30, 60$.

Fields, thickets, forest margins, forests; 100–2800 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Laos, Malesia, Nepal, Russia, Thailand, Vietnam; Africa, tropical America, Australia, Oceania].

2. Sigesbeckia glabrescens (Makino) Makino, J. Jap. Bot. 1: 25. 1917.

毛梗豨莶 mao geng xi xian

Sigesbeckia orientalis Linnaeus f. *glabrescens* Makino, Bot. Mag. (Tokyo) 18: 100. 1904; *S. formosana* Kitamura; *S. glabrescens* var. *leucoclada* Nakai; *S. orientalis* subsp. *glabrescens* (Makino) H. Koyama.

Annuals. Stems 35–100 cm tall, shortly appressed pilose. Median cauline leaves with winged petiole, blade ovate-deltate, 5–13 × 3.5–11 cm, irregularly toothed, upper surface shortly appressed pubescent; upper leaves sessile, oblong; uppermost leaves linear. Capitula radiate, ca. 12 mm wide; peduncle 1–3 cm, densely shortly pubescent; phyllaries spatulate, densely glandular pilose. Ray limb 1.5–2.5 mm, 3-toothed, tube 0.5–1 mm, pilose; disk corolla ca. 1.5 mm, 3-toothed, tube ca. 0.5 mm, densely pilose. Achenes ca. 2 mm. Fl. Apr–Sep, fr. Jun–Sep. $2n = 30$.

Roadsides, fields, thickets; 300–2500 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Korea].

3. Sigesbeckia pubescens (Makino) Makino, J. Jap. Bot. 1: 24. 1917.

腺梗豨莶 xian geng xi xian

Sigesbeckia orientalis Linnaeus f. *pubescens* Makino, Bot. Mag. (Tokyo) 18: 100. 1904; *S. orientalis* subsp. *pubescens* (Makino) H. Koyama.

Annuals. Stems 60–120 cm tall, densely white pubescent, especially on upper part. Median cauline leaves ovate to deltate-ovate, 7–19 × 6–18 cm, short appressed pubescence on both surfaces, veins on lower surface densely white pubescent. Capitula radiate, ca. 20 mm wide; peduncle 15–35 mm, densely glandular pilose; phyllaries linear, rounded at apex, glandular pilose at base. Ray limb ca. 3.5 mm, shallowly 2- or 3-toothed, tube ca. 1.5 mm; disk corolla 2–2.5 mm, 5-toothed, tube 0.5–1 mm, pilose. Achenes 2.5–3.5 mm. Fl. May–Aug, fr. Jun–Oct. $2n = 30$.

Mountain slopes, forest margins, thickets, grasslands; below 3400 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jilin, Liaoning, Jiangsu, Jiangxi, Nei Mongol, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea].

217. SMALLANTHUS Mackenzie in Small, Man. S.E. Fl. 1406. 1933.

包果菊属 bao guo ju shu

Perennials, annuals, or shrubs, 1–3(–12) m tall. Stems erect. Leaves cauline, opposite, petiolate (petioles usually winged) or sessile; blade usually deltate to ovate, usually palmately lobed, both surfaces hirtellous, pilosulose, or puberulent, gland-dotted (at least abaxially), ultimate margin dentate to denticulate. Capitula radiate, borne singly or 2–5 in crowded, corymbiform arrays; involucres hemispheric, 8–15 mm in diam.; phyllaries persistent, 12 or 13(–25) in 2 series, herbaceous, inner as many as ray florets, more membranous to scarious, narrower and shorter. Receptacles flat to convex, paleate, paleae obovate to spatulate, scarious. Ray florets 7–13(–25+), female, fertile; corollas yellow, white, or orange, tubes hairy, lamina linear to elliptic or ovate. Disk florets (20–)40–80(–150), functionally male; corollas yellow or orange, tubes shorter than abruptly campanulate or funnelform throats, lobes 5, deltate. Achenes obliquely inserted on receptacle, each shed separately from subtending phyllary, obovoid [or quadrangular], somewhat compressed, finely 30–40-ribbed or -striate, not narrowed at bases, not apically beaked; pappus absent (achenes sometimes hairy at apices). $x = 16$.

About 23 species: Central, North, and South America; two species (both introduced) in China.

See Wells, Brittonia 17(2): 144–159. 1965. See Robinson, Phytologia 39: 47–53. 1978.

1a. Leaf blade usually lobed; underground stems without tubers ..... 1. *S. uvedalia*
1b. Leaf blade unlobed; underground stems tuberous ..... 2. *S. sonchifolius*

1. Smallanthus uvedalia (Linnaeus) Mackenzie in Small, Man. S.E. Fl. 1509. 1933.

包果菊 bao guo ju

Osteospermum uvedalia Linnaeus, Sp. Pl. 2: 923. 1753; *Polymnia uvedalia* (Linnaeus) Linnaeus.

Herbs, perennial, 1–3 m tall. Stems erect and hollow, purple spotted. Leaves opposite, sessile or with broad conspicuous wings to base of petiole; petiole 3–12 cm; blade ovate to deltate, 10–35(–60) × 10–35 cm, usually palmately 3–5-lobed. Capitula clustered in loose leafy cymes; phyllaries 4–6, ovate to ovate-lanceolate, 10–20 × 10–12 mm. Ray florets 7–13, female, fertile, lamina yellow, 12–30 mm. Achenes 5–6 × ca. 4 mm. Fl. Jun–Aug(–Oct). $2n = 32$.

Thickets, fields. Naturalized in Anhui and Jiangsu [native to Central and North America].

Known as yellow-flowered leaf-cup, this species is primarily a weed of pastures, hay fields, hedgerows, and roadsides in North America.

2. Smallanthus sonchifolius (Poeppig) H. Robinson, Phytologia 39: 51. 1978.

菊薯 ju shu

Polymnia sonchifolia Poeppig, Nov. Gen. Sp. Pl. 3: 47. 1843.

Herbs, perennial, 1–3 m tall. Stems cylindric and hollow; underground part irregularly branched, often producing spindle-shaped tubers 100–200 mm and 30–80 mm in diam. Lower leaves broadly ovate and hastate or subhastate, connate and auriculate at base; upper leaves ovate-lanceolate, without lobes and hastate base; upper and lower surfaces densely pubescent. Synflorescence terminal, composed of 1–5 branches, each one with 3 capitula; peduncles densely pilose; phyllaries 5, 1-seriate, ovate. Corollas yellow to bright orange; ray florets female, 2- or 3-toothed, depending on clone, lamina ca. 12 × 7 mm; disk florets male, ca. 7 mm. Immature achenes purple, turning dark brown or black at maturity. Fl. Jun–Sep.

Cultivated in Fujian, Guizhou, Hainan, Hebei, Hubei, Hunan, Shandong, Taiwan, Yunnan, and Zhejiang [native to South America (Bolivia, Colombia, Ecuador, Peru)].

Known as Yacón in South America, this species is an ancient crop of the Andes with tuberous roots that can be eaten raw or cooked.

218. BLAINVILLEA Cassini in F. Cuvier, Dict. Sci. Nat. 29: 493. 1823.

百能葳属 bai neng wei shu

Herbs, annual or perennial. Leaves opposite or alternate in upper part, petiolate, margin serrate. Capitula small, terminal or axillary, slender and long pedunculate; involucre ovoid, ovoid-campanulate, or hemispheric; phyllaries few, outer papery; receptacle convex; paleae rigid and dry membranous. Ray florets female, 1- or 2-seriate, lamina light yellow, yellow, or rarely white, short or very short, apex 2–4-dentate. Disk florets tubular, limbs 5-dentate. Anther tails obtuse, entire or inconspicuously auriculate. Achenes gla-

brous or pubescent, apex truncate, of female florets 3-ribbed, dorsally compressed, of bisexual florets 3- or 4-ribbed, or laterally compressed; pappus 2–5, unequal, spinelike or squamalike, base connate.

About ten species: tropics; one species in China.

1. Blainvillea acmella (Linnaeus) Philipson, Blumea 6: 350. 1950.

百能葳 bai neng wei

Verbesina acmella Linnaeus, Sp. Pl. 2: 901. 1753; *Blainvillea latifolia* (Linnaeus f.) Candolle; *Eclipta latifolia* Linnaeus f.; *Spilanthes acmella* (Linnaeus) Murray.

Herbs, annual. Stems erect, 40–60 cm tall, branched. Lower leaves opposite, with up to 1 cm petioles, blade ovate to ovate-lanceolate, 3–6 × 2–3 cm, both surfaces scabrid, base cuneate, margin sparsely serrate, apex acuminate; upper leaves smaller, usually alternate, ovate to ovate-oblong, 2–3 × 1.3–1.5 cm, base usually rounded. Capitula axillary or terminal, ca. 1 cm in diam.; peduncles slender, 15–40 mm, with spreading hairs; phyllaries 2-seriate, outer papery, green, ovate-oblong, ca. 6 mm, dorsally densely hairy, apex shortly acute or obtuse, inner ovate to oblong-linear, ca. 5 mm, sparsely pubescent, apex acute; paleae oblong-lanceolate, ca. 5 mm, dorsally pubescent, apex aristiform. Ray florets 1-seriate, yellow or yellowish white, lamina ca. 3 mm, apex 2–4-toothed. Disk florets campanulate, limbs 5-toothed. Achenes densely pubescent, those in female florets 3-angled, ca. 4 mm, those in bisexual florets compressed, ca. 5 mm; pappus short, unequal, 2–5. Fl. Apr–Jun.

Open broad-leaved forests, grassy slopes; below 2600 m. Hainan, Sichuan, Yunnan [India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam; Africa, Australia, South America].

219. SYNEDRELLA Gaertner, Fruct. Sem. Pl. 2: 456. 1791, nom. cons.

金腰箭属 jin yao jian shu

Ucacou Adanson.

Herbs, annual. Stems erect or ascending. Leaves opposite, petiolate. Capitula radiate, sessile or subsessile, in axillary glomerules or borne singly; involucres cylindric to campanulate; phyllaries persistent, 2–5+, 1(or 2)-seriate; receptacle convex, paleate. Ray florets 1- or 2-seriate, female, fertile; corollas yellowish. Disk florets bisexual, fertile; corollas yellowish, tubes ± equaling slightly ampliate cylindric throats, 4-lobed, orbicular-deltate. Achenes dimorphic, strongly obcompressed or flattened, narrowly oval and winged or linear-cuneate and wingless; pappus of 2 triangular scales (ray) or 2 or 3 subulate scales or awns (disk), persistent.

One species: Caribbean, Central and South America, Mexico; introduced in Africa, Asia, Australia, and Pacific islands, including China.

See Turner, Phytologia 76(1): 39–51. 1994.

1. Synedrella nodiflora (Linnaeus) Gaertner, Fruct. Sem. Pl. 2: 456. 1791.

金腰箭 jin yao jian

Verbesina nodiflora Linnaeus, Cent. Pl. 1: 28. 1755.

Annuals, 10–80 cm tall. Stems erect or ascending, branched from bases or ± throughout. Leaves cauline, opposite, petiolate; blade ovate to elliptic, 3–10 × 2–5 cm, both surfaces ± scabrid, usually 3-veined, base cuneate to rounded, margin toothed. Capitula radiate, sessile or subsessile in axillary glomerules or capitula solitary; involucres cylindric to campanulate, 3–6 mm in diam.; phyllaries persistent, 2–5+, 1(or 2)-seriate, lanceolate, herbaceous to papery; receptacle convex; paleae linear-lanceolate, scarious, flat or weakly cupped at bases. Ray florets 2–9, 1- or 2-seriate, female, fertile; corollas yellowish, ca. 2 mm; lamina ovate to linear, 2–4 mm. Disk florets 4–12+, bisexual, fertile; corollas yellowish, tubes ca. 4 mm, ± equaling slightly enlarged cylindric throats, 4-lobed, orbicular-deltate. Fl. year-round. $2n = 40$.

Fields, wastelands, roadsides. Guangdong, Hainan, Taiwan, Yunnan [pantropical weed of South American origin].

220. CALYPTOCARPUS Lessing, Syn. Gen. Compos. 221. 1832.

金腰箭舅属 jin yao jian jiu shu

Herbs, annual or perennial, small, usually procumbent or prostrate. Leaves opposite, petiolate, margin crenate-serrate. Capitula solitary or in small dense clusters, radiate; phyllaries ca. 5; receptacle with flat or concave paleae. Ray florets 5–8, female, yellow. Disk florets 4- or 5-lobed, yellow. Achenes oblanceolate-obconical, dorsiventrally compressed, tuberculate or smooth; pappus of 2 stout awns.

Three species: South to North America; one species (introduced) in China.

See MacVaugh and Smith, Brittonia 19: 268–272. 1967.

1. Calyptocarpus vialis Lessing, Syn. Gen. Compos. 221. 1832.

金腰箭舅 jin yao jian jiu

Herbs, perennial. Stems prostrate, branched, rooting at nodes, densely appressed strigillose. Petiole 3–8 mm, narrowly winged toward blade, margin ciliate; leaf blade ovate to broadly

ovate, to 35 × 25 mm, both surfaces densely appressed strigillose, base attenuate, margin crenate-serrate, apex acute, apiculate. Capitula axillary, solitary, subsessile; peduncle to 15 mm; involucre narrowly oblong-oblanceolate, 6–7 × 2.5–3.5 mm; phyllaries 4, 2-seriate, concave, lanceolate, 6–7 × 3–3.5 mm, apex acuminate and apiculate; paleae hyaline, narrowly elliptic, 3.5–4.8 × 0.8–1 mm. Ray florets 3–8, yellow; corolla 4.5–6.2 × 1.4–1.8 mm, 3-toothed; achenes oblanceolate, 3.5–4 × 1.7–2 mm; pappus of 2 ascending divergent awns, 1.2–2.4 mm. Disk florets 3–8; corolla 2.6–3.6 mm, apex 2- or 3-toothed or entire, densely papillose within; achenes similar to those of ray florets but slightly narrower and thicker, sometimes 3-angled, 1.1–1.7 mm wide, evidently muricate. $2n = 24$.

Naturalized weed of roadsides. Taiwan [native to Cuba, Mexico, and United States].

221. ELEUTHERANTHERA Poiteau, Bull. Sci. Soc. Philom. Paris 3: 137. 1802.

离药金腰箭属 li yao jin yao jian shu

Fingalia Schrank; *Gymnolomia* Kunth; *Kegelia* Schultz Bipontinus; *Ogiera* Cassini.

Herbs, annual. Stems erect or sprawling. Leaves opposite, petiolate; blade ovate to trullate, 3-veined. Capitula axillary, solitary, nodding, discoid; involucre campanulate; phyllaries 2- or 3-seriate, herbaceous; receptacles flat, paleaceous; paleae partially involute around outer florets. Florets bisexual, corollas yellow; anthers free, not united into a cylinder, black or golden brown; style branches tapered, apices papillose. Achenes compressed, quadrate to terete, tuberculate; pappus a small apical peg.

Two species: Neotropics, one widely adventive in the Old World; one species (introduced) in China.

1. Eleutheranthera ruderalis (Swartz) Schultz Bipontinus, Bot. Zeitung (Berlin) 24: 165. 1866.

离药金腰箭 li yao jin yao jian

Melampodium ruderale Swartz, Fl. Ind. Occid. 3: 1372. 1806, nom. cons.; *Eleutheranthera ovata* Poiteau; *Gymnopsis microcephala* Gardner; *Kegelia ruderalis* (Swartz) Schultz Bipontinus; *Verbesina foliacea* Sprengel; *Wedelia discoidea* Lessing.

Herbs, erect, to 30 cm. Stems glabrate to pilose. Petiole 1–2 cm; leaf blade ovate, 3(–8) cm, 3-veined from near base, both surfaces pubescent and glandular, base obtuse, acute, or acuminate, margin entire or crenulate-dentate, apex acute or acuminate. Synflorescence terminal, of 2–5 capitula; peduncles slender, pilose, usually longer than capitulum. Capitula discoid, 4–6 mm; phyllaries 2-seriate, outer slightly imbricate, ovate, abaxially pubescent toward base, margin ciliate, apex acuminate or acute, inner paleaceous and involute around florets. Florets 2–6, ca. 2.5 mm; anthers black; style branches lanceolate, pubescent abaxially. Achenes brown, ca. 3 mm, 3-angled, body tuberculate, sparsely setuliferous; pappus an apical peg.

Recently naturalized in Taiwan [widespread in Central and South America but also found in W Africa and Australia].

The occurrence of this species in Taiwan was first reported by Sheng Z. Yang and G. P. Hsieh (Taiwania 51: 46–49. 2006).

222. ECLIPTA Linnaeus, Mant. Pl. 2: 157, 286. 1771, nom. cons.

鳢肠属 li chang shu

Eupatoriophalacron Miller.

Herbs, annual or perennial, erect, branched, strigose. Leaves opposite, toothed. Capitula terminal on stems and branches or axillary, pedunculate, heterogamous; involucre campanulate; phyllaries imbricate, ca. 2-seriate; receptacle flat or convex, paleaceous; paleae awnlike. Ray florets bisexual, mostly fertile, lamina minutely 2-lobed, white to yellowish. Disk florets bisexual, corolla tubular, greenish white to yellowish, 4- or rarely 5-lobed; anthers entire or very shortly bifid at base; style branches obtuse, mammillate at apex. Achenes thick, maturing and falling rapidly, those of ray florets 3-angled, those of disk florets compressed, 4-angled, coarsely hairy, tuberculate, margin with 1–3 minute teeth, apex truncate and depressed; pappus absent, coroniform, or of 2 or 3 awns. $x = 11$.

About five species: mostly warm-temperate to tropical New World, introduced in Old World; one species (introduced) in China.

1. Eclipta prostrata (Linnaeus) Linnaeus, Mant. Pl. 2: 286. 1771.

鳢肠 li chang

Verbesina prostrata Linnaeus, Sp. Pl. 2: 902. 1753; *Eclipta alba* (Linnaeus) Hasskarl; *E. alba* var. *zippeliana* (Blume) Miquel; *E. thermalis* Bunge; *E. zippeliana* Blume; *V. alba* Linnaeus.

Herbs, annual. Stems erect, ascending or prostrate, to 60(–100) cm tall, strigose-pilose, branched at base. Leaves lanceolate, 3–10 × 0.5–2.5 cm, papery, densely strigose-pubescent on both surfaces, base narrowed, sessile or shortly petiolate, margin serrulate, apex gradually acuminate. Capitula ca. 6 mm wide; peduncle slender, 2–4.5 cm; involucre globose-campanulate, ca. 5 × 6–7 mm, enlarging to 11 mm wide in fruit; phyllaries 5 or 6, 2-seriate, oblong, acute, outer longer. Ray florets 2-seriate; lamina 2.5–3 × ca. 0.4 mm, bifid or entire. Disk florets many; corolla ca. 1.5 mm, 4-lobed. Achenes ca. 2.8 × 1.5 mm, margin ribbed. Fl. Jun–Sep.

Riversides, fields, abandoned ponds, roadsides; below 1600 m. Anhui, Fujian, Gansu, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Yunnan, Zhejiang [native to Central, North, and South America; introduced in Africa, Asia, Australia, Europe, and Pacific islands].

223. CLIBADIUM F. Allamand ex Linnaeus, Mant. Pl. 2: 161. 1771.

苏利南野菊属 su li nan ye ju shu

Baillieria Aublet; *Trixis* Swartz (1788), not P. Browne (1756); *Oswalda* Cassini; *Orsinia* Bertoloni ex Candolle; *Trichapium* Gilli.

Shrubs or small trees. Leaves opposite, sessile or petiolate; blade lanceolate to broadly cordate, 3-veined, leathery. Synflorescence of terminal lax or congested panicles or corymbs, sometimes of glomerule-like cymes. Capitula disciform; involucres cylindric, campanulate, or hemispheric; phyllaries 2–6-seriate, subequal, imbricate, membranous, scarious, inner enclosing marginal achenes, greenish to purple, sometimes white; receptacles flat to shallowly convex, usually paleaceous; paleae subtending female florets resembling inner phyllaries, ovate or orbicular, 3–9-veined, paleae subtending disk florets membranous, lanceolate, 1–3-veined, margin remotely ciliate. Marginal florets female, 1(or 2)-seriate; corollas inconspicuous, white, greenish white, or yellowish white, 2–5-lobed. Disk florets functionally male; corollas white or greenish white, 4- or 5-lobed; anther black, anther appendage with glandular trichomes; style branches acuminate. Achenes obcompressed, obovoid to obpyriform, sometimes drupelike, glabrous to variously setuliferous, especially at apices; pappus absent. $x = 16$.

About 24 species: Neotropics; one species (introduced) in China.

For more on the genus, see Schulz (Bot. Jahrb. Syst. 46(5): 613–628. 1912) and Arriagada (Brittonia 55: 245–301. 2003).

1. Clibadium surinamense Linnaeus, Mant. Pl. 2: 294. 1771.

苏利南野菊 su li nan ye ju

Baillieria aspera Aublet; *Clibadium asperum* (Aublet) Candolle; *C. caracasanum* Candolle; *C. lanceolatum* Rusby; *C. lehmannianum* O. E. Schulz; *C. surinamense* Linnaeus var. *macrophyllum* Steyermark; *C. trinitatis* Candolle; *C. villosum* Bentham; *Oswalda baillierioides* Cassini; *Trixis aspera* (Aublet) Swartz.

Shrubs, 1.5–4(–5) m. Stems hispidulous to scabrid. Leaves petiolate; petiole 1.5–5 cm; blade lanceolate to broadly ovate, 5–12(–20) × 2–6(–12) cm, both surfaces hispidulous, base obtuse, margin serrate, or serrate-dentate, apex acute to acuminate. Synflorescence thyrsoid or paniculiform. Capitula sessile; phyllaries 3 or 4, leathery, broadly ovate, 5-veined, apex acute. Female florets 3–5; paleae ovate, ca. 4 × 3–4 mm, 5-veined. Disk florets 10–14; corolla ca. 3 mm, 4-lobed. Achenes ca. 2.5 × 2 mm, setuliferous in upper half.

Recently naturalized in Taiwan [native to and widely distributed in Central and South America; introduced in Indian Ocean islands (Mauritius) and Indonesia (Borneo, Java, Sumatra)].

The occurrence of this species in Taiwan was first reported by Y. H. Tseng et al. (Taiwania 53: 103–106. 2008).

224. SPHAGNETICOLA O. Hoffmann, Notizbl. Königl. Bot. Gart. Berlin 3: 36. 1900.

蟛蜞菊属 peng qi ju shu

Herbs, perennial, woody, subfleshy, with prostrate stems, often rooting at nodes. Leaves opposite, shortly petiolate, often appearing sessile, blade often 3-lobed, margin lobed to serrate. Capitula solitary, terminal, often appearing axillary because of sympodial growth, long pedunculate, radiate, heterogamous; involucre broadly campanulate; outer phyllaries 3–5, herbaceous, often longer than inner, apices reflexed, inner phyllaries 10–12, thinly herbaceous or scarious; receptacle convex to conical; paleae persistent, scarious, conduplicate about ray achenes. Ray florets 1- or 2-seriate, female, fertile; corollas orange to yellow; lamina narrowly oblong, apices 3-lobed. Disk florets numerous, bisexual; corollas tubular, 5-lobed, lobes with hairlike papillae along inner margin; anther thecae and anther appendages blackish with scattered glandular dots. Achene body smooth to roughened or tuberculate, blackish, ray achenes triangular, disk achenes compressed, margin sometimes obscurely winged, apex shortly rostrate with a corona of erose to fimbrillate pappus setae.

About four species: New World tropics and subtropics; two species (one introduced) in China.

See Pruski, Novon 6: 404–418. 1996.

1a. Leaves usually 3-lobed ..... 1. *S. trilobata*
1b. Leaves sparsely serrulate ..... 2. *S. calendulacea*

1. Sphagneticola trilobata (Linnaeus) Pruski, Mem. New York Bot. Gard. 78: 114. 17 Dec 1996.

南美蟛蜞菊 nan mei peng qi ju

Silphium trilobatum Linnaeus, Syst. Nat., ed. 10, 2: 1233. 1759; *Thelechitonia trilobata* (Linnaeus) H. Robinson & Cuatrecasas; *Wedelia trilobata* (Linnaeus) Hitchcock.

Herbs, perennial, procumbent. Stems stout, glabrous or pubescent, seldom scabrid. Leaves opposite, somewhat succulent; petiole distinct but less than 5 mm; blade elliptic or lanceolate, to 18 cm, often with triangular lobes and conspicuous marginal teeth, glabrous or sparsely pubescent, sometimes scabrid, base cuneate, apex acute. Capitula solitary on elongate peduncle, radiate; involucre green; phyllaries lanceolate, 10–15 mm, cili-

ate, obscurely veined, innermost narrower. Ray florets 4–8, showy, yellow, 15–20 mm, 3- or 4-denticulate, fertile. Disk florets numerous, yellow, ca. 2 cm; corolla 5–6 mm. Achenes blackish, sometimes mottled, clavate, angled, ca. 5 mm; pappus of fused scales, coroniform.

Cultivated as an ornamental ground cover and escaped in many countries, occasionally naturalized on slopes and along roadsides at lower elevations. Guangdong, Taiwan [native to the New World tropics but widespread in the Old World tropics].

2. Sphagneticola calendulacea (Linnaeus) Pruski, Novon 6: 411. 1996.

蟛蜞菊 peng qi ju

Verbesina calendulacea Linnaeus, Sp. Pl. 2: 902. 1753; *Complaya chinensis* (Osbeck) Strother; *Jaegeria calendulacea* (Linnaeus) Sprengel; *Seruneum calendulaceum* (Linnaeus) Kuntze; *Solidago chinensis* Osbeck; *Thelechitonia chinensis* (Osbeck) H. Robinson & Cuatrecasas; *Wedelia calendulacea* (Linnaeus) Lessing (1832), not Richard (1807); *W. chinensis* (Osbeck) Merrill.

Stems prostrate with ascending tips, elongate, rooting from lower nodes, appressed pilose. Leaves sessile or shortly petiolate; blade linear-oblong to lanceolate, 2–10 cm × 6–20 mm, papery, appressed pilose on both surfaces, base narrowed, margin sparsely mucronulate-serrulate, apex acute. Capitula 2–2.5 cm wide, solitary on erect branches; peduncle 6–12 cm; involucre hemispheric, 8–9 mm; phyllaries 5, subequal in length, 1-seriate, oblong, shortly appressed pubescent, apex acute or sometimes obtuse. Ray florets 1-seriate, yellow; corolla 9–11 × 3–3.5 mm, 2- or 3-dentate. Disk corolla 4–4.5 mm, 5-lobed. Achenes obovoid, ca. 3.5 × 1.5–2 mm, coarsely hairy at tip; pappus vase- or cup-shaped. Fl. Mar–Sep.

Paddy ridges, in grassy fields and moist lowland depressions in the north, also common in littoral areas. Fujian, Guangdong, Liaoning, Taiwan [India, Indonesia, Japan, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam].

225. MELANTHERA Rohr, Skr. Naturhist.-Selsk. 2(1): 213. 1792.

卤地菊属 lu di ju shu

Perennial herbs or weak shrubs. Leaves opposite, slightly fleshy. Synflorescence terminal, of solitary capitula or corymbose. Capitula radiate; involucre 2-seriate; paleae strongly veined. Ray florets female. Disk florets bisexual. Achenes of ray florets obconical, 3-angled, those of disk florets obconical, 4-angled; pappus absent or of 1 short awn.

About 20 species: Africa, Asia, Central, North, and South America, Pacific islands; one species in China.

See Fosberg and Sachet (Smithsonian Contr. Bot. 45: 1–40. 1980) and Ohashi and Ohashi (J. Jap. Bot. 85(1): 59–63. 2010).

1. Melanthera prostrata (Hemsley) W. L. Wagner & H. Robinson, Brittonia 53: 557. 2002.

卤地菊 lu di ju

Wedelia prostrata Hemsley, J. Linn. Soc., Bot. 23: 434. 1888, based on *Verbesina prostrata* Hooker & Arnott, Bot. Beechey Voy. 195. 1837, not Linnaeus (1753); *Eclipta dentata* H. Léveillé & Vaniot; *Melanthera robusta* (Makino) K. Ohashi & H. Ohashi; *W. prostrata* var. *robusta* Makino; *W. robusta* (Makino) Kitamura; *Wollastonia prostrata* Hooker & Arnott (1838), not Candolle (1836).

Stems long creeping, rooting at nodes, coarsely hirsute; flowering branches ascending, leafy, densely strigose. Cauline leaves with 2–8 mm petiole, oblong, sometimes ovate or lanceolate, thickly leathery, coarsely strigose on both surfaces, 3-veined, base cuneate, margin loosely dentate, apex acute. Capitula 5–22 × 16–22 mm, usually solitary, terminal; peduncle 1–7 cm; involucre hemispheric, 10–12 × 5–6 mm; phyllaries 1-seriate, ovate to ovate-oblong, 2–3.5 mm wide, coarsely strigose, apex acute to obtuse. Ray corollas yellow, 8–11 × ca. 4 mm. Disk corollas tubular, 5–6 mm, 5-lobed. Achenes 3.5–4 × ca. 2 mm, apically strigillose, 3- or 4-angled; pappus bristles 1 or 2, or obsolete. $2n = 30$.

Littoral sand dunes, sandy seashores. Guangdong, Taiwan [Japan, Korea, Thailand, Vietnam].

Wagner and Robinson (Brittonia 53: 557. 2001) noted that "*Melanthera prostrata* var. *robusta* Makino" (a combination that does not exist) is thought to represent a hybrid between *M. prostrata* and *M. biflora* (here treated as *Wollastonia biflora*), q.v. C. I Peng et al. (Fl. Taiwan, ed. 2, 4: 1094, 1097. 1998, as *Wedelia prostrata* var. *robusta*). This is not recognized here, q.v. Wagner and Robinson (loc. cit.).

226. WOLLASTONIA Candolle ex Decaisne, Nouv. Ann. Mus. Hist. Nat. 3: 414. 1834.

孪花菊属 luan hua ju shu

Perennial herbs or weak shrubs. Leaves opposite; blade ovate, 3-veined. Synflorescence of solitary terminal capitula or open paniculate cymes. Capitula radiate; involucre hemispheric to campanulate; phyllaries 2-seriate; receptacle convex. Ray florets female; lamina yellow. Disk florets bisexual; corollas yellow or greenish yellow; anthers brown to black. Ray achenes cuneiform, 3-angled, base setuliferous, apex truncate. Disk achenes compressed and obscurely 4-angled, base setuliferous; pappus absent or usually a single awn.

Probably two species: Indo-Pacific coastal region and montane areas; two species in China.

See Fosberg and Sachet, Smithsonian Contr. Bot. 45: 1–40. 1980.

1a. Capitula usually (1 or)3–6, 20–30 mm in diam.; stems scandent ..... 1. *W. biflora*
1b. Capitula always solitary, ca. 15 mm in diam.; stems erect ..... 2. *W. montana*

1. Wollastonia biflora (Linnaeus) Candolle, Prodr. 5: 546. 1836.

孪花菊 luan hua ju

Verbesina biflora Linnaeus, Sp. Pl., ed. 2, 2: 1272. 1763; *Acmella biflora* (Linnaeus) Sprengel; *Melanthera biflora* (Linnaeus) Wild; *M. biflora* var. *ryukyuensis* (H. Koyama) K. Ohashi & H. Ohashi; *Stemmodontia biflora* (Linnaeus) W. Wight; *Wedelia biflora* (Linnaeus) Candolle; *W. biflora* var. *ryukyuensis* H. Koyama; *W. wallichii* Lessing var. *megalantha* H. Chuang; *Wollastonia scabriuscula* Candolle ex Decaisne, nom. illeg. superfl.

Subshrubs or somewhat woody herbs. Stems elongate, branched, scandent, coarsely appressed strigose. Cauline leaves long petiolate; petiole 1.2–2.3 cm; blade ovate, 7–14 × 3–8 cm, thickly papery, appressed strigose, base rounded, margin serrate, apex acuminate. Capitula (1 or)3–6, terminal, 2–3 cm wide; peduncles 1.5–5.5(–8) cm, slender or thick; involucre 10–13 × 5–7 mm; phyllaries ovate-lanceolate or narrowly ovate, densely appressed strigose, gradually narrowed to tip. Ray florets 14 or 15, yellow, 1-seriate; corolla 9–13 mm, 2- or 3-dentate. Disk florets yellow; corolla ca. 5 mm, apex 5-lobed. Achenes 3–3.5 × 2–2.5 mm, cuneate at base, often 3-angled, coarsely strigose toward tip; pappus bristles 2 or 3, 2–2.5 mm, sometimes absent. Fl. year-round. $2n = 30, 45, 50, 75$.

Seasides. Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [India, Indonesia, Japan, Malaysia, Philippines, Vietnam; Pacific islands].

Under *Wedelia biflora* the variety *W. biflora* var. *ryukyuensis* was recognized by Koyama (Acta Phytotax. Geobot. 33: 245. 1982), differing from the typical variety by degree, in having larger capitula with more ray and disk florets, larger leaf blade with a longer petiole, and a chromosome number of $2n = 45$ (see also C. I Peng et al., Fl. Taiwan, ed. 2, 4: 1093–1094. 1998). However, in their recent synopsis of the genus, Wagner and Robinson (Brittonia 53: 539–561. 2001) recognized only a variable species without infraspecific taxa.

2. Wollastonia montana (Blume) Candolle, Prodr. 5: 547. 1836.

山蟛蜞菊 shan peng qi ju

Verbesina montana Blume, Bijdr. 911. 1826; *Wedelia montana* (Blume) Boerlage; *W. montana* var. *pilosa* H. Koyama; *W. montana* var. *wallichii* (Lessing) H. Koyama; *W. urticifolia* Candolle; *W. urticifolia* var. *wallichii* (Lessing) Candolle; *W. wallichii* Lessing.

Perennial herbs. Stems erect, stout, glabrous or scabrid. Leaves petiolate; petiole 1–2 cm; blade ovate or ovate-lanceolate, (3–)5–9 × (1–)3–4 cm, both surfaces scabrid, base rounded or cuneate, margin crenulate, apex acuminate. Capitula ca. 15 mm in diam., solitary on elongate peduncle; involucre campanulate, 7–10 × 4–5 mm; outer phyllaries papery, green, oblong, ca. 10 mm, dorsally scabrid, apex obtuse or shortly acute, inner phyllaries oblong to lanceolate, ca. 7 mm, dorsally pubescent in upper part, apex acuminate; paleae oblong, sparsely pubescent. Ray florets 1-seriate, yellow; lamina oblong, 4–6 × ca. 2 mm, apex 2- or 3-toothed. Disk florets tubular, yellow. Achenes red-brown, obovoid-trigonous, slightly compressed, ca. 5 mm; pappus elements 2 or 3. Fl. Apr–Oct.

Streamsides, roadsides; 500–1200(–3000) m. Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand].

Two taxa are represented among the material cited by Candolle under *Wollastonia montana*. That representing Blume's concept of *Verbesina montana* certainly does not belong to *Melanthera*, and it is felt better to include it here within the concept of *Wollastonia*. It should also be noted that *Wedelia wallichii* var. *megalantha* is not conspecific with type material of *W. wallichii* but appears to be *Wollastonia biflora*.

227. SCLEROCARPUS Jacquin, Icon. Pl. Rar. 1: 17. 1781.

硬果菊属 ying guo ju shu

Annuals, perennials, or subshrubs. Stems sprawling to erect, branched. Leaves mostly cauline, opposite (proximal) or alternate, petiolate [or sessile]; blade ovate to rhombic or lanceolate, both surfaces glabrous or ± scabrid, 3-veined, base cuneate to rounded, margin coarsely toothed. Capitula radiate, solitary; involucres rotate to hemispheric, 12–20 mm in diam.; phyllaries persistent, 5–8(–21), 1(or 2)-seriate; receptacle low conical; paleae each closely investing subtended floret, each forming a hard perigynium around fruit and shed with it. Ray florets 5–8, neuter; corollas yellow to orange. Disk florets 10–50, bisexual, fertile; corollas usually yellow to orange, sometimes with purple, tubes much shorter than cylindric throats, lobes 5, linear-lanceolate. Achenes weakly compressed, glabrous, obliquely obovoid or arcuate; pappus absent, or coroniform of distinct or connate scales or bristles. $x = 12$.

About 12 species: mainly in Mexico, United States, and Central America, one species in tropical Africa and Asia; one species (introduced) in China.

1. Sclerocarpus africanus Jacquin, Icon. Pl. Rar. 1: 17. 1781.

硬果菊 ying guo ju

Herbs, annual. Stems 25–50[–120] cm tall, white hirsute. Leaves opposite, alternate in upper part; blade ovate, 3.5–7 × 1.5–2 cm, both surfaces scabrid, base decurrent to petiole, margin serrate, apex acute or obtuse. Capitula solitary, 8–12 mm in diam.; involucre campanulate; outer phyllaries ovate, ca. 1 cm, apex acuminate, inner ovate-oblong, shorter than outer, abaxially densely tomentose. Ray florets 1-seriate; lamina broadly elliptic, apex 2-lobed. Disk florets puberulent. Achenes oblong; pappus coroniform, of distinct or connate scales.

Naturalized in Xizang [native to tropical Africa and Asia].

228. LAGASCEA Cavanilles, Anales Ci. Nat. 6: 331. 1803 [*"Lagasca"*], nom. cons.

单花葵属 dan hua kui shu

Annual herbs or perennial shrubs. Stems terete, glabrous to pilose and often stipitate glandular. Leaves opposite, petiolate or sessile; blade ovate to oblanceolate, subglabrous to sericeous abaxially, subglabrous to strigose adaxially, base obtuse to subauriculate, margin obscurely to markedly serrate, apex acute to acuminate. Synflorescence globose to campanulate, of 1-flowered (rarely 2- or 3-flowered) capitula aggregated secondarily, sometimes to third degree, solitary, cymose, or racemose clusters; receptacle convex; secondary phyllaries separate, herbaceous, lanceolate to obovate, abaxially subglabrous to pilose and sometimes stipitate glandular; primary phyllaries laterally connate into an involucral tube, abaxially subglabrous to densely pilose, with 1–3 rows of resinous glands, apices acute to acuminate and sometimes stipitate glandular. Florets bisexual; corollas yellow, white, pink, or red, narrowly funnelform, lobes 5; anthers yellow, tan, brown, black, pink, or red; style bifid, style branches tapering toward apices. Achenes brown to black, narrowly cylindric to obovoid, minutely grooved, glabrous or setuliferous; pappus an erose pubescent crown or of short pubescent awns.

About nine species: mainly in Mexico and Central America, one species is a widespread pantropic weed; one species (introduced) in China.

See Stuessy, Fieldiana, Bot. 38(8): 75–133. 1978.

1. Lagascea mollis Cavanilles, Anales Ci. Nat. 6: 332. 1803.

单花葵 dan hua kui

Herbs, annual, to 1 m tall, rarely perennial, creeping or straggling, to 90 cm tall or long, sometimes rooting at nodes, sometimes mat-forming. Stems sometimes purplish, with stipitate glandular hairs on young parts. Leaves opposite; petiole 5–27 mm; blade narrowly ovate or ovate, 1–7 × 0.5–4 cm, shortly pubescent to slightly scabridulous, 3–5-veined from base, base obtuse to attenuate, margin subentire to serrate, apex acute to acuminate. Glomerules solitary and terminal, campanulate, 8–13 × 8–30 mm, with 8–25 1-flowered capitula; subtending bracts lanceolate to obovate, 5–15 × 1–6 mm; involucre of capitula 4–5 × ca. 1 mm, stipitate glandular. Florets white or with blue tinge, 4–5 mm. Achenes brown or black, ca. 3 mm, setuliferous near apex; pappus a minute crown, pubescent; achene usually surrounded by connate phyllaries topped by scales, 2–2.5 mm.

Hong Kong [probably native to Central America; widespread throughout the tropics].

229. RUDBECKIA Linnaeus, Sp. Pl. 2: 906. 1753.

金光菊属 jin guang ju shu

Annuals, biennials, or perennials. Leaves alternate, rarely opposite; blade ovate to broadly ovate, unlobed or pinnatifid, rarely sessile and cordate. Capitula in terminal, paniculiform cymes, radiate, rarely discoid; involucre flat to reflexed, rarely hemispheric; phyllaries persistent, in 1 or 2(or 3) series; receptacle conical to columnar; paleae scarious, conduplicate or concave, ± enclosing florets. Ray florets neuter; corolla golden to lemon-yellow, orange, or reddish, or bicolored. Disk florets: corolla yellow to purplish, often bicolored. Achenes oblong to obpyramidal, 4-angled, glabrous or with some thick, multicellular trichomes on radial angles; pappus a small crown of minute scales, or of 2–4 small scales, or absent.

About 17 species: North America; two species (both introduced) in China.

Rudbeckia amplexicaulis Vahl, *R. fulgida* Aiton, *R. fulgida* var. *speciosa* (Wenderoth) Perdue, *R. maxima* Nuttall, and *R. triloba* Linnaeus are cultivated in China.

1a. Leaf blades usually 1- or 2-pinnatifid or pinnately lobed, glabrous or hairy; disk corollas yellow to yellowish green ..... 1. *R. laciniata*
1b. Leaf blades entire or serrate, with coarse stiff hairs; disk corollas yellowish green, distally brown-purple ..... 2. *R. hirta*

1. Rudbeckia laciniata Linnaeus, Sp. Pl. 2: 906. 1753.

金光菊 jin guang ju

Perennials, 50–200 cm tall. Leaves green; blade broadly ovate to lanceolate, all but distalmost ones 1- or 2-pinnatifid or pinnately compound; leaflets or lobes 3–11, glabrous or hairy, base cuneate to attenuate or cordate, margin entire or dentate, apex acute to acuminate; basal leaves petiolate, 15–50 × 10–25 cm; cauline leaves petiolate or sessile, mostly lobed to pinnatifid, sometimes not lobed, 8–40 × 3–20 cm. Capitula 2–25 in loose, corymbiform arrays; phyllaries 8–15, ovate to lanceolate, glabrous or hairy, margin mostly ciliate; receptacle hemispheric or ovoid to globose; paleae 3–7 mm, abaxially densely hairy at apex, apex truncate or rounded. Ray florets 8–12; corolla limb elliptic to oblanceolate, 15–50 × 4–14 mm, abaxially hairy. Disk 0.9–3 × 1–2.3 cm; disk florets numerous; corolla yellow to yellowish green, 3.5–5 mm; style branches 1–1.5 mm, apex acute to rounded. Achenes 3–4.5 mm; pappus coroniform or of 4 scales, to 1.5 mm. Fl. Jul–Sep.

Widely cultivated and naturalized in China [native to North America].

2. Rudbeckia hirta Linnaeus, Sp. Pl. 2: 907. 1753.

黑心菊 hei xin ju

Annuals, biennials, or perennials. Stems hispid to hirsute. Leaf blade elliptic, lanceolate, or ovate, hispid to hirsute, base attenuate to cuneate, margin entire or serrate, apex acute; basal leaves petiolate, blade 8–30 × 0.5–7 cm; cauline leaves petiolate or sessile, blade 3–20 × 0.4–4 cm. Capitula solitary or 2–5 in loose, corymbiform arrays; phyllaries to 3 cm; receptacle

hemispheric to ovoid; paleae 4–6 mm, abaxially hirsute to hispid at apex, apex acute, often attenuate. Ray florets 8–16; corolla limb usually uniformly yellow to yellow-orange or with a basal maroon splotch, sometimes mostly maroon, elliptic to oblong or oblanceolate, 15–45 × 5–10 mm, abaxially hispid to hirsute. Disk 1.2–2.2 × 1–2 cm; disk florets numerous; corolla proximally yellowish green, distally brown-purple, 3–4.2 mm; style branches ca. 1.5 mm, apex subulate. Achenes 1.5–2.7 mm; pappus absent. Fl. Jun–Sep.

Widely cultivated and naturalized in China [native to North America].

Rudbeckia bicolor Nuttall is listed in some Chinese floras; it is now treated as a synonym of *R. hirta* var. *pulcherrima* Farwell.

230. TITHONIA Desfontaines ex Jussieu, Gen. Pl. 189. 1789.

肿柄菊属 zhong bing ju shu

Annuals, perennials, subshrubs, or shrubs. Stems erect, branched. Leaves all or mostly cauline, opposite (proximal) or mostly alternate, petiolate or sessile; blade mostly deltate or pentagonal, sometimes 3- or 5-lobed, often (1 or)3- or 5-veined, both surfaces glabrous, ± hirsute, pilose, soft pubescent, or villous, often gland-dotted, base truncate or auriculate, ultimate margin serrate to crenate. Capitula borne singly; peduncles usually distally dilated, fistulose; involucres campanulate to hemispheric; phyllaries persistent, 2–5-seriate; receptacles hemispheric to convex, paleate. Ray florets 8–30, neuter; corollas yellow or orange. Disk florets bisexual, fertile; corollas yellow, tubes shorter than throats, lobes 5, triangular. Achenes compressed or flattened, often 3- or 4-angled or biconvex, cuneiform in silhouette, sometimes with basal elaiosomes; pappus absent or coroniform, of connate scales, 1 or 2 scales sometimes subulate to aristate. $x = 17$.

About 11 species: Mexico, SW United States; Central America; one species (introduced) in China.

See La Duke, Rhodora 84: 463–522. 1982.

Tithonia rotundifolia (Miller) S. F. Blake is cultivated in China.

1. Tithonia diversifolia (Hemsley) A. Gray, Proc. Amer. Acad. Arts 19: 5. 1883.

肿柄菊 zhong bing ju

Mirasolia diversifolia Hemsley, Biol. Cent.-Amer., Bot. 2: 168. 1881.

Perennials, subshrubs, or shrubs, to 250(–500) cm. Petiole 2–6 cm; blade ± deltate to pentagonal, 7–33 × 7–22 cm, sometimes 3- or 5-lobed, abaxially glabrous to hispid-pilose. Peduncles 7–24 cm; phyllaries 16–28, (3 or)4-seriate, oblong to ovate, outer phyllaries 6–10 × 4–7 mm, abaxially usually glabrous, apex rounded to acute, inner 10–20 × 3–10 mm, abaxially glabrous, apex rounded to acute; paleae 10–13 × 2–3 mm, mucros 1.5–2.5 mm. Ray florets 7–14; corollas yellow, lamina linear, 48–69 × 9–16 mm. Disk florets 80–120+. Achenes 4–6 mm. Fl. Sep–Jan. $2n = 34$.

Introduced and naturalized in Guangdong, Taiwan, and Yunnan [native to Mexico].

231. HELIANTHUS Linnaeus, Sp. Pl. 2: 904. 1753.

向日葵属 xiang ri kui shu

Annuals or perennials. Stems erect or ascending to decumbent or procumbent, usually branched distally. Leaves basal and/or cauline, opposite, opposite (proximal) and alternate, or alternate, petiolate or sessile; blade mostly deltate, linear-lanceolate, lanceolate, ovate-lanceolate, linear, or ovate, both surfaces glabrous or hairy, often gland-dotted, base cordate to narrowly cuneate, margin usually entire or serrate, rarely lobed. Synflorescence of solitary capitula or of corymbs, panicles, or spikes. Capitula usually radiate or sometimes discoid; involucres usually hemispheric, sometimes campanulate or cylindric; phyllaries persistent, in 2 or 3+ series, subequal to unequal; receptacle flat to slightly convex or conical; paleae conduplicate, usually rectangular-oblong, usually 3-toothed, sometimes entire, apices sometimes reddish or purplish. Ray florets usually 5–30, rarely 0, neuter; corollas usually yellow. Disk florets numerous, bisexual, fertile; corollas yellow or reddish, tubes shorter than campanulate throats, lobes 5, triangular. Achenes usually purplish black, sometimes mottled, ± obpyramidal, ± compressed; pappus absent or readily falling, of 2(or 3) usually lanceolate, aristate, or erose scales plus 0–8 usually shorter scales, 0.2–2 mm. $x = 17$.

About 52 species: North America; three species (all introduced) in China.

See Heiser et al., Mem. Torrey Bot. Club 22(3): 1–218. 1969.

Helianthus angustifolius Linnaeus, *H. argophyllus* Torrey & A. Gray, *H. atrorubens* Linnaeus, *H. decapetalus* Linnaeus, *H.* ×*laetiflorus* Persoon, *H. maximiliani* Schrader, and *H. mollis* Lamarck are cultivated in China.

1a. Capitula large, 10–30 cm in diam.; disk florets brown or purple ..... 1. *H. annuus*
1b. Capitula small, 2–5 cm in diam.; disk florets yellow or reddish.
2a. Rootstock tuberous; perennial herbs; disk floret corollas yellow; leaves gland-dotted abaxially ..... 3. *H. tuberosus*
2b. Rootstock entirely fibrous; annual or perennial herbs; disk floret corollas usually reddish; leaves not gland-dotted abaxially ..... 2. *H. debilis*

1. Helianthus annuus Linnaeus, Sp. Pl. 2: 904. 1753.

向日葵 xiang ri kui

Helianthus annuus subsp. *jaegeri* (Heiser) Heiser; *H. annuus* subsp. *lenticularis* (Douglas ex Lindley) Cockerell; *H. annuus* var. *lenticularis* (Douglas ex Lindley) Steyermark; *H. annuus* var. *macrocarpus* (Candolle) Cockerell; *H. annuus* subsp. *texanus* Heiser; *H. aridus* Rydberg; *H. jaegeri* Heiser; *H. lenticularis* Douglas ex Lindley; *H. macrocarpus* Candolle.

Annuals, 100–300 cm. Stems erect, usually hispid. Leaves mostly cauline, mostly alternate; petiole 2–20 cm; blade ovate-lanceolate to ovate, 10–40 × 5–40 cm, abaxially usually ± hispid, sometimes gland-dotted, base cuneate to subcordate or cordate, margin serrate. Capitula 1–9; peduncles 2–20 cm; involucres hemispheric or broader, 15–40(–200) mm in diam.; phyllaries 20–30(–100), ovate to ovate-lanceolate, 13–25 × (3–)5–8 mm, abaxially usually hirsute to hispid, rarely glabrate or glabrous, usually gland-dotted, margin usually ciliate, apex abruptly narrowed, long acuminate; paleae 9–11 mm, 3-toothed, middle teeth long acuminate, glabrous or hispid. Ray florets (13–)17–30(–100+); lamina 25–50 mm. Disk florets 150–1000; corollas 5–8 mm, throats bulbous at bases, lobes usually reddish, sometimes yellow; anthers brownish to black, appendages yellow or dark. Achenes (3–)4–5(–15) mm, glabrate; pappus of 2 lanceolate scales 2–3.5 mm plus 0–4 obtuse scales 0.5–1 mm. Fl. Jul–Sep, fr. Aug–Oct. $2n = 34$.

Open areas. Widely cultivated in China [native to North America].

Helianthus annuus is a major agronomic crop, introduced nearly worldwide.

2. Helianthus debilis Nuttall subsp. **cucumerifolius** (Torrey & A. Gray) Heiser, Madroño 13: 160. 1956.

瓜叶葵 gua ye kui

Helianthus cucumerifolius Torrey & A. Gray, Fl. N. Amer. 2: 319. 1842.

Herbs, annual or perennial, 40–200 cm. Stems erect, glabrous, hirsute, or puberulent. Leaves cauline, mostly alternate; petiole 1–7 cm; blade deltate-ovate, lanceolate-ovate, or ovate, 2.5–14 × 1.8–13 cm, abaxially glabrous to hispid, not gland-dotted, base cordate to truncate or broadly cuneate, margin subentire to serrate, apex acute. Capitula 1–3, radiate; peduncles 9–30 cm; involucres hemispheric, 10–22 mm in diam.; phyllaries lanceolate 8–17 × 1–3 mm, abaxially glabrous or hispid, apex acute to long attenuate; paleae 7.5–8 mm, apex 3-toothed. Ray florets 11–23; corollas yellow. Disk florets ca. 30; corollas reddish, sometimes yellow, 4.5–5 mm; style branches reddish or yellow. Achenes 5–12 mm, glabrous or sparsely setuliferous; pappus of 2 lanceolate or linear-lanceolate awns, 1.2–2.5 mm.

Roadsides, roadside ditches, seashores. Recently introduced and naturalized in Taiwan; also cultivated in Beijing and Shanghai and sometimes naturalized [native to North America].

The occurrence of this taxon in Taiwan was first reported by Y. H. Tseng et al. (Taiwania 53: 316–320. 2008).

3. Helianthus tuberosus Linnaeus, Sp. Pl. 2: 905. 1753.

菊芋 ju yu

Helianthus tomentosus Michaux; *H. tuberosus* var. *subcanescens* A. Gray.

Herbs, perennial, 50–200 cm, rhizomatous, producing tubers late in growing season. Stems erect, scabrid-hispid to hirsute, sometimes glaucous. Leaves mostly cauline, opposite or alternate proximally, usually alternate distally; petiole 2–8 cm, often ± winged; blade lanceolate to ovate, 10–23 × 7–15 cm, 3-veined from near base, abaxially puberulent or hirsutulous to tomentulose and gland-dotted or ± scabrid, base broadly to narrowly cuneate, margin entire or serrate. Capitula 3–15; peduncles 1–15 cm; involucres hemispheric, 10–25 × 8–12 mm; phyllaries often dark green, drying nearly black, 22–35, subequal, lanceolate, 8.5–15 × 2–4 mm, abaxially hispidulous or puberulent, gland-dotted, base appressed, margin ciliate, apex ± spreading, sometimes reflexed in fruit, acuminate; paleae 8–9 mm, 3-toothed, apices hairy. Ray florets 10–20; lamina 25–40 mm. Disk florets 60+; corollas 6–7 mm, lobes yellow; anthers dark brown or black, appendages dark or yellowish. Achenes 5–7 mm, glabrous or apically hairy; pappus of 2 aristate scales 1.9–3 mm plus 0–1 deltate scales 0.5–0.8 mm. Fl. Aug–Sep. $2n = 102$.

Roadsides, fields, wastelands. Widely cultivated and sometimes naturalized in China [native to North America; widely cultivated in temperate areas].

Helianthus tuberosus is a vegetable crop and widely naturalized.

232. XANTHIUM Linnaeus, Sp. Pl. 2: 987. 1753.

苍耳属 cang er shu

Annuals. Stems erect, branched. Leaves cauline, mostly alternate (proximal 2–6 sometimes opposite), petiolate; blade lanceolate, linear, ovate, orbicular-deltate, or suborbicular, often palmately or pinnately lobed, both surfaces hirtellous or ± strigose, usually gland-dotted as well, ultimate margin entire or ± toothed. Capitula discoid, either female (proximal) or functionally male (distal), in racemiform to spiciform arrays or borne singly (in axils). Female capitula: involucres ± ellipsoid, 2–5 mm in diam. at anthesis; phyllaries in 6–12 series, outer 5–8 distinct, remainder (sometimes interpreted as paleae) proximally connate, their distinct tips mostly ± hooked (distal 1–3 usually longer, stouter, and not hooked), whole becoming a hard, prickly perigynium (a bur); florets 2, corollas 0. Male capitula: involucres saucer-shaped, 3–5 mm in diam.; phyllaries in 1 or 2 series, distinct to bases; receptacle conical to columnar; paleae spatulate to cuneiform or linear, membranous, apically villous or hirtellous; florets 20–50, corollas whitish, funnelform, lobes 5, erect or reflexed; filaments connate, anthers free or weakly coherent. Achenes black, fusiform, enclosed in obovoid to ellipsoid, hard, prickly, 2-chambered burs; pappus absent. $x = 18$.

Two or three species: New World, introduced nearly worldwide; two species (both introduced) in China.

For more on the genus, see Widder (Repert. Spec. Nov. Regni Veg. Beih. 20: 1–222. 1923; Phyton (Horn) 11: 69–82. 1964), Löve and Dansereau (Canad. J. Bot. 37: 172–208. 1959), and Löve (Lagascalia 5: 55–71. 1975).

1a. Nodal spines (1–)3-lobed, 15–30+ mm; leaf blades ± lanceolate to ovate or lanceolate-linear ..... 1. *X. spinosum*
1b. Nodal spines absent; leaf blades suborbicular to pentagonal or deltate ..... 2. *X. strumarium*

1. Xanthium spinosum Linnaeus, Sp. Pl. 2: 987. 1753.

刺苍耳 ci cang er

Acanthoxanthium spinosum (Linnaeus) Fourreau; *Xanthium cloessplateaum* D. Z. Ma; *X. spinosum* var. *inerme* Bel.

Herbs, annual, 10–60(–120) cm; nodal spines usually in pairs, simple or 2- or 3-partite, 15–30 mm. Petiole 1–15(–25) mm; leaf blade ± ovate to lanceolate or lanceolate-linear, 4–8(–12) × 1–3(–5) cm, often pinnately 3(–7)-lobed, abaxially gray to white, densely strigose. Burs 10–12(–15) mm. Fl. Jul–Oct. $2n = 36$.

Damp or seasonally wet alkaline soils, wastelands, margins of agricultural land. Beijing, Henan [native to North and South America].

The synonymy of *Xanthium spinosum* is far more extensive than is indicated here. *Xanthium ambrosioides* Hooker & Arnott is sometimes included within the synonymy of this species. It is, however, a very distinctive taxon from Argentina (Patagonia) that should perhaps be recognized as a separate species.

2. Xanthium strumarium Linnaeus, Sp. Pl. 2: 987. 1753.

苍耳 cang er

Xanthium americanum Walter; *X. chasei* Fernald; *X. chinense* Miller; *X. curvescens* Millspaugh & Sherff; *X. cylindricum* Millspaugh & Sherff; *X. echinatum* Murray; *X. echinellum* Greene ex Rydberg; *X. globosum* C. Shull; *X. inaequilaterum* Candolle; *X. indicum* J. Koenig ex Roxburgh var. *inaequilaterum* (Candolle) Miquel; *X. inflexum* Mackenzie & Bush; *X. italicum* Moretti; *X. japonicum* Widder; *X. mongolicum* Kitagawa; *X. orientale* Linnaeus; *X. oviforme* Wallroth; *X. pensylvanicum* Wallroth; *X. sibiricum* Patrin ex Widder; *X. sibiricum* var. *jingyuanense* H. G. Hou & Y. T. Lu; *X. sibiricum* var. *subinerme* Widder; *X. speciosum* Kearney; *X. strumarium* var. *canadense* (Miller) Torrey & A. Gray; *X. strumarium* var. *glabratum* (Candolle) Cronquist; *X. strumarium* var. *japonicum* (Widder) H. Hara; *X. strumarium* subsp. *sibiricum* (Patrin ex Widder) Greuter; *X. varians* Greene; *X. wootonii* Cockerell.

Herbs, annual, 20–120 cm; nodal spines absent. Petiole 3.5–10 cm, not winged; median cauline leaves ovate-deltate, 9–25 cm, papery, densely scabrid on both surfaces, base shallowly cordate to broadly cuneate, margin irregularly dentate, often obsoletely 3-lobed, apex acute. Capitula monoecious. Male capitula in terminal umbels; phyllaries 1-seriate, oblong-lanceolate, ca. 2.2 mm; outer paleae oblong-lanceolate, inner paleae lanceolate, ca. 2.2 mm; corolla white, tubular, ca. 2.5 mm, 5-dentate. Female capitula axillary; phyllaries 1-seriate, oblong-lanceolate, ca. 3 mm, inner bracts connate with outer paleae. Burs sessile, oblong, ellipsoid, or ovoid, 10–18 × 6–12 mm, densely puberulent, 2-beaked. Fl. Jul–Aug, fr. Sep–Oct. $2n = 36$.

Damp or seasonally wet often alkaline soils, wastelands, margins of agriculture, common weed. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [a pantropical weed, known to be widely distributed in both Old and New Worlds, but most probably originating in the New World].

233. AMBROSIA Linnaeus, Sp. Pl. 2: 987. 1753.

豚草属 tun cao shu

Annuals, perennials, or shrubs. Stems erect, decumbent, or prostrate, branched. Leaves usually cauline, opposite throughout or opposite (proximal) and alternate or mostly alternate, sessile or petiolate; blade deltate, elliptic, filiform, lanceolate, linear, obovate, ovate, or rhombic, usually pinnately, sometimes palmately, lobed, both surfaces hairy or glabrate, usually gland-dotted or stipitate glandular, ultimate margin entire or toothed. Capitula discoid, unisexual, female proximal to or intermixed with male, male capitula usually arranged in racemes or spikes; rarely single plants all or mostly male or female. Female capitula: phyllaries 1–8-seriate, outer (1–)5–8 distinct or connate, herbaceous, remainder connate, usually with free tips forming tubercles, spines, or wings; florets 1(–5); corollas 0. Male capitula: involucres cup-shaped to saucer-shaped, 1.5–6 mm in diam.; phyllaries 1-seriate, connate; receptacle flat or convex; paleae spatulate to linear, membranous, sometimes villous, hirtellous, and/or gland-dotted or stipitate glandular, sometimes absent; florets 5–60; corollas whitish or purplish, funnelform, 5-lobed, erect or incurved; staminal filaments connate, anthers free or weakly coherent. Achenes black, ovoid or fusiform, enclosed within globose to obovoid, pyramidal, pyriform, obconical, or fusiform, hard, smooth, tuberculate, spiny, or winged burs; pappus absent. $x = 18$.

About 43 species: tropical to subtropical and temperate New World, mostly North America; three species (all introduced) in China.

See Payne, J. Arnold Arbor. 45(4): 401–438. 1964.

1a. Leaves palmately 3–5-lobed, sometimes undivided ..... 2. *A. trifida*
1b. Leaves once or more commonly twice pinnatifid/pinnatisect.
2a. Annuals; involucres of male capitula 2–3 mm in diam.; burs 2–3 mm; male florets 12–20 ..... 1. *A. artemisiifolia*
2b. Perennials; involucres of male capitula 3–5 mm in diam.; burs 3–4 mm; male florets 15–25 ..... 3. *A. psilostachya*

1. Ambrosia artemisiifolia Linnaeus, Sp. Pl. 2: 988. 1753.

豚草 tun cao

Ambrosia artemisiifolia var. *elatior* (Linnaeus) Descourtilz; *A. elatior* Linnaeus.

Annuals, 20–150 cm. Stems erect. Leaves opposite and alternate; petiole 2.5–3.5(–6) cm; blade deltate to lanceolate or elliptic, 2.5–5.5(–9) × 2–3(–5) cm, pinnately 1- or 2-lobed, abaxially sparsely pilosulose to strigillose, adaxially strigillose, both surfaces gland-dotted, base cuneate, ultimate margin entire or toothed. Female capitula clustered, proximal to male; floret 1. Male capitula: peduncles 0.5–1.5 mm; involucres shallowly cup-shaped (usually without black veins), 2–3 mm in diam., glabrous or hispid to pilosulose; florets 12–20. Burs ± globose to pyriform, 2–3 mm, ± pilosulose, spines or tubercles 3–5, near middle or apex, conical to acerose, 0.1–0.5 mm, tips straight. Fl. Jul–Oct, fr. Sep–Oct. $2n = 34, 36$.

Introduced noxious weed of wet to dry soils; below 1000 m. Widely distributed in China [native to Central and North America; introduced and widely distributed in Asia and Europe].

2. Ambrosia trifida Linnaeus, Sp. Pl. 2: 987. 1753.

三裂叶豚草 san lie ye tun cao

Annuals, 30–150 cm. Stems erect. Leaves mostly opposite; petiole 10–30(–70) mm; blade orbicular-deltate to ovate or elliptic, 4–15(–25) × 3–7(–20) cm, usually some palmately 3(–5)-lobed, both surfaces scaberulose and gland-dotted, base truncate to cuneate, sometimes decurrent onto petiole, margin usually toothed, rarely entire. Female capitula clustered, proximal to male; floret 1. Male capitula: peduncles 1–3 mm; involucres saucer-shaped, 2–4 mm in diam., scaberulose; florets 3–25. Bur pyramidal, 3–5(–7) mm, glabrous or glabrate, spines 4 or 5, apical, acerose, 0.5–1 mm, tips straight. Fl. Jul–Aug, fr. Sep–Nov. $2n = 24, 48$.

Weed of disturbed sites, wastelands, damp soils; below 1600 m Hebei, Heilongjiang, Hunan, Jiangxi, Jilin, Liaoning, Shandong, Sichuan, Zhejiang [native to North America].

3. Ambrosia psilostachya Candolle, Prodr. 5: 526. 1836.

裸穗豚草 luo sui tun cao

Ambrosia coronopifolia Torrey & A. Gray.

Herbs, perennial, to 75(–100) cm tall. Stems leafy, glabrescent below, simple or with ascending branches from above middle. Leaves opposite below, alternate on branches, petiolate below, upper sessile; petiole 1–3 cm; blade ovate in outline, 4–10 × (2–)4–9 cm, 1 or 2 times pinnatisect, large segments 2–4 cm, divergent or ascending, linear or elliptic-oblong, central rachis 2–6 mm wide. Synflorescences terminal, spiciform, 10–20 cm × ca. 10 mm, usually surrounded by smaller secondary spikes terminating axillary branches, spike primarily of 50–100 male capitula. Male capitula: involucre cup-shaped or turbinate, 3–5 mm in diam.; paleae filiform, apices expanded and pubescent; florets 15–25; corollas pale yellow or greenish yellow, 2–2.5 mm; anthers white, inflexed-subulate, bases obtuse. Female capitula few and inconspicuous, solitary or 2–5 together in sessile leafy-bracteate axillary clusters on nodes beneath male part of spike; floret 1. Bur ± obovoid, 3–4 mm (including beak), 2–3 mm wide including blunt spines, spines 0.5–0.8 mm and thick, body rounded and coarsely reticulate above spines, beak tapering, 0.7–1 mm.

Recently naturalized in Taiwan [native to temperate North America and parts of South America].

The occurrence of this species in Taiwan was first reported by Y. H. Tseng and C. I Peng (Endemic Sp. Res. 6: 71–74. 2004).

234. PARTHENIUM Linnaeus, Sp. Pl. 2: 988. 1753.

银胶菊属 yin jiao ju shu

Annuals, biennials, perennials, subshrubs, or shrubs. Stems erect, usually branched. Leaves usually cauline, sometimes in rosettes, alternate, petiolate or sessile; blade elliptic, lanceolate, linear, lyrate, oblanceolate, obovate, ovate, orbicular-deltate, or spatulate, sometimes pinnately (1 or)2-lobed, both surfaces usually hairy and gland-dotted (at least abaxial), ultimate margin entire or toothed. Capitula usually radiate, sometimes ± disciform; involucres hemispheric; phyllaries deciduous, 2-seriate, outer 5(–8) herbaceous to scarious, inner 5–8 scarious to membranous; receptacle flat to conical; paleae cuneate to flabelliform, scarious or membranous, distally papillate and/or fimbrillate, all or peripheral each ± enfolding a disk floret. Ray female florets 5(–8), fertile; corollas ochroleucous, tubes stout, glandular. Disk florets functionally male; corollas ochroleucous, funnelform, lobes 5. Achenes oblanceolate, obovate, or pyriform, often obcompressed; pappus absent. $x = 9$.

About 16 species: North America to South America, including the Caribbean; one species (introduced) in China.

Parthenium argentatum A. Gray is cultivated in China.

See Rollins, Contr. Gray Herb. 172: 1–73. 1950.

1. Parthenium hysterophorus Linnaeus, Sp. Pl. 2: 988. 1753.

银胶菊 yin jiao ju

Herbs, annual, 30–120 cm tall. Leaf blade ovate to elliptic, 3–18 × 1–5(–9) cm, pinnately (1 or)2-lobed, ultimate lobes lanceolate to linear, 3–50 × 2–15 mm, both surfaces sparsely to densely scaberulose and gland-dotted. Synflorescences of open panicles. Capitula obscurely radiate; peduncles 1–8(–15+) mm; outer phyllaries 5(or 6), elliptic-lanceolate, 2–4 mm, inner 5(or 6) ovate to orbicular, 2.5–4 mm. Female florets 5(or 6); corolla limbs reniform or orbicular to oblong, 0.3–1 mm. Disk florets 12–30(–60). Achenes obovoid, 1.5–2(–3.5) mm; pappuslike enations erect, deltate to ovate, 0.5–1 mm. Fl. Apr–Aug. $2n = 34$.

Fields, roadsides; below 1500 m. Guangdong, Guangxi, Guizhou, Yunnan [native to tropical America; a widely introduced weed in the tropics].

235. GAILLARDIA Fougeroux, Observ. Phys. 29: 55. 1786 [*"Gaillarda"*].

天人菊属 tian ren ju shu

Annuals, perennials, or subshrubs. Stems usually erect, usually branched. Leaves petiolate or sessile; leaf blade entire to pinnatifid, sometimes semisucculent. Capitula terminal or axillary, solitary, radiate or discoid; involucre hemispheric to broadly hemispheric; phyllaries persistent, in 2 or 3 or more series, subequal, herbaceous or papery; receptacle convex to hemispheric, densely setose. Ray florets usually neuter, rarely female and fertile or styliferous and sterile; corolla yellow to white or orange to red, purplish, or brown, often bicolored. Disc florets bisexual, fertile; corolla yellow or orange to red, purplish, or brown; tube much shorter than throat; throat ampliate, campanulate to cylindric, or urceolate; lobes 5, broadly deltate or ovate. Achenes obpyramidal to clavate, sparsely to densely hairy; pappus usually persistent, of 6–12 medially thickened, laterally scarious scales in 1 or 2 series, rarely of linear scales with erose margins.

Twenty species: North and South America; one species (introduced) in China.

See Biddulph, Res. Stud. State Coll. Washington 12: 195–256. 1944.

Gaillardia amblyodon J. Gay and *G. aristata* Pursh are cultivated in China.

1. Gaillardia pulchella Fougeroux, Hist. Acad. Roy. Sci. Mém. Math. Phys. (Paris, 4to). 1786: 5. 1788.

天人菊 tian ren ju

Herbs, annual, 10–60 cm. Leaves cauline, sessile to subsessile; blade linear, oblong, or spatulate, 5–10 cm × 4–12(–35) mm, densely strigillose or hirtellous to ± villous, margin usually entire, sometimes toothed or lobed. Phyllaries 18–28, narrowly triangular-attenuate to linear-attenuate, 6–14 mm, margin usually ciliate with jointed hairs. Receptacular setae 1.5–3 mm. Ray florets usually 8–14; corolla usually reddish to purplish proximally, yellow to orange distally, rarely yellow, reddish, or purplish throughout, 13–30 mm. Disk florets numerous; corolla yellowish to purple or brown, often bicolored; tube 0.8–1.2 mm; throat campanulate to urceolate, 3–4 mm; lobes deltate to ovate, often attenuate. Achenes obpyramidal, 2–2.5 mm; hairs 1.5–2 mm, inserted at base and on angles; pappus of 7 or 8 deltate to lanceolate, aristate scales 4–7 mm. Fl. May–Aug. $2n = 34$.

Widely cultivated and naturalized in China [native to North America].

15. Tribe **EUPATORIEAE**

泽兰族 ze lan zu

Chen Yilin (陈艺林 Chen Yi-ling); Takayuki Kawahara, D. J. Nicholas Hind

Herbs (rarely aquatic or semiaquatic), subshrubs, shrubs, climbers, small trees, sometimes epiphytic. Leaves usually opposite, rarely strictly alternate, sometimes rosulate or verticillate, sessile or petiolate, blade usually simple. Synflorescence usually a corymbose panicle, sometimes spicate. Capitula sessile or distinctly pedunculate, homogamous, discoid, rarely with some zygomorphic outer florets; involucre cylindric, campanulate, or hemispheric, rarely subtended by a subinvolucral bract; phyllaries in 1 to several series, few or numerous, imbricate, subimbricate, or distant, equal, subequal, or markedly graded, persistent or variously deciduous, lanceolate or ovate; receptacle flat to convex, sometimes highly conical, usually naked, glabrous or sometimes pubescent. Florets few, very rarely 1, often 4 or 5 to many, commonly fragrant; corollas funnelform to tubular, never truly yellow; lobes relatively short, commonly 5, very rarely 4; anther cylinders usually included within corolla tube; anther appendages obtuse or acute, rarely emarginate or lobed, as long as broad or shorter, sometimes absent, basal appendages short or almost absent, obtuse or rounded; antheropodia indistinct, cylindric or variously pronounced; nectary rarely visible; style base glabrous or pubescent, sometimes with a swollen node; styles usually very conspicuous and much exserted, glabrous or rarely pubescent; style branches linear to clavate, obtuse, stigmatic surfaces variously papillate. Achenes obovoid or oblong with phytomelanin in achene walls, usually 3–5(or 10)-ribbed, body rarely flattened with 2 ribs or 5 winged ribs, sometimes glandular, glabrous or variously setuliferous; carpopodium often paler than achene body, rarely indistinct or absent, of several layers of variously enlarged, sometimes ornamented cells, usually symmetrical, rarely eccentric, annular, cylindric, or stopper-shaped; pappus sometimes absent and reduced to an apical callus, rarely a laciniate crown, or vestigial, occasionally coroniform, usually of setae, commonly uniseriate, rarely biseriate or very rarely multiseriate, usually persistent, sometimes fragile, usually numerous, sometimes few, usually equal or subequal, rarely very short, or occasionally of flattened scales or awnlike scales, rarely of two distinct elements, very rarely of broad laciniate setae, or of few clavate apical appendages; setae commonly barbellate or laciniate, rarely plumose, apices acute or obtuse, usually gradually tapering, sometimes dilated, very rarely conspicuously narrowing.

About 180 genera and ca. 2,000 species: concentrated in Mexico and Central and South America, with relatively few native species in the Old World; several pantropical weeds widespread in the Old World; ten genera (seven introduced) and 25 species (six endemic, nine introduced) in China.

The tribe appears to be nearly restricted to the W Hemisphere, suggesting a Neotropical origin. The subtribes show a mixed distribution pattern, with explosive speciation in several, especially those occurring in Brazil, the Caribbean, Colombia, and Mexico. There are many pantropical and pansubtropical weeds in the tribe. Uses of members of the tribe have been briefly summarized by King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987). More recent references on the topic include S. Garg and T. C. S. Sastry (in P. D. S. Caligari & D. J. N. Hind, Compositae Biol. Utiliz. 2: 361–382. 1996; *Ageratum conyzoides*, *Mikania micrantha*), Y. P. Huang and Y. R. Ling (in P. D. S. Caligari & D. J. N. Hind, loc. cit.: 431–451; *Ageratum houstonianum*, *Adenostemma*), M. Heinrich (in P. D. S. Caligari & D. J. N. Hind, loc. cit.: 475–503; 31 Mexican species), and J. Vallès et al. (in P. D. S. Caligari & D. J. N. Hind, loc. cit.: 453–466; *Eupatorium cannabinum*). *Stevia rebaudiana* (Bertoni) Hemsley, a native of Paraguay, is cultivated in China as the source of a strong sweetener and sugar substitute.

See also Hind and Robinson (in Kadereit & C. Jeffrey, Fam. Gen. Vasc. Pl. 8: 510–574. 2007).

1a. Phyllaries and florets 4 per capitulum (subtribe Mikaniinae) ..... 237. *Mikania*
1b. Phyllaries and florets not of equal number, or if florets 4 then phyllaries more numerous.
2a. Phyllaries distant, with non-articulate bases (subtribe Adenostemmatinae).
3a. Pappus of 3–5 clavate glandular knobs ..... 238. *Adenostemma*
3b. Pappus absent ..... 239. *Gymnocoronis*
2b. Phyllaries imbricate or subimbricate, sometimes distant, bases always articulate.
4a. Phyllaries all deciduous leaving a naked receptacle, remaining appressed until lost and not spreading with age (subtribe Praxelinae).
5a. Receptacle flat to slightly convex ..... 244. *Chromolaena*
5b. Receptacle conical ..... 243. *Praxelis*
4b. At least some basal phyllaries persistent, phyllaries usually spreading with age.
6a. Pappus of scales or awns, rarely absent; receptacle paleaceous ..... 240. *Ageratum*
6b. Pappus of capillary setae; receptacle epaleate.
7a. Style base pubescent (subtribe Eupatoriinae).
8a. Carpopodium scarcely differentiated; phyllaries green, sometimes with purplish apex, not evidently ribbed ..... 241. *Eupatorium*
8b. Carpopodium prominent; phyllaries straw-colored, weakly ribbed ..... 242. *Austroeupatorium*
7b. Style base glabrous.
9a. Receptacle conical; corollas usually blue; florets 50–70; carpopodium obsolete ..... 245. *Conoclinium*
9b. Receptacle slightly convex; corollas white; florets 10–60; carpopodium distinct ..... 236. *Ageratina*

236. AGERATINA Spach, Hist. Nat. Vég. 10: 286. 1841.

紫茎泽兰属 zi jing ze lan shu

Shrubs or perennial herbs, usually erect. Leaves usually opposite; blade narrowly elliptic to deltate, mostly toothed, lobed, serrate, or crenate. Capitula laxly to densely corymbose. Phyllaries ca. 30, 2- or 3-seriate, distant to weakly subimbricate, mostly subequal; receptacle usually slightly convex, glabrous or with minute scattered hairs. Florets 10–60, often sweetly scented; corollas white or lavender, usually with slender basal tube and campanulate limb (in *A.* subg. *Ageratina* and *A.* subg. *Klattiella*), others narrowly funnelform; lobes distinctly longer than wide, outer surface smooth, glabrous or glandular, usually with hairs (in *A.* subg. *Ageratina*), inner surface densely papillose; antheropodium cylindric, usually elongate; anther appendage large, ovate-oblong, longer than wide; style base usually enlarged [except in *A.* subg. *Apoda*]; style branches rarely slightly broadened distally, densely papillose with projecting cells on lateral and outer surfaces. Achenes prismatic or fusiform, usually 5-ribbed, setuliferous or glandular or both; carpopodium distinct (cylindric in *A.* subg. *Ageratina*) [in others rounded or broadly stopper-shaped]; pappus setae uniseriate, 5–40, barbellate, often easily deciduous, capillary, often enlarged distally, often with outer series of shorter setulae. $x = 17$.

About 265 species: tropics and subtropics of the New World; one species (introduced) in China.

King and Robinson (Phytologia 19: 208–229. 1970) first provided an infrageneric division recognizing four subgenera, later raising *Ageratina* subg. *Pachythamnus* R. M. King & H. Robinson to generic status. Subsequently (King & Robinson, Phytologia 38: 323–355. 1978), they recognized two further subgenera. A complete list of species in the five subgenera was provided by King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987).

See B. L. Turner's The Comps of Mexico, Vol. 1 (Phytologia Mem. 11: i–iv, 1–272. 1997).

1. Ageratina adenophora (Sprengel) R. M. King & H. Robinson, Phytologia 19: 211. 1970.

破坏草 po huai cao

Eupatorium adenophorum Sprengel, Syst. Veg., ed. 16, 3: 420. 1826, based on *E. glandulosum* Kunth in Humboldt et al., Nov. Gen. Sp. 4, ed. f°: 96. 1818, not Michaux (1803).

Shrubs or perennial herbs, 30–90(–200) cm tall. Stems erect; branches opposite, obliquely ascending, white or ferruginous puberulent, upper part and peduncles more densely so, glabrescent or glabrous in lower part by anthesis. Leaves opposite, long petiolate; blade abaxially pale, adaxially green, ovate, triangular-ovate, or rhombic-ovate, 3.5–7.5 × 1.5–3 cm, thin, both surfaces sparsely puberulent, more densely so abaxially and on veins, basally 3-veined, base truncate or slightly cordate, margin coarsely crenate, apex acute. Synflorescences terminal, corymbose or compound-corymbose, to 12 cm in diam. Capitula numerous, 2–4 cm, 40–50-flowered; involucre broadly campanulate, ca. 3 × 4 mm; phyllaries 2-seriate, linear or linear-lanceolate, 3.5–5 mm, apex acute or acuminate; receptacle convex to conical; corollas purplish, tubular, ca. 3.5 mm. Achenes black-brown, narrowly elliptic, 1–1.5 mm, 5-angled, without hairs and glands; pappus setae 10, basally connate, white, fine, equal to corolla. Fl. and fr. Apr–Oct. $2n = 51$.

Wet places or roadsides on slopes, forest margins; 900–2200 m. Introduced and naturalized in Guangxi, Guizhou, Nanhai Zhudao, and Yunnan [native to Mexico; pantropical and pansubtropical invasive weed in Cambodia, India, Laos, Myanmar, Nepal, Indonesia, Philippines, Thailand, Vietnam; S Africa, America, Atlantic islands (Canary Islands), Australia, Pacific islands].

Ageratina adenophora was introduced into China in the middle of the 19th century. It is poisonous; oxen and horses have become ill and have sometimes died from consuming it.

237. MIKANIA Willdenow, Sp. Pl. 3: 1481, 1742. 1803, nom. cons.

假泽兰属 jia ze lan shu

Carelia Jussieu ex Cavanilles (1803), not Fabricius (1759), nor Lessing (1832); *Corynanthelium* Kunze; *Kanimia* Gardner; *Willoughbya* Necker ex Kuntze.

Plants usually woody vines, sometimes erect perennial herbs or shrubs, moderately branched, never rosulate. Leaves opposite or whorled, sessile to long petiolate; blade linear to broadly ovate, membranous to leathery, base narrow to cordate. Synflorescence terminal on stems or lateral branches, cymose to corymbose or thyrsoid; capitula clustered, sessile to pedunculate, with subinvolucral bract; phyllaries distant, 4, subequal, persistent; receptacle flat, epaleate. Florets 4; corollas white or pink, funnelform or with variously campanulate limb, with or without distinct basal tube, glabrous to pilosulose or glandular on outer surface, with or without papillae on inside of throat or lobes; lobes broadly triangular to narrowly oblong; antheropodium broad; anther cylinder exserted from corolla throat; anther appendages as long as or longer than wide; style base thick, without distinct basal node, glabrous or sometimes papillose; style branches narrowly linear, not broadened at apex, scarcely to strongly papillose. Achenes prismatic, 4–10-ribbed; carpopodium broadly cylindric; pappus setae numerous, persistent, capillary-like, apical cells obtuse to acute.

About 430 species: pantropical, mainly in Brazil; two species (one introduced) in China.

See Holmes's Revision of Old World *Mikania* (Compositae) (Bot. Jahrb. Syst. 103: 211–246. 1982).

1a. Leaves, phyllaries, and corollas eglandular; phyllaries 5–7 mm; corollas narrowly campanulate; pappus usually rather reddish ..... 1. *M. cordata*

1b. Leaves, phyllaries, and corollas with pale glands; phyllaries ca. 3.5 mm; corollas broadly campanulate; pappus off-white, never reddish ..... 2. *M. micrantha*

1. Mikania cordata (N. L. Burman) B. L. Robinson, Contr. Gray Herb. 104: 65. 1934.

假泽兰 jia ze lan

Eupatorium cordatum N. L. Burman, Fl. Indica, 176. 1768; *Mikania volubilis* Willdenow.

Herbs, perennial, climbing. Stems slender, many branched, sparsely shortly pubescent or subglabrous. Median leaves: petiole 2.5–6 cm; blade triangular-ovate, 4–10 × 2–7 cm, both surfaces sparsely shortly pubescent, glabrescent or glabrous by anthesis, base cordate, margin entire or repand-crenate; upper leaves gradually smaller, shortly petiolate, triangular or lanceolate, base truncate or cuneate. Capitula numerous in terminal corymb or compound corymb; peduncle slender, pubescent or glabrous, with linear-lanceolate bracteole leaves; phyllaries narrowly elliptic, 5–7 mm, sparsely pubescent and glandular, distinctly 3-veined, apex obtuse or slightly acute; corollas white, 3.5–5 mm, with slender tube and campanulate limb, sparsely puberulent. Achenes narrowly elliptic, ca. 3.5 mm, 4-ribbed, glandular; pappus off-white or rather reddish, 3.5–4 mm. Fl. and fr. Aug–Nov. $2n = 34, 36, 38$.

Thickets, forests; 100–1700 m. Hainan, Taiwan, SE Yunnan [Borneo, Cambodia, Indonesia (Java), Laos, New Guinea, Philippines, Thailand, Vietnam; probably widespread throughout SE Asia].

2. Mikania micrantha Kunth in Humboldt et al., Nov. Gen. Sp. 4, ed. f°: 105. 1818.

微甘菊 wei gan ju

Vines, slender, branched. Stems yellowish or brownish, usually terete, slightly striate, glabrate to sparsely puberulent. Leaves opposite; petiole 1–6 cm; blade ovate, 3–13 × ca. 10 cm, both surfaces glabrate with numerous glandular spots, base cordate to deeply so, margin entire to coarsely dentate, apex shortly acuminate. Synflorescence a corymbose panicle, capitula clustered on subcymose branches; phyllaries oblong, ca. 3.5 mm, glabrous to puberulent, apex shortly acuminate; corollas white, 2.5–3 mm, tube narrow, limb broadly campanulate, inside papillate. Achenes 1.5–2 mm, 4-ribbed, with many scattered glands; pappus setae dirty white, ca. 3 mm. Fl. and fr. year-round. $2n = 36, 72$.

Naturalized in China [native to the Caribbean, Central and South America, and Mexico; widely introduced in Asia and the Pacific islands].

238. ADENOSTEMMA J. R. Forster & G. Forster, Char. Gen. Pl. 45. 1775.

下田菊属 xia tian ju shu

Lavenia Swartz.

Herbs, perennial. Leaf blade narrowly elliptic to broadly ovate or hastate, crenate to strongly serrate, acute to slightly acuminate. Synflorescence very laxly cymose. Phyllaries 10–30, 2-seriate, ± overlapping, somewhat fused at base, equal to subequal; receptacle covered with discrete oval deeply concave scars. Florets 10–60; corollas usually white, narrowly funnelform or with narrow basal tube and broadly campanulate limb, usually with hairs or glands on outer surface, hairs often moniliform; lobes 5, ca. 1.5 × longer than wide, not papillose; antheropodium usually strongly expanded below; anther appendages distinctly shorter than wide; style shaft with or without long hairs; style branches slightly to strongly clavate, often forming most showy part of head, fleshy, rounded apically, scarcely mammillate below. Achenes slightly curved, usually 3-angled without distinct ribs or 5-angled, often tuberculate; carpopodium forming a prominent asymmetrical knob; pappus usually of 3 or 5 terete clavate knobs, knobs with tips and upper outside surface covered with an elongated mass of viscid glands. $x = 10$.

About 26 species: pantropical; one species in China.

1. Adenostemma lavenia (Linnaeus) Kuntze, Revis. Gen. Pl. 1: 304. 1891.

下田菊 xia tian ju

Herbs, annual, 30–100 cm tall. Stems erect, solitary, rigid, usually divaricately branched in upper part, white puberulent, glabrous in lower part. Leaves remote; basal leaves persistent or withered at anthesis; median leaves large; petiole narrowly winged, 0.5–4 cm; blade elliptic-lanceolate to elliptic or rhombic-elliptic, or broadly ovate to cordate, 4–12 × 2–5 cm, both surfaces sparsely puberulent or glabrescent, usually rather densely hairy on veins, base broadly or narrowly cuneate, margin crenate or incised, serrate, or doubly serrate, apex acute or obtuse; upper and lower leaves smaller, shortly petiolate. Capitula few, rarely many, small, in a lax or dense corymb or panicle; peduncle 0.8–3 cm, gray-white or ferruginous puberulent; involucre hemispheric, 4–5 × 6–8 mm, to 10 mm in diam. at fruiting; phyllaries 2-seriate, green, subequal, narrowly elliptic, thin, submembranous, outer phyllaries mostly connate, sparsely white villous, apex obtuse; corollas ca. 2.5 cm, viscid-glandular, pubescent. Achenes blackish brown when mature, oblanceolate, ca. 4 × 1 mm, glandular, sometimes densely tuberculate, contracted at base, apex obtuse; pappus elements clavate, ca. 4.1 mm, basally connate into a ring, fulvous viscid-glandular. Fl. and fr. Aug–Oct. $2n = 20$.

Watersides, roadsides, forests and thickets on slopes, forest margins; 400–2300 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Nanhai Zhudao, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea, ?Myanmar, Nepal, Philippines, Thailand; probably widespread throughout SE Asia, Australia].

This is an extremely variable and problematic taxon. *Adenostemma lavenia* is regarded by some authorities as distinct from *A. tinctorium* and *A. viscosum*, and to be endemic to Sri Lanka (cf. King & Rob-

inson, Monogr. Syst. Bot. 22: 1–581. 1987), while others consider it to be pantropical.

1a. Leaves broadly ovate or cordate, margin incised, serrate, or doubly serrate; achenes densely tuberculate ..... 1b. var. *latifolium*
1b. Leaves elliptic-lanceolate to elliptic or rhombic-elliptic, margin crenate.
  2a. Leaves elliptic-lanceolate, margin crenate; achenes glandular ..... 1a. var. *lavenia*
  2b. Leaves elliptic-lanceolate, rhombic-elliptic, or elliptic, thick; achenes densely tuberculate ..... 1c. var. *parviflorum*

1a. Adenostemma lavenia var. **lavenia**

下田菊(原变种) xia tian ju (yuan bian zhong)

Verbesina lavenia Linnaeus, Sp. Pl. 2: 902. 1753; *Adenostemma tinctorium* (Loureiro) Cassini; *A. viscosum* J. R. Forster & G. Forster; *Anisopappus candelabrum* H. Léveillé; *Myriactis candelabrum* (H. Léveillé) H. Léveillé [*"caudelabrum"*]; *Spilanthes tinctoria* Loureiro.

Leaves elliptic-lanceolate, margin crenate. Achenes glandular.

Watersides, roadsides, forests and thickets on slopes; 400–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Nanhai Zhudao, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Nepal, Philippines; Australia].

Adenostemma lavenia var. *lavenia* is a widespread weed.

1b. Adenostemma lavenia var. **latifolium** (D. Don) Handel-Mazzetti, Symb. Sin. 7: 1086. 1936.

宽叶下田菊 kuan ye xia tian ju

Adenostemma latifolium D. Don, Prodr. Fl. Nepal. 181. 1825.

Leaves broadly ovate or cordate, margin incised, serrate, or doubly serrate. Achenes densely tuberculate.

Forest margins, shaded wet places by rivers, along coasts, thickets; 500–2300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Nanhai Zhudao, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea].

Adenostemma lavenia var. *latifolium* is used medicinally for skin diseases of the foot.

1c. Adenostemma lavenia var. **parviflorum** (Blume) Hochreutiner, Candollea 5: 298. 1934.

小花下田菊 xiao hua xia tian ju

Lavenia parviflora Blume, Bijdr. 905. 1826; *Adenostemma parviflorum* (Blume) Candolle; *A. viscosum* var. *parviflorum* (Blume) J. D. Hooker.

Leaves elliptic-lanceolate, rhombic-elliptic, or elliptic, thick. Capitula small. Involucre 5–7 mm in diam. Achenes small, densely tuberculate.

● Hainan, Hunan, Jiangxi, Taiwan.

239. GYMNOCORONIS Candolle, Prodr. 5: 106. 1836.

裸冠菊属 luo guan ju shu

Herbs, annual to perennial, erect. Leaf blade lanceolate to ovate or deltate. Synflorescence strongly cymose. Phyllaries 20–50, 2-seriate, equal to subequal; receptacle with discrete oval scars and with soft tissue in between. Florets 50–200; corollas white, narrowly funnelform, with shortly stalked glands on outer surface; lobes as wide as long to wider than long; antheropodium slightly enlarged; anther appendages small, wider than long; style branches very broadly oar-shaped, mammillate abaxially, smooth adaxially. Achenes slightly curved, prismatic, (4 or)5-ribbed, glandular between ribs, ribs sometimes corky; carpopodium broadly cylindric; pappus absent.

Five species: Mexico and South America, one species recently naturalized in Japan and China; one species (introduced) in China.

See King and Robinson's Studies in the Eupatorieae (Phytologia 29: 1–20. 1974).

The occurrence of this genus in China was reported by T. G. Gao and Yan Liu (Acta Phytotax. Sin. 45: 329–332. 2007). Its occurrence in Japan was reported by C. Suyama (J. Phytogeogr. Taxon. 49: 183–184. 2001).

1. Gymnocoronis spilanthoides (D. Don ex Hooker & Arnott) Candolle, Prodr. 7: 266. 1838.

裸冠菊 luo guan ju

Alomia spilanthoides D. Don ex Hooker & Arnott, Companion Bot. Mag. 1: 238. 1836.

Herbs, perennial, 1–1.5 m tall. Stems erect, few branched, glabrous, angled, fistulose. Leaves opposite, glabrous, broadly lanceolate to ovate; petiole ca. 2.5 cm; blade 8–12(–18) × 1–2.5(–9) cm, 3-veined or veins pinnate, base attenuate, rarely truncate, margin serrate, apex acute. Synflorescence terminal, cymose. Involucre hemispheric, ca. 4 × 8 mm; phyllaries 2-seriate, lanceolate, outside pubescent; receptacle convex; corollas white, ca. 4 mm, short-stipitate glandular throughout; style base lacking basal node, glabrous; style branches clavate to oar-shaped, white or pink. Achenes ca. 3 mm, 5-ribbed, body gland-dotted. Fl. and fr. Sep–Oct. $2n = 20$.

Recently introduced, and now naturalized, in Guangxi, Taiwan, and Yunnan [native to South America; naturalized in Australia, Japan, and Pacific islands (New Zealand)].

Gymnocoronis spilanthoides is an emergent plant and prefers marshes or pond sides. It spreads by the stems, which easily produce roots.

240. AGERATUM Linnaeus, Sp. Pl. 2: 839. 1753.

藿香蓟属 huo xiang ji shu

Caelestina Cassini; *Carelia* Fabricius; *Isocarpha* Lessing (1830), not R. Brown (1817).

Subshrubs or annual to perennial herbs. Leaves opposite or sometimes alternate; blade elliptic or lanceolate to deltate or ovate, margin entire to dentate. Synflorescence cymose to subcymose, sometimes subumbellate. Phyllaries 30–40, distant, 2- or 3-seriate, equal or subequal, lanceolate, markedly hardened, often with scarious margin; receptacle conical, glabrous or paleaceous. Florets 20–125; corollas white, blue, or lavender, funnelform or with distinct basal tube; lobes 5, as long as wide, partially papillose and sometimes hispidulous on outer surface, papillose on inner surface; antheropodium cylindric; style base not enlarged, glabrous, style branches linear, usually strongly and densely papillose. Achenes prismatic, 4- or 5-ribbed, glabrous or ribs setuliferous; carpopodium distinct; pappus of 5 or 6 free, flattened, sometimes awnlike, scales or lacking or coroniform. $x = 10, 20$.

About 40 species: Central and South America, one species (*Ageratum houstonianum*) widely cultivated and another species (*A. conyzoides*), although sometimes cultivated, a widespread weed throughout the tropics in both the Old and New Worlds; two species (both introduced) in China.

See Johnson (Ann. Missouri Bot. Gard. 58: 6–88. 1971) and Robinson (Phytologia 69: 93–104. 1990).

1a. Leaves basally cordate or truncate; phyllaries narrowly lanceolate, apex long acuminate, margin entire, stipitate glandular, with long hairs ..... 1. *A. houstonianum*
1b. Leaves basally obtusely or broadly cuneate; phyllaries broad, oblong or lanceolate-oblong, acute, glabrous or with long, non-viscid hairs, eglandular ..... 2. *A. conyzoides*

1. Ageratum houstonianum Miller, Gard. Dict., ed. 8, *Ageratum* no. 2. 1768.

熊耳草 xiong er cao

Ageratum mexicanum Sims.

Herbs, annual, 30–70(–100) cm tall. Stems erect, simple or branched from middle or lower part; stems and branches purple-red, green, or straw-colored, white tomentose or thinly lanate. Leaves broadly ovate or triangular-ovate; petiole 0.7–3 cm; median stem leaves 2–6 × 1.5–3.5 cm, or length equal to width; upper and axillary leaves smaller; all leaves basally 3-veined or inconspicuously 5-veined, both surfaces sparsely or densely white pubescent, base cordate or truncate, margin crenate-serrate, apex rounded or acute; petioles of upper leaves and axillary branches usually spreading white long tomentose. Synflorescence corymbose, 2–4 cm in diam.; peduncle densely pubescent or powdery pubescent. Capitula 5–15 or more; involucre campanulate, 6–7 mm in diam.; phyllaries 2- or 3-seriate, narrowly lanceolate, 4–5 mm, abaxially glandular pubescent, margin entire, apex long acuminate; corollas tubular, 2.5–3.5 mm; limb purplish; lobes pubescent. Achenes black, 5-angled, 1.5–1.7 mm; pappus of 5 short free scales; scales oblong-lanceolate, 2–3 mm, apex aristate-acuminate, sometimes truncate and 0.1–1.5 mm. Fl. and fr. year-round. $2n = 20, 40$.

Grasslands, roadsides, slopes in valleys; 100–1500 m. Cultivated and naturalized in Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Jiangsu, Nanhai Zhudao, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [native to tropical America; cultivated and naturalized in India, Myanmar, Nepal, Thailand; Africa].

Ageratum houstonianum is used medicinally. People in Central America (Ecuador) use the plant as an antiphlogistic, to relieve swelling and pain in the throat.

2. Ageratum conyzoides Linnaeus, Sp. Pl. 2: 839. 1753.

藿香蓟 huo xiang ji

Herbs, annual, 50–100 cm tall, sometimes less than 10 cm, with inconspicuous main root. Stems robust, ca. 4 cm in diam. at base, simple or branched from middle, stems and branches reddish, or green toward apex, white powdery puberulent or densely spreading long tomentose. Leaves often with axillary abortive buds; petiole 1–3 cm, densely white spreading villous; median leaves ovate, elliptic, or oblong, 3–8 × 2–5 cm; upper leaves gradually smaller, oblong, sometimes all leaves small, ca. 1 × 0.6 cm, both surfaces sparsely white puberulent and yellow gland-dotted, basally 3-veined or obscurely 5-veined, base obtuse or broadly cuneate, margin crenate-serrate, apex acute. Capitula small, 4–14, in dense terminal corymbs; peduncle 0.5–1.5 cm, powdery puberulent; involucre campanulate or hemispheric, ca. 5 mm in diam.; phyllaries 2-seriate, oblong or lanceolate-oblong, 3–4 mm, glabrous, margin lacerate; corollas 1.5–2.5 mm, glabrous or apically powdery puberulent; limb purplish, 5-lobed. Achenes black, 5-angled, 1.2–1.7 mm, sparsely white setuliferous; pappus scales 5 or awned, 1.5–3 mm. Fl. and fr. year-round. $2n = 20, 38, 40$.

Valleys, forests, forest margins on slopes, riversides, grasslands, field margins. Cultivated and naturalized in Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Jiangsu, Jiangxi, Nanhai Zhudao, Shaanxi, Sichuan, Taiwan, Yunnan; only cultivated in Hebei and Zhejiang [native to tropical America; widespread weed throughout Africa, India, Nepal, and SE Asia].

Ageratum conyzoides is used medicinally in China to treat a variety of conditions, including common colds, headaches, boils, eczema, bleeding wounds, and burns.

241. EUPATORIUM Linnaeus, Sp. Pl. 2: 836. 1753.

泽兰属 ze lan shu

Eupatoriadelphus R. M. King & H. Robinson.

Herbs, annual to perennial. Leaves opposite or verticillate, upper leaves subopposite to alternate; blade linear to ovate, deltate, or 3-lobed, serrate to subentire. Synflorescence a corymbose or pyramidal panicle. Phyllaries 10–22, weakly to strongly subimbricate, 2–5-seriate, sometimes inner phyllaries deciduous; receptacle flat or weakly convex. Florets 3–23; corollas white to purple, lavender, or pink, narrowly funnelform or with constricted basal tube and narrowly to broadly campanulate limb, outer surface with glands often concentrated at base of throat and on outer surfaces of lobes, rarely with a few hairs; lobes 5, usually slightly longer than wide; antheropodium cylindric; anther appendages large, ovate-triangular, ca. 1.5 × as long as wide; style base puberulent or rarely glabrous, with or without node; style branches filiform to slightly broadened or flattened distally, papillose. Achenes prismatic, 5-ribbed; carpopodium not or slightly differentiated; pappus setae 25–40, barbellate, persistent, apical cells with rounded to shortly acute tips. $x = 10, 20$.

Forty-five species: Asia, Europe, North America; 14 species (six endemic) in China.

The results of the studies by G. J. Schmidt & E. E. Schilling (Amer. J. Bot. 87: 716–726. 2000) and those of M. Ito et al. (J. Plant Res. 113: 79–89. 2000) are in conflict as to the re-recognition of *Eupatoriadelphus*. Schmidt and Schilling favor a distinct *Eupatoriadelphus* (= the "*Eutrochium* group") whereas Ito et al. imply that *Eupatorium* s.s. can be divided into three "morphological species groups," one of which is the "*Eutrochium* group." As there is still much confusion among the Chinese species of *Eupatorium* with both sexual and agamospermous species, the species here are simply arranged alphabetically. The presence of the hybrid *E.* ×*tripartitum* (Makino) Murata & H. Koyama (*E. chinense* × *E. lindleyanum*), a plant with tripartite leaves, has been recorded.

See Lamont, Mem. New York Bot. Gard. 72: 1–68. 1995.

1a. Leaves glabrous and eglandular on both surfaces, or abaxially sparsely puberulent.
2a. Leaves undivided, ovate, triangular-ovate, or oblong-ovate, basally 3-veined; shrubs ..... 14. *E. tashiroi*
2b. Leaves usually 3-lobed; lobes narrowly elliptic-lanceolate or oblanceolate, pinnately veined; perennial herbs; few branched ..... 5. *E. fortunei*
1b. Leaves sparsely or densely puberulent or villous, or tomentose on both surfaces, glandular on both surfaces or at least abaxially; achenes setuliferous or glabrous but usually glandular.
3a. Leaves basally 3- or 5-veined.
4a. Phyllaries acute at apex.
5a. Leaves petiolate ..... 2. *E. cannabinum*
5b. Leaves sessile ..... 9. *E. lindleyanum*
4b. Phyllaries obtuse or rounded at apex.
6a. Leaves usually tripartite, with large terminal lobe; achenes sparsely setuliferous above or at apex only ..... 11. *E. nanchuanense*
6b. Leaves simple; achenes sparsely long setuliferous.
7a. Capitula 9–15-flowered; shrubs ..... 1. *E. amabile*
7b. Capitula 5-flowered; herbs.
8a. Leaves sessile, ovate or ovate-lanceolate, apex acute ..... 13. *E. shimadae*
8b. Leaves shortly petiolate, ovate-oblong, apex long acuminate ..... 10. *E. luchuense*
3b. Leaves pinnately veined.
9a. Phyllaries acute at apex ..... 9. *E. lindleyanum*
9b. Phyllaries obtuse or rounded at apex.
10a. Leaves simple.
11a. Achenes glabrous and eglandular ..... 12. *E. omeiense*
11b. Achenes glandular.
12a. Leaf base cuneate, apex long acuminate, both surfaces sparsely crisped-pubescent, abaxial surface gland-dotted; synflorescence of lax corymbs ..... 3. *E. chinense*
12b. Leaf base shallowly cordate or rounded, apex obtuse or shortly acuminate, both surfaces ± glabrous, abaxial surface gland-dotted; synflorescence of dense corymbs ..... 7. *E. hualienense*
10b. Leaves divided.
13a. Achenes glabrous and eglandular ..... 4. *E. formosanum*
13b. Achenes glandular.
14a. Leaves simple, ovate, broadly ovate, or narrowly ovate, base rounded, sessile or very shortly petiolate ..... 3. *E. chinense*
14b. Leaves divided; lobes narrowly elliptic or lanceolate, or leaves simple, base truncate, petiolate, petiole 1–2 cm.
15a. Leaves white tomentose on both surfaces, abaxially and on veins densely tomentose, margin serrate-incised ..... 6. *E. heterophyllum*
15b. Leaves scabrid, sparsely puberulent, margin finely serrate ..... 8. *E. japonicum*

1. Eupatorium amabile Kitamura, Acta Phytotax. Geobot. 1: 283. 1932.

多花泽兰 duo hua ze lan

Shrubs. Stems ca. 1 m tall, not scandent; branches slender, divaricate, striate, densely glandular villous in upper part. Leaves abaxially pale green, adaxially green, ovate or ovate-oblong, 9–12 × 3.5–4 cm, abaxially sparsely villous and glandular, adaxially subglabrous, basally 3-veined, sparsely villous on veins, base rounded, margin mucronate-serrate, apex long acuminate. Synflorescence of divaricate terminal corymbs. Capitula 9–15-flowered; involucre campanulate, ca. 5 mm; phyllaries 12–15, unequal, linear, apically much obtuse, 2- or 3-seriate, outer phyllaries very short, sparsely glandular villous; corollas tubular, ca. 4.5 mm, glandular. Achenes black, striate, ca. 2.5 mm, sparsely villous; pappus off-white, 4.5–5 mm, barbellate. Fl. and fr. Jul–Mar. $2n = 20$*.

• Grasslands, slopes, rocks. Taiwan.

2. Eupatorium cannabinum Linnaeus, Sp. Pl. 2: 838. 1753.

大麻叶泽兰 da ma ye ze lan

Eupatorium nodiflorum Wallich ex Candolle.

Herbs, perennial, 50–150 cm tall. Rhizomes robust, with many fibrous roots. Stems erect, purplish red, simple or only apically corymbose branched, puberulent; synflorescence branches and peduncles more densely hairy, glabrescent in median lower part by anthesis. Leaves opposite, shortly petiolate; petiole ca. 5 mm; median and lower leaves irregularly lobed; central lobe elliptic or narrowly lanceolate, large, 6–11 × 2–3 cm, base cuneate or broadly cuneate, apex acuminate or long acuminate; lateral lobes same shape as central lobe, smaller; upper stem leaves gradually smaller, irregularly lobed or simple; lower stem leaves shed by anthesis; all stem leaves scabrid, rather thick, sparsely puberulent and glandular, more densely hairy abaxially and on veins, pinnately veined, lateral veins 5- or 6-paired, margin serrate, undulate. Synflorescences terminal, of densely compound corymbs. Capitula numerous, 3–7-flowered; involucre campanulate, ca. 6 mm; phyllaries 2- or 3-seriate, imbricate; outer phyllaries short, ovate-lanceolate, ca. 2 mm, puberulent; median and inner phyllaries gradually longer, with membranous margin and purplish tip; corollas purple-red, pink, or whitish, ca. 5 mm, outside sparsely yellow glandular. Achenes black-brown, cylindric, ca. 3 mm, 5-ribbed, with yellow glands; pappus setae white, ca. 5 mm. $2n = 20$.

Summits of small hills, grasslands, among bamboos. Jiangsu, ?Taiwan, Zhejiang, may be introduced and naturalized [Europe].

3. Eupatorium chinense Linnaeus, Sp. Pl. 2: 837. 1753.

多须公 duo xu gong

Eupatorium chinense var. *oppositifolium* (Koidzumi) Murata & H. Koyama; *E. chinense* var. *yuliense* C. H. Ou; *E. crenatifolium* Handel-Mazzetti; *E. makinoi* T. Kawahara & Yahara; *E. makinoi* var. *oppositifolium* (Koidzumi) T. Kawahara & Yahara; ?*E. melanadenium* Hance; *E. sachalinense* Makino var. *oppositifolium* Koidzumi.

Herbs, perennial, or small shrubs or subshrubs, (50–)70–100(–250) cm tall. Lower part woody, well branched, stems often purplish red; branches ascending, upper branches and corymb sordid-white puberulent, synflorescence branches and peduncles more densely hairy, glabrescent in lower part by anthesis. Leaves opposite, sessile or subsessile with petiole to 2–4 mm; median stem leaves simple or 3-lobed, ovate or broadly ovate, 4.5–10(–20) × (2–)3–5(–6.5) cm, both surfaces scabrid, white puberulent and glandular, more densely so abaxially and on veins, pinnately veined, veins 3–7-paired, base rounded, margin regularly crenate-serrate, apex acuminate or obtuse; upper stem leaves homomorphic with median leaves, but smaller; radical leaves withered by anthesis, margin irregularly crenate. Synflorescences terminal, of large laxly compound corymbs, 20–30 cm in diam. Capitula numerous, 5-flowered; involucre campanulate, ca. 5 mm; phyllaries 3-seriate, imbricate; outer phyllaries short, ovate or lanceolate-ovate, outside puberulent and sparsely glandular, 1–2 mm; median and inner longer, elliptic or elliptic-lanceolate, 5–6 mm, apically and marginally white, membranous, glabrous, but with yellow glands; corollas white, pink, red, or reddish purple, ca. 5 mm, with yellow glands. Achenes pale black-brown, elliptic, ca. 3 mm, 5-ribbed, yellow glandular; pappus setae white, ca. 5 mm. Fl. and fr. Jun–Nov. $2n = 20, 30, 31, 39, 40, 50$.

Forest margins on slopes, forests, thickets or grasslands on slopes; 200–1900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Nepal].

One of us (Chen) does not accept the broad view of *Eupatorium chinense* by King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987), who included *E. japonicum*, together with many other synonyms, but excluded *E. reevesii* Wallich ex Candolle, which was synonymized with *E. squamosum* D. Don.

T. Kawahara et al. (Pl. Sp. Biol. 4: 37–46. 1989) found sexual diploids with restricted distribution and agamospermous polyploids with broad distributions in this complex. They mentioned sexual populations belong to different varieties, which are morphologically distinct from each other and have allopatric distributions, but agamospermous populations may be of hybrid origin and have significant morphological variation.

Eupatorium chinense is poisonous, especially the leaves, but it is used medicinally to treat large carbuncles, scabies, snakebites, and to alleviate pain.

4. Eupatorium formosanum Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 122. 1908.

台湾泽兰 tai wan ze lan

Eupatorium cannabinum Linnaeus subsp. *asiaticum* Kitamura; *E. formosanum* var. *quasitripartitum* (Hayata) Kitamura; *E. quasitripartitum* Hayata.

Herbs, perennial, ca. 2 m tall. Stems erect, fascicled; branches obliquely ascending, divaricate synflorescence branches corymbose, slender; stems and branches green initially, densely ferruginous puberulent, later glabrescent, gray-brown. Leaves opposite; median stem leaves 3-partite; central lobe lanceolate, large, 10–15 × 2.5–3 cm, base cuneate, apex acuminate; lateral lobes lanceolate, small; upper leaves gradu-

ally smaller; lower leaves simple, ovate or broadly ovate; upper leaves abaxially pale green, adaxially green, narrowly ovate or ovate-lanceolate, abaxially with many yellow glands and densely adpressed puberulent, adaxially sparsely scabrid-hairy, pinnately veined, lateral veins 5–7-paired, adaxially slightly prominent. Synflorescence of lax terminal corymbs 8–11 cm in diam. Capitula numerous, 5-flowered; involucre campanulate, ca. 5 mm; phyllaries 3-seriate, imbricate, outer phyllaries elliptic, 1–1.5 mm, median and inner phyllaries longer, narrowly elliptic, ca. 5 mm, all phyllaries obtuse, glabrous and eglandular; corollas white, ca. 3.5 mm. Achenes black-brown, ca. 2.5 mm, angled, without hairs and glands; pappus off-white, ca. 3 mm. Fl. and fr. Dec–Aug. $2n = 20$*.

Forest margins, grasslands. Taiwan [Japan (Ryukyu Islands)].

5. Eupatorium fortunei Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 24(1): 170. 1851.

佩兰 pei lan

Eupatorium caespitosum Migo; *E. chinense* Linnaeus var. *tripartitum* Miquel; *E. fortunei* var. *angustilobum* Y. Ling; *E. stoechadosmum* Hance.

Herbs, perennial, 40–100 cm tall. Rhizomes procumbent, reddish brown. Stems erect, green or reddish purple, few branched or apically synflorescence branched, sparsely puberulent, more densely on synflorescences and peduncles. Median stem leaves large, 3-sect or 3-partite; petiole 0.7–1 cm; terminal lobe large, narrowly elliptic, elliptic-lanceolate, or oblanceolate, 5–10 × 1.5–2.5 cm, apex acuminate; lateral lobes identical to terminal lobe but smaller, pinnately veined; margin coarsely toothed or irregularly finely toothed; lower stem leaves gradually smaller; radical leaves withered by anthesis. Capitula numerous in apical compound corymbs; synflorescence 3–6(–10) cm in diam. Involucre campanulate, 6–7 cm; phyllaries 2- or 3-seriate, imbricate, outer phyllaries short, ovate-lanceolate; median and inner phyllaries gradually longer, narrowly elliptic, ca. 7 mm; all phyllaries purple-red, without hairs and glands, apex obtuse; corollas white or reddish, ca. 5 mm, eglandular. Achenes black-brown, elliptic, 3–4 mm, 5-angled, glabrous and eglandular; pappus white, ca. 5 mm. Fl. and fr. Jul–Nov. $2n = 40$.

Rare as a wild plant, but commonly cultivated, usually in thickets or roadside ditches; ca. 2000 m. ?Anhui, ?Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang [?introduced in Japan, Korea, N Thailand, Vietnam].

The whole plant of *Eupatorium fortunei* is fragrant like *Lavandula angustifolia* Miller when crushed.

The plant is used medicinally The fragrant stems and leaves are used for making fragrant oils.

6. Eupatorium heterophyllum Candolle, Prodr. 5: 180. 1836.

异叶泽兰 yi ye ze lan

Eupatorium cannabinum Linnaeus var. *heterophyllum* (Candolle) Kitamura; *E. mairei* H. Léveillé; *E. wallichii* Candolle var. *heterophyllum* (Candolle) Diels.

Herbs perennial, 1–2 m tall, or subshrublike, woody in median-lower part. Stems erect, brownish or purple-red, 1–2 cm in diam. at base, branched, and with corymbose synflorescence branches, white or sordid-white puberulent, more densely hairy on synflorescence branches and peduncles, glabrescent or sparsely hairy in middle-lower part by anthesis. Leaves opposite; median stem leaves large, 3-sect, -partite, or -lobate; petiole 0.5–1 cm; central lobe large, elliptic or lanceolate, 7–10 × 2–3.5 cm, base cuneate, apex acuminate; lateral lobes homomorphic with central lobe, smaller, or all stem leaves simple, oblong, elliptic-lanceolate, or ovate, abaxially densely gray-white tomentose, adaxially scabrid, white puberulent, both surfaces with dense yellow glands, pinnately veined, lateral veins 3–7-paired, abaxially prominent, margin rather regularly and deeply incised-crenate, not undulate; basal leaves withered by anthesis. Capitula numerous in terminal compound corymb; synflorescence to 25 cm in diam. Involucre campanulate, 7–9 cm; phyllaries 3-seriate, imbricate; outer phyllaries short, ovate or broadly ovate, ca. 2 mm, outside sparsely white puberulent; median and inner phyllaries elliptic, 8–9 mm; all phyllaries purple-red or purplish rose, apex obtuse. Florets white or reddish tinged; corolla ca. 5 mm, with sparse yellow glands. Achenes black-brown, elliptic, ca. 3.5 mm, 5-angled, with yellow glands, glabrous. Pappus white, ca. 5 mm. Fl. and fr. Apr–Oct.

Forests, forest margins, grasslands on slopes and in valleys; 1700–3000 m. Anhui, Gansu, Guizhou, Hubei, Shaanxi, Sichuan, ?Taiwan, Xizang, Yunnan [Nepal].

One of us (Hind) follows King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987) in treating *Eupatorium heterophyllum* as a synonym of *E. cannabinum*. However, the others of us (Chen and Kawahara) prefer to treat *E. heterophyllum* as a distinct species. Whereas the leaves of *E. cannabinum* are irregularly lobed, with the margin serrate and undulate, those of *E. heterophyllum* are 3-sect, with the margin rather regularly and deeply incised-crenate and not undulate.

The stems or whole plant of *Eupatorium heterophyllum* are used medicinally for treating injuries and trauma.

7. Eupatorium hualienense C. H. Ou, S. W. Chung & C. I Peng, Fl. Taiwan, ed. 2, 4: 956. 1998.

花莲泽兰 hua lian ze lan

Herbs, perennial. Stems erect, 50–150 cm, simple or branching apically, branches divaricate and ascending. Leaves: petiole short, 2–10 mm; median leaves broadly ovate, thick, 6.5–9 × 4.5–6.5 cm, lateral veins 5–7 pairs, both surfaces glabrous, abaxially gland-dotted, base shallowly cordate or rounded, margin serrate with obtuse teeth, apex obtuse or shortly acuminate. Synflorescence of compact corymbs. Capitula numerous, 5–8-flowered; involucre cylindric; phyllaries 3-seriate, sparsely gland-dotted, apices obtuse or rounded. Corolla tubular, ca. 3.5 mm, glandular. Achenes 5-ribbed, black, 3–4 mm, gland-dotted, sparsely setuliferous; pappus whitish, 3–4 mm, barbellate.

• Cliffs. Taiwan.

8. Eupatorium japonicum Thunberg in Murray, Syst. Veg., ed. 14, 737. 1784.

白头婆 bai tou po

Eupatorium chinense Linnaeus var. *simplicifolium* (Makino) Kitamura; *E. chinense* var. *tozanense* (Hayata) Kitamura; *E. fortunei* Turczaninow f. *aureoreticulatum* (Makino) Nakai; *E. fortunei* var. *simplicifolium* (Makino) Nakai; *E. fortunei* var. *tripartitum* (Makino) Nakai; *E. japonicum* f. *aureoreticulatum* Makino; *E. japonicum* var. *dissectum* Makino; *E. japonicum* var. *simplicifolium* Makino; *E. japonicum* var. *tozanense* (Hayata) Kitamura; *E. japonicum* var. *tripartitum* Makino; *E. japonicum* var. *wallichii* (Candolle) Yamamoto; *E. tozanense* Hayata; *E. wallichii* Candolle.

Herbs perennial, 50–200 cm tall. Rhizomes short, with numerous fibrous roots. Stems erect, purplish red, usually simple or corymbose synflorescence branched in upper part, white crisped-puberulent, more dense on synflorescence branches, glabrescent or sparsely hairy in lower part. Leaves opposite; petiole 0.5–2 cm, rather thick; median stem leaves elliptic, narrowly elliptic, ovate-elliptic, or lanceolate, 6–20 × 2–6.5 cm, pinnately veined, lateral veins 7-paired, abaxially prominent, base broadly or narrowly cuneate, margin sometimes 3-partite, apex acuminate; basal stem leaves withered by anthesis; upper leaves smaller, homomorphic with median leaves; both surfaces scabrid, crisped-villous or puberulent and yellow glandular, more densely hairy abaxially on veins and on petiole; margin coarsely or doubly serrate. Capitula apically densely corymbose, synflorescence usually 3–6 cm in diam., rarely forming a large compound corymbose synflorescence to 20 cm in diam. Involucre campanulate, 5–6 mm, 5-flowered; phyllaries imbricate, 3-seriate; outer phyllaries very short, lanceolate, 1–2 mm, median and inner phyllaries gradually longer, lanceolate, narrowly elliptic, or elliptic-lanceolate, 5–6 mm, green or purple-tinged, apex obtuse or rounded. Florets white, red-purple, or pink; corolla ca. 5 mm, with dense yellow glands. Achenes black-brown, elliptic, ca. 3.5 mm, 5-angled, with many yellow glands, glabrous. Pappus white, ca. 5 mm. Fl. and fr. Jun–Nov.

Grasslands on slopes, open forests, thickets, wet places, riverbanks; 100–3000 m. Anhui, Fujian, Guangdong, Guizhou, Hainan, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

9. Eupatorium lindleyanum Candolle, Prodr. 5: 180. 1836.

林泽兰 lin ze lan

Herbs, perennial, 30–150 cm tall. Rhizome short, with numerous fibrous roots. Stems erect, red or purplish red in lower and median parts, often branched from base or simple, or with corymbose synflorescence branches, only densely white villous or shortly pubescent. Lower stem leaves shed by anthesis; median stem leaves elliptic-lanceolate or linear-lanceolate, 3–12 × 0.5–3 cm, simple or 3-sect, thick, both surfaces scabrid, long or shortly white scabrous, densely so adaxially and on veins, abaxially with yellow glands or eglandular, basally 3-veined, base cuneate, apex acute; upper leaves gradually smaller upward, homomorphic with median stem leaves; all stem leaves basally 3-veined, margin deeply or shallowly dentate, sessile or subsessile. Capitula numerous in apical dense corymb; synflorescence 2.5–6 cm in diam., or large compound corymbs ca. 20 cm in diam.; synflorescence and peduncles purple-red or green, densely shortly white pubescent. Involucre campanulate, 5-flowered; phyllaries 3-seriate, imbricate; outer phyllaries short, lanceolate or broadly lanceolate, 1–2 mm; median and inner phyllaries longer, elliptic or elliptic-lanceolate, 5–6 mm; all phyllaries green or purple-reddish, acute; corollas white, pink, or purplish red, ca. 4.5 mm, with sparse yellow glands. Achenes black-brown, elliptic, ca. 3 mm, 5-ribbed; pappus white, equal to or rather longer than corollas. Fl. and fr. May–Dec. $2n = 20, 30, 40$.

Shaded wet places in valleys, wet places in forests or grasslands; 200–2600 m. Throughout China except Xinjiang [Japan, Korea, Myanmar, Philippines, Russia (Siberia)].

1a. Leaves with yellow glands abaxially ..... 9a. var. *lindleyanum*

1b. Leaves eglandular abaxially ..... 9b. var. *eglandulosum*

9a. Eupatorium lindleyanum var. **lindleyanum**

林泽兰(原变种) lin ze lan (yuan bian zhong)

Eupatorium kirilowii Turczaninow; *E. lindleyanum* f. *aureoreticulatum* Makino; *E. lindleyanum* var. *trifoliolatum* Makino; *E. subtetragonum* Miquel.

Leaves with yellow glands abaxially.

Shaded wet places in valleys, forests, or grasslands; 200–2600 m. Throughout China except Xinjiang [Japan, Korea, Russia (Siberia)].

The stems and leaves of *Eupatorium lindleyanum* var. *lindleyanum* are used medicinally as a carminative and vasopressin (i.e., to promote water retention).

9b. Eupatorium lindleyanum var. **eglandulosum** Kitamura, J. Jap. Bot. 11: 169. 1935.

无腺林泽兰 wu xian lin ze lan

Eupatorium lindleyanum f. *eglandulosum* (Kitamura) Murata & H. Koyama.

Leaves eglandular abaxially.

● Jiangsu, Zhejiang.

10. Eupatorium luchuense Nakai, Bot. Mag. (Tokyo) 30: 147. 1916.

基隆泽兰 ji long ze lan

Eupatorium kiirunense (Kitamura) C. H. Ou & S. W. Chung; *E. luchuense* var. *kiirunense* Kitamura.

Herbs, perennial. Rhizome short. Stems 50–120 cm tall, often woody at lower part, decumbent, sometimes forming tussocks, glabrescent. Leaves opposite, shortly petiolate; petiole 3–8 cm; blade adaxially shiny, obovate to elliptic-lanceolate, 8–10 × 5–7 cm, subglabrous, abaxially glandular, 3-veined, base truncate or cordate, margin simple, serrate with obtuse teeth, apex long acuminate. Capitula numerous in terminal corymbs; synflorescence 10–17 cm in diam., ± loose; phyllaries 4–5 mm; corollas white to pale pink, 3–4 mm. Achenes 2.5–3 mm; pappus white, ca. 5 mm. Fl. and fr. Jan–Aug. $2n = 20$.

Open places, often on rock walls and coral-based islands. Taiwan [Japan (Ryukyu Islands)].

11. Eupatorium nanchuanense Y. Ling & C. Shih, Fl. Reipubl. Popularis Sin. 74: 354. 1985.

南川泽兰 nan chuan ze lan

Herbs, perennial, 30–120 cm tall. Rhizomes procumbent; stems erect, brownish, purple-red, or dark purple-red; branches ascending; upper synflorescence branches corymbose; stems and branches white crisped-puberulent, more densely hairy on peduncles, sparsely hairy, or glabrescent in middle-lower part. Leaves irregularly opposite, often with axillary leaf buds, abaxially pale green, adaxially dark green; median stem leaves 3-sect; petiole ca. 1 cm; central lobe large, elliptic or lanceolate-elliptic, 6–8 cm, base cuneate, pinnately lobed, partite, apex caudate-acuminate; basal segment large; lateral lobes smaller, 3–5 mm, elliptic or lanceolate-elliptic, pinnately lobate, semilobed, incised-dentate; upper leaves 3-sect or irregularly 3-partite; lateral lobes unequal in size; central lobe sparsely incised-serrate or sometimes undivided, often lanceolate or ovate-lanceolate; basal leaves withered by anthesis; all leaves with both surfaces sparsely white adpressed puberulent and yellow glandular. Synflorescence terminal or compound corymbs, 8–12 cm in diam. Capitula numerous; involucre campanulate; phyllaries 3-seriate, imbricate, outer phyllaries short, elliptic, ca. 2.5 mm, median and inner phyllaries elliptic or lanceolate-elliptic, ca. 5 mm, all phyllaries purple tinged, apically rounded; corollas white or reddish, ca. 5 mm, with sparse yellow glands. Achenes black-brown, elliptic, ca. 3 mm, 6-angled, sparsely white setuliferous apically. Fl. and fr. Jun–Jul.

• Hill slopes; 1200–1700 m. Chongqing (Nanchuan), Yunnan (Daguan).

12. Eupatorium omeiense Y. Ling & C. Shih, Fl. Reipubl. Popularis Sin. 74: 354. 1985.

峨眉泽兰 e mei ze lan

Herbs, perennial. Rhizomes robust, with numerous adventive roots. Stems erect, 1–2 m tall, multibranched; branches ascending, slender; synflorescence branched, corymbose in upper part. Stems and branches pulverous dirty-white puberulent; synflorescence branches and peduncles rather densely hairy, sparsely hairy or glabrous in lower part by anthesis. Leaves opposite, thickly papery; median stem leaves abaxially pale green, adaxially dark green, elliptic or ovate-oblong, 6–9 × 2–3.5 cm, both surfaces sparsely white puberulent and with yellow glands, pinnately veined, lateral veins 4- or 5-paired, base cuneate, margin subentire or repand-crenate, apex acuminate; upper leaves homomorphic with middle leaves, but smaller, basal leaves withered by anthesis. Synflorescence of terminal compound corymbs. Capitula numerous, 5-flowered; involucre campanulate, ca. 4 mm; phyllaries 2- or 3-seriate, imbricate; outer phyllaries short, elliptic, ca. 1 mm; median and inner phyllaries gradually longer, elliptic, ca. 4 mm, puberulent, without glands, apex rounded; corollas white, ca. 4 mm, sparsely yellow glandular. Achenes blackish brown, subelliptic, 5-ribbed, glabrous and eglandular; pappus white, ca. 4 mm. Fl. and fr. Sep–Nov.

• Roadsides on hill slopes; 700–900 m. Sichuan (Emei Shan, Tianquan).

13. Eupatorium shimadae Kitamura, Acta Phytotax. Geobot. 1: 284. 1932 [*"Shimadai"*].

毛果泽兰 mao guo ze lan

Herbs, perennial, 40–80 cm tall. Rhizomes short, procumbent. Stems erect, fulvous or purple-tinged, ca. 4 mm in diam. at base, usually simple, or with terminal corymbose synflorescence branches, rarely few branched, white puberulent in upper part, densely hairy on synflorescences and peduncles, glabrescent in lower part. Leaves opposite, thick, simple, abaxially pale green, adaxially green, sessile or nearly so; median leaves large, ovate-lanceolate, ovate-oblong, or ovate, 8–10 × 5–7 cm, base rounded or truncate, apex caudate-acuminate; from middle part upward or downward gradually smaller, but homomorphic with median stem leaves; all leaves abaxially with yellow glands, both surfaces white puberulent, densely hairy on veins, basally 3-veined, margin coarsely or shallowly serrate. Synflorescences terminal, of compound corymbs, 8–18 cm in diam. Capitula numerous, 5-flowered; involucre campanulate, ca. 6 mm; phyllaries 2- or 3-seriate, imbricate, outer phyllaries short, oblong or lanceolate-oblong, 2–2.5 mm, median and inner phyllaries oblong, ca. 6 mm, all phyllaries sparsely shortly pubescent, without glands, apex obtuse or rounded; corollas white or purplish, ca. 4 mm, with few yellow glands. Achenes black-brown, elliptic, 3–3.5 mm, 5-ribbed, sparsely villous, eglandular; pappus off-white, ca. 4 mm. Fl. and fr. May–Jun. $2n = 20$*.

• Grasslands on slopes, rocky places. Fujian, Taiwan.

14. Eupatorium tashiroi Hayata, J. Coll. Sci. Imp. Univ. Tokyo 18(8): 9. 1904.

木泽兰 mu ze lan

Eupatorium clematideum (Wallich ex Candolle) Schultz Bipontinus var. *gracillimum* (Hayata) C. I Peng & S. W. Chung; *E. gracillimum* Hayata; *E. tashiroi* f. *gracillimum* (Hayata) Sasaki; *E. tashiroi* var. *gracillimum* (Hayata) Yamamoto.

Shrubs, subshrubs, or herbs, scandent. Stems terete, slender, glabrous; branches divaricate, flexuous. Leaves opposite; petiole 4–6 mm; blade 4–8 × 2–3 cm, thin, 3-veined, base obtuse or rounded, margin dentate, apex acuminate. Synflorescence a lax corymb. Capitula 5-flowered, ca. 1 cm; peduncle 1–1.5 cm, pubescent; involucre narrowly campanulate; phyllaries narrowly lanceolate, 1- or 2-seriate, outer phyllaries ca. 1.5 mm, inner phyllaries ca. 5 mm, margin scarious; corollas white, ca. 4 mm. Achenes black, cylindric, ca. 2.5 mm, 5-ribbed, glabrous; pappus 1-seriate, 3–4 mm, barbellate. $2n = 20$*.

• Mountains. C and S Taiwan.

Eupatorium clematideum (Wallich ex Candolle) Schultz Bipontinus (= *E. squamosum* D. Don) was recognized in Fl. Taiwan, ed. 2 (4: 953. 1998); however, *E. clematideum* is a native of Nepal, and the plants in Taiwan are actually *E. tashiroi*.

242. AUSTROEUPATORIUM R. M. King & H. Robinson, Phytologia 19: 433. 1970.

南泽兰属 nan ze lan shu

Subshrubs or herbs, erect. Leaves opposite below, often subopposite or alternate above; blade ovate to narrowly oblong, usually crenulate to serrulate. Synflorescences of terminal flattened corymbose panicles. Involucre campanulate, 5–6 × 4–5 mm; phyllaries 12–18, 2- or 3-seriate, mostly unequal; receptacle flat or slightly convex. Florets 9–23, fragrant; corolla white, rarely lilac, narrowly funnelform with rather narrow tube, glands on outer surface; lobes ca. 1.5 × as long as wide, without stomata; lower part of filaments slender and flexuous; antheropodium narrowly cylindric; anther appendages ovate-oblong, longer than wide, style base not enlarged, densely puberulent; style filiform. Achenes prismatic, 5-ribbed; carpopodium distinct; pappus setae 30–40, slender, barbellate, persistent, apical cells often enlarged, with rounded tips. $x = 10$.

Thirteen species: S South America, one species adventive in the palaeotropics; one species (introduced) in China.

1. Austroeupatorium inulifolium (Kunth) R. M. King & H. Robinson, Phytologia 19: 434. 1970.

南泽兰 nan ze lan

Eupatorium inulifolium Kunth in Humboldt et al., Nov. Gen. Sp. 4, ed. f°: 85. 1818.

Subshrubs or perennial herbs, to 3 m tall. Stems erect, few branched, brownish, terete, densely puberulent. Leaves mostly opposite; petiole ca. 15 mm, winged toward blade; blade narrowly ovate to lanceolate, ca. 15 × 6 cm, abaxially densely puberulent and gland-dotted, adaxially sparsely to densely puberulent, gland-dotted, 3-veined, base rounded to cuneate, abruptly narrowed, margin serrulate to crenate-serrate, apex narrowly acuminate. Synflorescence a broad dense corymb; peduncles 2–5 mm, densely puberulent. Capitula 6–7 mm, 8–15 florets; phyllaries 3-seriate, subimbricate, broadly oblong, 1.5–6 mm, margin and tip scarious, weakly 2–4-ribbed, puberulent outside, apex shortly acute to rounded; corollas white, 4–4.5 mm, tube and lobes sparsely gland-dotted, lobes with few hairs. Achenes 1.8–2 mm, glabrous or very sparsely gland-dotted; carpopodium short; pappus 1-seriate, persistent, 3.5–5 mm, barbellate, off-white. [Fl. and fr. Oct–May in South America.]

Introduced and naturalized in Taiwan [widespread in Central and South America; naturalized in Indonesia and Sri Lanka].

T. W. Hsu et al. (Taiwania 51: 41–45. 2006) reported *Austroeupatorium inulifolium* as a newly naturalized plant in Taiwan.

243. PRAXELIS Cassini in F. Cuvier, Dict. Sci. Nat. 43: 261. 1826.

假臭草属 jia chou cao shu

Subshrubs or annual or perennial herbs, erect to decumbent. Leaves opposite or whorled; blade ovate to elliptic or filiform, subentire to sharply serrate. Synflorescences of solitary capitula on long erect peduncles or laxly thyrsoid or rather densely corymbose. Involucre usually campanulate; phyllaries 15–25, 3- or 4-seriate, unequal, gradate, outer phyllaries falling first; receptacle highly conical, glabrous. Florets 25–30; corollas white, blue, or lavender, narrowly funnelform or with cylindric throat and slightly narrower basal tube, outer surface mostly smooth, with a few glands; lobes 1.5–3 × as long as wide, outer surface usually with some projecting cells at tip, inner surface densely long papillose; antheropodia with enlarged bases, narrowed apically; anther appendages slightly longer than wide to distinctly longer than wide, often toothed at tip; style base not enlarged; style branches long, narrowly linear, more broadened in distal half, densely long papillose. Achenes slightly to strongly obcompressed, 3- or 4-ribbed, sparsely setuliferous; carpopodium distinct, broad, highly asymmetrical; pappus setae ca. 40, persistent, not or scarcely broadened distally. $x = 10$.

Sixteen species: South America, one species adventive in E Asia and Australia; one species (introduced) in China.

1. Praxelis clematidea R. M. King & H. Robinson, Phytologia 20: 194. 1970.

假臭草 jia chou cao

Eupatorium clematideum Grisebach, Abh. Königl. Ges. Wiss. Göttingen 24: 172. 1879, not (Wallich ex Candolle) Schultz Bipontinus (1866); *E. urticifolium* Linnaeus f. var. *clematideum* Hieronymus ex Kuntze; *E. catarium* Veldkamp.

Subshrubs or annual herbs, to 0.6 m tall. Stems erect or ascending, bright green, simple or poorly branched at base, leafy throughout except at base, pubescent throughout, hairs simple, eglandular. Leaves opposite, rank-smelling; petiole 3–7 mm; blade ovate, 20–35 × 12–25 mm, pubescent below, hairs long, simple, eglandular along venation, stipitate glandular and gland-dotted between veins, base attenuate, margin coarsely serrate, apex acute. Synflorescence terminal, corymbose, capitula pedunculate; peduncles 4–7 mm, pubescent; involucre narrowly campanulate, 4–5 mm in diam.; phyllaries 2- or 3-seriate, with scattered short simple eglandular hairs at base, glabrous apically, margin ciliate, apex long attenuate; receptacle conical, epaleate. Florets 35–40; corollas bright lilac-blue, ca. 4.5 mm; corolla lobes long papillose on inner surface, usually glabrous outside or with few simple eglandular hairs; anther appendages longer than wide, apex acute; style base not swollen, glabrous, bright lilac-blue; style branches coarsely papillose. Achenes 2–2.5 mm, 3–5-ribbed, ribs pale, setuliferous or glabrous, body black, with scattered setulae; pappus setae 3.5–4.5 mm, coarsely barbellate, off-white. Fl. and fr. often year-round.

Introduced and becoming naturalized in Guangdong and Taiwan [widespread in South America, becoming weedy in many cultivated areas; introduced and becoming naturalized in E Asia and N Australia].

244. CHROMOLAENA Candolle, Prodr. 5: 133. 1836.

飞机草属 fei ji cao shu

Osmia Schultz Bipontinus.

Subshrubs, shrubs, or perennial herbs, erect to somewhat scandent. Leaves usually opposite; blade mostly ovate or triangular to elliptic, sometimes linear, subentire to lobed. Synflorescences usually thyrsoid to candelabriform or with lax to densely corymbose branches, rarely of solitary capitula on long erect peduncles. Phyllaries 18–65, 4–6-seriate, markedly unequal, gradate, often with expanded herbaceous or colored tips; receptacle flat to slightly convex, glabrous, sometimes paleaceous. Florets 6–75; corollas white, blue, lavender, or purple, rather cylindric with scarcely narrower base, outer surface smooth below lobes, with few to many shortly stalked glands, often with rather stiff hairs; lobes slightly to distinctly longer than wide; usually densely papillose on inner surface, or smooth (*Chromolaena* subg. *Osmiella* R. M. King & H. Robinson); antheropodia usually broader below, narrowed apically, or not broadened below (*C.* subg. *Osmiella*); anther appendages large, oblong, ca. 1.5 × as long as wide, entire or crenulate at tip; style base not enlarged; style branches narrowly linear to slightly broadened distally, slightly mammillate to densely long papillose. Achenes prismatic, (3–)5-ribbed, with setulae mostly on ribs; carpopodium distinct, broadly cylindric or narrowed below; pappus setae ca. 40, slender, persistent, not or scarcely broadened distally. $x = 10, 16$.

About 165 species: New World tropics and subtropics, one species a pantropical weed; one species (introduced) in China.

King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987) noted two subgenera and provided characters in their generic description to separate species of *Chromolaena* subg. *Osmiella*. Concern is growing in many tropical countries over the alarming spread of the weed *Chromolaena odorata* (e.g., C. Zachariades et al., Proc. 5th Int. Workshop Biol. Control Managem. *Chromolaena odorata*. 2002). The taxonomy and distribution of this species has been well documented by L. Gautier (Candollea 47: 645–662. 1992).

1. Chromolaena odorata (Linnaeus) R. M. King & H. Robinson, Phytologia 20: 204. 1970.

飞机草 fei ji cao

Eupatorium odoratum Linnaeus, Syst. Nat., ed. 10, 2: 1205. 1759.

Herbs, perennial. Rhizomes robust, procumbent. Stems erect, 1–3 m tall, striate; branches robust, often opposite, spreading and horizontal, rarely alternate forming an acute angle with stem; stems and branches densely fulvous tomentose or shortly pubescent. Leaves opposite; petiole 1–2 cm; blade abaxially pale, adaxially green, ovate, triangular, or ovate-triangular, 4–10 × 1.5–5 cm, rather thick, both surfaces scabrid, villous with red-brown glands, abaxially and on veins more densely so, basally 3-veined, lateral veins fine, abaxially slightly raised, base truncate or shallowly cordate, margin sparsely coarsely and irregularly crenate or entire, or serrate on one side, or with one coarse tooth or 3-fid on each side, apex acute; leaves below synflorescence small, often entire. Synflorescence of numerous or few capitula in corymbs or compound corymbs; peduncle thick, densely shortly pubescent. Capitula ca. 20-flowered; involucre cylindric, ca. 10 × 4–5 mm; phyllaries 3- or 4-seriate, imbricate, outer phyllaries ovate, ca. 2 mm, puberulent, apex obtuse, median and inner phyllaries straw-colored, oblong, 7–8 mm, broadly 3-veined, eglandular, apex acuminate; corollas white or pink, ca. 5 mm. Achenes black-brown, ca. 4 mm, 5-ribbed, eglandular, sparsely white adpressed setuliferous along ribs. Fl. and fr. Apr–Dec. $2n = 58, 60$.

Forest margins, roadsides, open disturbed land. Introduced in Hainan during World War II; naturalized in Fujian, Hainan, and Yunnan [native to Mexico; widely naturalized in tropical Asia].

Chromolaena odorata is a competitive and pernicious weed.

245. CONOCLINIUM Candolle, Prodr. 5: 135. 1836.

锥托泽兰属 zhui tuo ze lan shu

Herbs, perennial, erect, rhizomatous. Leaves opposite; blade ovate to deltate-ovate, crenate to bipinnatifid. Synflorescence laxly cymose below, with densely cymose branches. Phyllaries 2- or 3-seriate, ca. 25, distant, mostly subequal, lanceolate; receptacle highly conical, glabrous or rarely pubescent. Florets 50–70; corollas blue or white, narrowly funnelform, with glands on outer surface; basal tube not constricted above nectary; lobes slightly longer than wide, outer surface papillose in distal half, inner surface with short bulging cells, mammillate to shortly papillose; antheropodia cylindric, often narrow; anther appendages ovate to ± quadrate, as long as wide; style base not enlarged, glabrous; style branches narrowly linear to filiform, slightly broadened distally, densely papillose. Achenes prismatic, 5-ribbed, glabrous or with a few scattered glands, rarely setuliferous above; carpopodium usually obsolete, rarely distinct and asymmetrical; pappus setae uniseriate, ca. 30, barbellate, persistent, often with slightly to distinctly enlarged tips, apical cells obtuse to rounded. $x = 10$.

Four species: United States and Mexico, one species often cultivated and sometimes escaped; one species (introduced) in China.

1. Conoclinium coelestinum (Linnaeus) Candolle, Prodr. 5: 135. 1836.

锥托泽兰 zhui tuo ze lan

Eupatorium coelestinum Linnaeus, Sp. Pl. 2: 838. 1753.

Herbs, perennial, 0.3–2 m. Stems usually erect, sometimes decumbent or procumbent and rooting at nodes. Leaves oppo-

site, petiolate; leaf blade triangular to deltate or ovate, 2–7(–13) × 1.5–3 cm, base usually cuneate to truncate, rarely subcordate, margin serrate to serrate-dentate or crenate, apex acute. Phyllaries 3.5–4 mm; corollas blue to blue-violet or rosy violet, (1.6–)2–2.5 mm. Achenes 1–1.5 mm, glabrous; pappus setae not dilated at apices. Fl. and fr. Aug–Oct.

Cultivated and escaped, now growing in wet areas on slopes and roadsides. Guizhou, Yunnan [native to United States].

GENERA INCERTAE SEDIS

246. CAVEA W. W. Smith & J. Small, Trans. & Proc. Bot. Soc. Edinburgh 27: 119. 1917.

亭菊属 ting ju shu

Chen Yousheng (陈又生); Arne A. Anderberg

Herbs, perennial. Rhizome stout and branched, usually growing in a large clone. Stems erect, simple, solitary or clustered. Leaves oblanceolate, mostly basal with distinct petioles, cauline ones ± sessile, alternate. Capitula solitary, broadly campanulate, disciform with numerous marginal female florets and disk male florets or discoid and plants monoecious or dioecious. Involucres in several series, herbaceous, outermost series largest. Receptacle slightly convex or flat, foveolate, epaleate. Functionally male florets usually in center, 20–30 in number; corollas tubular-campanulate, deeply 5-lobed, lobes reflexed; style undivided, conic at apex; pappus of one series. Female florets numerous (sometimes totally female florets in a head or in all capitula of one plant); corolla tubular, shallowly 4-toothed; style 2-branched, branches linear, rounded at apex. Achenes oblong or narrowly obovoid. Pappus of 2 series, barbellate bristles, persistent, numerous on female florets, sparse and shorter on male florets.

One species: Himalaya, including China.

The original description of this genus is somewhat inaccurate. Smith, in the protologue, noted that the pappus is in one series; however, only the pappus in male florets is uniseriate, while those in female florets are biseriate and longer, and all pappus bristles are persistent. Smith described the receptacle as paleate, but the receptacle is, in fact, epaleate.

Cavea was originally separated from the genus *Saussurea*. It has been associated with the Inuleae in the older literature, but Merxmüller et al. (in Heywood et al., Biol. Chem. Compos. 1: 579. 1977) excluded it from that tribe because of its aberrant pollen-wall morphology. Anderberg considered it might be a relative of *Saussurea* in the Cardueae. Jeffrey (in Kadereit & C. Jeffrey, Fam. Gen. Vasc. Pl. 8: 146. 2007) considered it to be a Carduoid genus of uncertain placement, but he also noted that *Cavea* may prove to belong elsewhere in Asteraceae.

1. Cavea tanguensis (J. R. Drummond) W. W. Smith & J. Small, Trans. & Proc. Bot. Soc. Edinburgh 27: 120. 1917.

亭菊 ting ju

Saussurea tanguensis J. R. Drummond, Bull. Misc. Inform. Kew 1910: 78. 1910.

Herbs, perennial. Rhizome woody, stout, usually branched, 10–30 cm, caespitose with rosette of sterile leaves and flowering stems. Stems stout, 5–25 cm tall, many leaved or sparsely leaved, somewhat scapelike, brownish glandular. Leaves in lower parts subleathery, or ± fleshy, spatulate-oblong, 15–60(–120) × 5–10 mm, abaxially densely glandular pubescent or subglabrous, base attenuate, margin remotely denticulate, apex obtuse or obtuse-acuminate; cauline leaves ovate-lanceolate to oblong-spatulate, 30–60 × 5–12 mm, slightly fleshy, margin sparsely serrate, apex obtuse; upper cauline leaves like bracts, ovate-lanceolate, no more than 15 mm, subverticillate at top and ± closely embracing capitulum. Capitula solitary, terminal, widely hemispheric, (2–)3–3.5 cm in diam. Involucre 1.5–2 cm; phyllaries in 4 or 5 series, leaflike, linear-oblong or obovate-lanceolate, nearly as long as florets, margin covered with moderately sparse glandular hairs, apex obtuse or acute. Florets 100–200 in number, very slender. Male florets tubular-campanulate, 5-lobed, limb ca. 4.5 mm, lobes ca. 4 mm; stigma undivided; pappus of 1 series, ca. 5 mm; sterile achenes ca. 11 mm, glabrous. Female florets purplish, tubular, densely white hispid, limb ca. 7 mm, lobes ca. 0.2 mm; stigma 2-lobed, lobes exserted in corolla tube; pappus ca. 7.5 mm. Achenes 5–6 mm, densely sericeous. Pappus nitid purple, as long as corolla, persistent, of 2 series of ca. 50 scabrid subequal bristles. Fl. Jul–Aug, fr. Sep–Oct.

Gravelly ground near streams and glaciers; 4000–5100 m. SW Sichuan, Xizang [Bhutan, India (Sikkim)].

247. CENTIPEDA Loureiro, Fl. Cochinch. 2: 492. 1790.

石胡荽属 shi hu sui shu

Shi Zhu (石铸 Shih Chu); Michael G. Gilbert

Myriogyne Lessing.

Annual or perennial herbs. Leaves alternate, entire or coarsely toothed. Capitula apparently axillary, solitary or in monochasial cymes, sometimes grouped into racemelike synflorescence, sessile or shortly pedunculate, heterogamous and discoid. Involucre small, hemispheric; phyllaries in 1 or 2 series, subequal, herbaceous, margins scarious. Receptacle flat or convex, naked. Marginal florets female, in several rows, fertile; corolla minute, tubular, obscurely 3-lobed, creamy white, pale yellow, green, or purplish. Disk florets few, bisexual; corolla campanulate, 4-lobed, similar in color, glabrous. Anthers obtuse at base. Style branches of disk florets short, truncate. Achenes scarcely compressed, obtusely 3- or 4-ribbed or -angled; corona absent.

Ten species: all species in Australia and New Zealand, one species extending to South America, one species extending to Papua New Guinea, and one weedy species extending to Asia and the Pacific Islands, including China.

Centipeda superficially resembles *Cotula* in the Anthemideae, where it was placed in the treatment in FRPS (76(1): 132–133. 1983), but it differs in the synflorescence and in the tubular corollas of the female florets. K. Bremer and Humphries (Bull. Nat. Hist. Mus. London, Bot. 23: 161.

1993) suggested that it be placed in the Astereae, whereas N. G. Walsh (Muelleria 15: 33. 2001), in his revision of the genus, suggested that it might belong to the Astereae or Gnaphalieae. Panero (in Kadereit & C. Jeffrey, Fam. Gen. Vasc. Pl. 8: 399. 2007) placed it in its own subtribe within the Athroismeae on the basis of molecular data.

1. Centipeda minima (Linnaeus) A. Braun & Ascherson, Index Sem. Hort. Berol. App. 6. 1867.

石胡荽 shi hu sui

Artemisia minima Linnaeus, Sp. Pl. 2: 849. 1753; *A. orbicularis* (Loureiro) Roxburgh; *A. sternutatoria* Roxburgh; *Centipeda minima* var. *lanuginosa* (Candolle) Domin; *C. minuta* (G. Forster) Bentham ex C. B. Clarke; *C. orbicularis* Loureiro; *C. orbicularis* var. *lanuginosa* (Candolle) F. M. Bailey; *Cotula minima* (Linnaeus) Willdenow; *C. minuta* G. Forster; *C. sternutatoria* (Roxburgh) Wallich ex Candolle; *Dichrocephala minima* (Linnaeus) Bojer; *Grangea minuta* (G. Forster) Poiret; *Myriogyne minima* (Linnaeus) Lessing ex Seemann; *M. minuta* (G. Forster) Lessing; *M. minuta* var. *lanuginosa* Candolle; *Sphaeromorphaea centipeda* Candolle, nom. illeg. superfl.; *S. russelliana* Candolle var. *glabrata* Candolle.

Prostrate or ascending, slender, leafy herb, sparsely lanate to subglabrous, usually with a mixture of white cottony and coarser multicellular hairs. Branches many, spreading from root, 8–20 cm. Leaf blade oblong-obovate to spatulate, 3–12(–27) × 1.5–4(–11) mm, glabrescent to moderately cottony, margins with a few, coarse teeth. Capitula leaf-opposed or apparently axillary, solitary, sessile or subsessile, rounded, 1.5–2.5(–5) mm in diam. Phyllaries obovate, ca. 1 mm, margins membranous, erose. Female corollas 0.2–0.4 mm. Bisexual florets 8–14, often purplish. Achenes narrowly cuneate, 0.6–1 mm, tipped with persistent style, angles 4 or 5, with short, ascending bristles, continued virtually to truncate apex; faces often each with a line of sessile glands.

Disturbed habitats; below 1500(–2500) m. Anhui, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [India, Indonesia, Japan, Papua New Guinea, Philippines, Russia, Thailand; Australia, Pacific islands (Fiji, New Zealand, Samoa)].

The Chinese material belongs to *Centipeda minima* subsp. *minima*. The second subspecies, *C. minima* subsp. *macrocephala* N. G. Wilson, is restricted to Australia.

Centipeda minima is widely used in traditional medicine.

248. SYMPHYLLOCARPUS Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 151. 1859.

含苞草属 han bao cao shu

Chen Yousheng (陈又生); Arne A. Anderberg

Capitula 3–4.5(–6) mm in diam., heterogamous, globose, sessile, compactly congested in 2s–4s in bifurcations of stem and its branches. Involucre distichous; phyllaries of various forms, lanceolate, oval, rhomboidal, or obovate, membranous, margin transparent, with fine denticles, apex acute. Receptacle flat with paleae. External florets multiseriate, female, carpogenous, tubular; corolla filiform, irregular, sometimes subregular, tridentate, more rarely bidentate, sometimes 4-dentate; ovary adnate to neighboring palea of receptacle almost to half of its length, without pappus, stigma bipartite; marginal female florets minutely radiate with tridentate or bidentate corolla. Central florets 6–20, bisexual, carpogenous, tubular; corolla campanulate, regular, 4-dentate; anthers with very short entire appendages at base; ovary oblong, adnate to 2 neighboring membranes or to 1 membrane of receptacle, more rarely not adnate. Achenes finely terete, smooth, with fine orbicular glands and sparse long glandular hairs, forked at ends. Pappus absent.

One species: China, Russia.

Symphyllocarpus has been associated with the Inuleae in the older literature, but it is unlikely to be a member of that tribe and is currently of unknown placement (Jeffrey in Kadereit & C. Jeffrey, Fam. Gen. Vasc. Pl. 8: 574. 2007).

1. Symphyllocarpus exilis Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 151. 1859.

含苞草 han bao cao

Herbs, annual, to 8(–20) cm tall, in habit analogous to *Centipeda*, glabrous; roots thin, fusiform; stems erect, sulcate, shortly forkedly branching above, branches arcuate-spreading. Leaves alternate, sessile, falsely opposite in bifurcations of stems or gathered in 4s, lanceolate, 12–15(–45) × 3–4(–6) mm, glabrous, with 1–3(–7) denticles in upper portion, base attenuate; upper and bract leaves linear, entire or toothed. Capitula sessile, congested in 2s–4s in bifurcations of stem and its branches, 3–4.5(–6) mm in diam., polyanthous, heterogamous, globose. Involucre distichous; phyllaries of various forms, lanceolate, rhomboidal, oval, or obovate, 1.5–2.5 × ca. 0.5 mm, membranous, glabrous, greenish in center, transparent at margin with fine denticles, apex acuminate. Receptacle flat with paleae lanceolate or ovate, adnate to ovaries of female florets almost up to half of their length, free above, slightly spreading, acuminate with fine denticles at apex, almost reaching apex of corolla in length. External florets multiseriate, female, carpogenous, light yellow, tubular; corolla 0.3–0.6 mm, filiform, irregular, sometimes subregular, mainly tridentate, more rarely bidentate, sometimes 4-dentate; style ca. 0.8 mm, filiform; stigma bipartite with short lobes, ca. 0.16 mm, upright, bluntly linear, ca. 0.06 mm wide, glabrous, slightly divergent; ovary terete, 0.5–1 × ca. 0.2 mm, stalked at base, adnate to nearest palea of receptacle almost up to middle of its length, with fine globose glands and with glandular, sparse, long, horizontally spreading hairs, ovary with upright glandular hairs at apex;

pappus absent; marginal female florets minutely radiate, with tridentate or bidentate corolla. Central florets 6–20, bisexual, carpogenous, tubular; corolla campanulate, ca. 0.5 mm, with 4-dentate limb. Style slightly prominent from corolla tube, flat; stigma bipartite, with short lobes, ± linear, ca. 0.12 × 0.08 mm, flattened blunt, with mammillae. Stamens 4, attached to middle of corolla tube; anthers connate into tube, surrounding style, fine, subglobose, ca. 0.25 × 0.12 mm, subtruncate above, basally with very short entire appendages, not united in pairs; filaments ca. 0.25 mm, flat, glabrous. Ovary oblong, ca. 0.5 × 0.2 mm, adnate to 2 touching paleae or to 1 palea of receptacle, more rarely not adnate, with sparse pubescence of glandular hairs. Achenes 0.5–1 mm, terete, smooth, crowned with remaining corolla, with very fine globose glands and sparse elongated glandular hairs, forked at ends and horizontally spreading, with upright hairs adaxially; marginal achenes slightly recurved, middle erect. Fl. Jul–Aug.

Silty, flooded, and sandy riverbanks or silty shallows of rivers. Heilongjiang, Jilin [Russia].

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Arecaceae	棕榈科	**23**	13(1)
Aristolochiaceae	马兜铃科	**5**	24
Asclepiadaceae	萝藦科	**16**	63
Aspleniaceae	铁角蕨科	2	4(2)
Asteraceae	菊科	**20–21**	74–80
Athyriaceae	蹄盖蕨科	2	3(2)
Aucubaceae	桃叶珊瑚科	**14**	56
Azollaceae	满江红科	3	6(2)
Balanophoraceae	蛇菰科	**5**	24
Balsaminaceae	凤仙花科	**12**	47(2)
Basellaceae	落葵科	**5**	26
Begoniaceae	秋海棠科	**13**	52(1)
Berberidaceae	小檗科	**19**	29
Betulaceae	桦木科	**4**	21
Biebersteiniaceae	熏倒牛科	**11**	43(1)
Bignoniaceae	紫葳科	**18**	69
Bixaceae	红木科	**13**	50(2)
Blechnaceae	乌毛蕨科	2	4(2)
Bolbitidaceae	实蕨科	3	6(1)
Bombacaceae	木棉科	**12**	49(2)
Boraginaceae	紫草科	**16**	64(2)
Botrychiaceae	阴地蕨科	2	2
Brassicaceae	十字花科	**8**	33
Bretschneideraceae	伯乐树科	**8**	34(1)
Bromeliaceae	凤梨科	**24**	13(3)
Burmanniaceae	水玉簪科	**23**	16(2)
Burseraceae	橄榄科	**11**	43(3)
Butomaceae	花蔺科	**23**	8
Buxaceae	黄杨科	**11**	45(1)
Cabombaceae	莼菜科	**6**	27
Cactaceae	仙人掌科	**13**	52(1)
Callitrichaceae	水马齿科	**11**	45(1)
Calycanthaceae	蜡梅科	**7**	30(2)
Campanulaceae	桔梗科	**19**	73(2)
Cannabaceae	大麻科	**5**	23(1)
Cannaceae	美人蕉科	**24**	16(2)
Capparaceae	山柑科	**7**	32
Caprifoliaceae	忍冬科	**19**	72
Cardiopteridaceae	心翼果科	**11**	46
Caricaceae	番木瓜科	**13**	52(1)
Carlemanniaceae	香茜科	**19**	71(1)
Caryophyllaceae	石竹科	**6**	26
Casuarinaceae	木麻黄科	**4**	20(1)
Celastraceae	卫矛科	**11**	45(3), 46
Centrolepidaceae	刺鳞草科	**24**	13(3)
Cephalotaxaceae	三尖杉科	**4**	7
Ceratophyllaceae	金鱼藻科	**6**	27
Cercidiphyllaceae	连香树科	**6**	27
Cheiropleuriaceae	燕尾蕨科	3	6(2)
Chenopodiaceae	藜科	**5**	25(2)
Chloranthaceae	金粟兰科	**4**	20(1)
Christenseniaceae	天星蕨科	2	2
Circaeasteraceae	星叶草科	**6**	28
Cistaceae	半日花科	**13**	50(2)
Cleomaceae	白花菜科	**7**	32
Clethraceae	桤叶树科	**14**	56
Clusiaceae	藤黄科	**13**	50(2)
Cneoraceae	牛筋果科	**11**	43(3)
Combretaceae	使君子科	**13**	53(1)
Commelinaceae	鸭跖草科	**24**	13(3)
Connaraceae	牛栓藤科	**9**	38
Convolvulaceae	旋花科	**16**	64(1)
Coriariaceae	马桑科	**11**	45(1)
Cornaceae	山茱萸科	**14**	56
Corsiaceae	白玉簪科	**23**	–
Costaceae	闭鞘姜科	**24**	16(2)
Crassulaceae	景天科	**8**	34(1)
Crypteroniaceae	隐翼科	**13**	52(2)
Cucurbitaceae	葫芦科	**19**	73(1)
Cupressaceae	柏科	**4**	7
Cyatheaceae	桫椤科	2	6(3)
Cycadaceae	苏铁科	**4**	7
Cymodoceaceae	丝粉藻科	**23**	8
Cynomoriaceae	锁阳科	**13**	53(2)
Cyperaceae	莎草科	**23**	11, 12

Family	中名	FOC vol.	FRPS vol.
Daphniphyllaceae	交让木科	**11**	45(1)
Davalliaceae	骨碎补科	3	2, 6(1)
Dennstaedtiaceae	碗蕨科	2	2
Diapensiaceae	岩梅科	**14**	56
Dichapetalaceae	毒鼠子科	**11**	43(3)
Dicksoniaceae	蚌壳蕨科	2	2
Diervillaceae	锦带花科	**19**	72
Dilleniaceae	五桠果科	**12**	49(2)
Dioscoreaceae	薯蓣科	**24**	16(1)
Dipentodontaceae	十齿花科	**11**	45(3)
Dipsacaceae	川续断科	**19**	73(1)
Dipteridaceae	双扇蕨科	3	6(2)
Dipterocarpaceae	龙脑香科	**13**	50(2)
Droseraceae	茅膏菜科	**8**	34(1)
Drynariaceae	槲蕨科	3	6(2)
Dryopteridaceae	鳞毛蕨科	3	5(1, 2)
Ebenaceae	柿科	**15**	60(1)
Elaeagnaceae	胡颓子科	**13**	52(2)
Elaeocarpaceae	杜英科	**12**	49(1)
Elaphoglossaceae	舌蕨科	3	6(1)
Elatinaceae	沟繁缕科	**13**	50(2)
Ephedraceae	麻黄科	**4**	7
Equisetaceae	木贼科	2	6(3)
Ericaceae	杜鹃花科	**14**	56, 57(1–3)
Eriocaulaceae	谷精草科	**24**	13(3)
Erythroxylaceae	古柯科	**11**	43(1)
Eucommiaceae	杜仲科	**9**	35(2)
Euphorbiaceae	大戟科	**11**	44(1–3)
Eupteleaceae	领春木科	**6**	27
Fabaceae	豆科	**10**	39–42
Fagaceae	壳斗科	**4**	22
Flacourtiaceae	大风子科	**13**	52(1)
Flagellariaceae	须叶藤科	**24**	13(3)
Frankeniaceae	瓣鳞花科	**13**	50(2)
Gentianaceae	龙胆科	**16**	62
Geraniaceae	牻牛儿苗科	**11**	43(1)
Gesneriaceae	苦苣苔科	**18**	69
Ginkgoaceae	银杏科	**4**	7
Gleicheniaceae	里白科	2	2
Gnetaceae	买麻藤科	**4**	7
Goodeniaceae	草海桐科	**19**	73(2)
Grammitidaceae	禾叶蕨科	3	6(2)
Gymnogrammitidaceae	雨蕨科	3	6(1)
Haloragaceae	小二仙草科	**13**	53(2)
Hamamelidaceae	金缕梅科	**9**	35(2)
Helminthostachyaceae	七指蕨科	2	2
Helwingiaceae	青荚叶科	**14**	56
Hemionitidaceae	裸子蕨科	2	3(1)
Hernandiaceae	莲叶桐科	**7**	31
Hippocastanaceae	七叶树科	**12**	46
Hippuridaceae	杉叶藻科	**13**	53(2)
Huperziaceae	石杉科	2	6(3)
Hydrocharitaceae	水鳖科	**23**	8
Hydrophyllaceae	田基麻科	**16**	64(1)
Hymenophyllaceae	膜蕨科	2	2
Hypodematiaceae	肿足蕨科	2	4(1)
Hypolepidaceae	姬蕨科	2	2
Icacinaceae	茶茱萸科	**11**	46
Illiciaceae	八角科	**7**	30(1)
Iridaceae	鸢尾科	**24**	16(1)
Isoetaceae	水韭科	2	6(3)
Juglandaceae	胡桃科	**4**	21
Juncaceae	灯心草科	**24**	13(3)
Juncaginaceae	水麦冬科	**23**	8
Lamiaceae	唇形科	**17**	65(2), 66
Lardizabalaceae	木通科	**6**	29
Lauraceae	樟科	**7**	31
Lecythidaceae	玉蕊科	**13**	52(2)
Leeaceae	火筒树科	**12**	48(2)
Lemnaceae	浮萍科	**23**	13(2)
Lentibulariaceae	狸藻科	**19**	69
Liliaceae	百合科	**24**	14, 15
Linaceae	亚麻科	**11**	43(1)
Lindsaeaceae	鳞始蕨科	2	2
Linnaeaceae	北极花科	**19**	72
Loganiaceae	马钱科	**15**	61
Lomariopsidaceae	藤蕨科	3	6(1)
Loranthaceae	桑寄生科	**5**	24
Lowiaceae	兰花蕉科	**24**	16(2)
Loxogrammaceae	剑蕨科	3	6(2)
Lycopodiaceae	石松科	2	6(3)
Lygodiaceae	海金沙科	2	2
Lythraceae	千屈菜科	**13**	52(2)
Magnoliaceae	木兰科	**7**	30(1)
Malpighiaceae	金虎尾科	**11**	43(3)
Malvaceae	锦葵科	**12**	49(2)
Marantaceae	竹芋科	**24**	16(2)
Marattiaceae	合囊蕨科	2	6(3)
Marsileaceae	苹科	3	6(2)
Martyniaceae	角胡麻科	**18**	69
Mastixiaceae	单室茱萸科	**14**	56
Melastomataceae	野牡丹科	**13**	53(1)
Meliaceae	楝科	**11**	43(3)
Menispermaceae	防己科	**7**	30(1)
Menyanthaceae	睡菜科	**16**	62
Molluginaceae	粟米草科	**5**	26
Monachosoraceae	稀子蕨科	2	2
Moraceae	桑科	**5**	23(1)
Morinaceae	刺参科	**19**	73(1)
Moringaceae	辣木科	**8**	34(1)

Family	中名	FOC vol.	FRPS vol.
Musaceae	芭蕉科	**24**	16(2)
Myoporaceae	苦槛蓝科	**19**	70
Myricaceae	杨梅科	**4**	21
Myristicaceae	肉豆蔻科	**7**	30(2)
Myrsinaceae	紫金牛科	**15**	58
Myrtaceae	桃金娘科	**13**	53(1)
Nelumbonaceae	莲科	**6**	27
Nepenthaceae	猪笼草科	**8**	34(1)
Nephrolepidaceae	肾蕨科	3	6(1)
Nitrariaceae	白刺科	**11**	43(1)
Nyctaginaceae	紫茉莉科	**5**	26
Nymphaeaceae	睡莲科	**6**	27
Nyssaceae	蓝果树科	**13**	52(2)
Ochnaceae	金莲木科	**12**	49(2)
Olacaceae	铁青树科	**5**	24
Oleaceae	木犀科	**15**	61
Oleandraceae	条蕨科	3	2, 6(1)
Onagraceae	柳叶菜科	**13**	53(2)
Onocleaceae	球子蕨科	2	4(2)
Ophioglossaceae	瓶尔小草科	2	2
Opiliaceae	山柚子科	**5**	24
Orchidaceae	兰科	**25**	17–19
Orobanchaceae	列当科	**18**	69
Osmundaceae	紫萁科	2	2
Oxalidaceae	酢浆草科	**11**	43(1)
Paeoniaceae	芍药科	**6**	27
Pandaceae	小盘木科	**11**	43(1)
Pandanaceae	露兜树科	**23**	8
Papaveraceae	罂粟科	**7**	32
Parkeriaceae	水蕨科	2	3(1)
Passifloraceae	西番莲科	**13**	52(1)
Pedaliaceae	胡麻科	**18**	69
Peganaceae	骆驼蓬科	**11**	43(1)
Pentaphragmataceae	五膜草科	**19**	73(2)
Pentaphylacaceae	五列木科	**12**	45(1)
Peranemaceae	球盖蕨科	2	4(2)
Philydraceae	田葱科	**24**	13(3)
Phrymaceae	透骨草科	**19**	70
Phytolaccaceae	商陆科	**5**	26
Pinaceae	松科	**4**	7
Piperaceae	胡椒科	**4**	20(1)
Pittosporaceae	海桐花科	**9**	35(2)
Plagiogyriaceae	瘤足蕨科	2	2
Plagiopteraceae	斜翼科	**11**	–
Plantaginaceae	车前科	**19**	70
Platanaceae	悬铃木科	**9**	35(2)
Platyceriaceae	鹿角蕨科	3	6(2)
Pleurosoriopsidaceae	睫毛蕨科	2	4(2)
Plumbaginaceae	白花丹科	**15**	60(1)
Poaceae	禾本科	**22**	9, 10
Podocarpaceae	罗汉松科	**4**	7
Podostemaceae	川藻草科	**5**	24
Polemoniaceae	花荵科	**16**	64(1)
Polygalaceae	远志科	**11**	43(3)
Polygonaceae	蓼科	**5**	25(1)
Polypodiaceae	水龙骨科	3	6(2)
Pontederiaceae	雨久花科	**24**	13(3)
Portulacaceae	马齿苋科	**5**	26
Posidoniaceae	波喜荡草科	**23**	8
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Primulaceae	报春花科	**15**	59(1, 2)
Proteaceae	山龙眼科	**5**	24
Psilotaceae	松叶蕨科	2	6(3)
Pteridaceae	凤尾蕨科	2	3(1)
Pteridiaceae	蕨科	2	3(1)
Rafflesiaceae	大花草科	**5**	24
Ranunculaceae	毛茛科	**6**	27, 28
Resedaceae	木犀草科	**8**	34(1)
Restionaceae	帚灯草科	**24**	13(3)
Rhamnaceae	鼠李科	**12**	48(1)
Rhizophoraceae	红树科	**13**	52(2)
Rhoipteleaceae	马尾树科	**5**	22
Rosaceae	蔷薇科	**9**	36–38
Rubiaceae	茜草科	**19**	53(2),71(1,2)
Ruppiaceae	川蔓藻科	**23**	8
Rutaceae	芸香科	**11**	43(2)
Sabiaceae	清风藤科	**12**	47(1)
Salicaceae	杨柳科	**4**	20(2)
Salvadoraceae	刺茉莉科	**11**	46
Salviniaceae	槐叶苹科	3	6(2)
Santalaceae	檀香科	**5**	24
Sapindaceae	无患子科	**12**	47(1)
Sapotaceae	山榄科	**15**	60(1)
Saururaceae	三白草科	**4**	20(1)
Saxifragaceae	虎耳草科	**8**	34(2), 35(1)
Scheuchzeriaceae	冰沼草科	**23**	8
Schisandraceae	五味子科	**7**	30(1)
Schizaeaceae	莎草蕨科	2	2
Sciadopityaceae	金松科	**4**	7
Scrophulariaceae	玄参科	**18**	67(2), 68
Selaginellaceae	卷柏科	2	6(3)
Simaroubaceae	苦木科	**11**	43(3)
Sinopteridaceae	中国蕨科	2	3(1)
Sladeniaceae	肋果茶科	**12**	49(2)
Solanaceae	茄科	**17**	67(1)
Sphenocleaceae	尖瓣花科	**19**	73(2)
Stachyuraceae	旌节花科	**13**	52(1)
Staphyleaceae	省沽油科	**11**	46
Stemonaceae	百部科	**24**	13(3)
Stenochlaenaceae	光叶藤蕨科	2	3(1)
Sterculiaceae	梧桐科	**12**	49(2)
Stylidiaceae	花柱草科	**19**	73(2)
Styracaceae	安息香科	**15**	60(2)

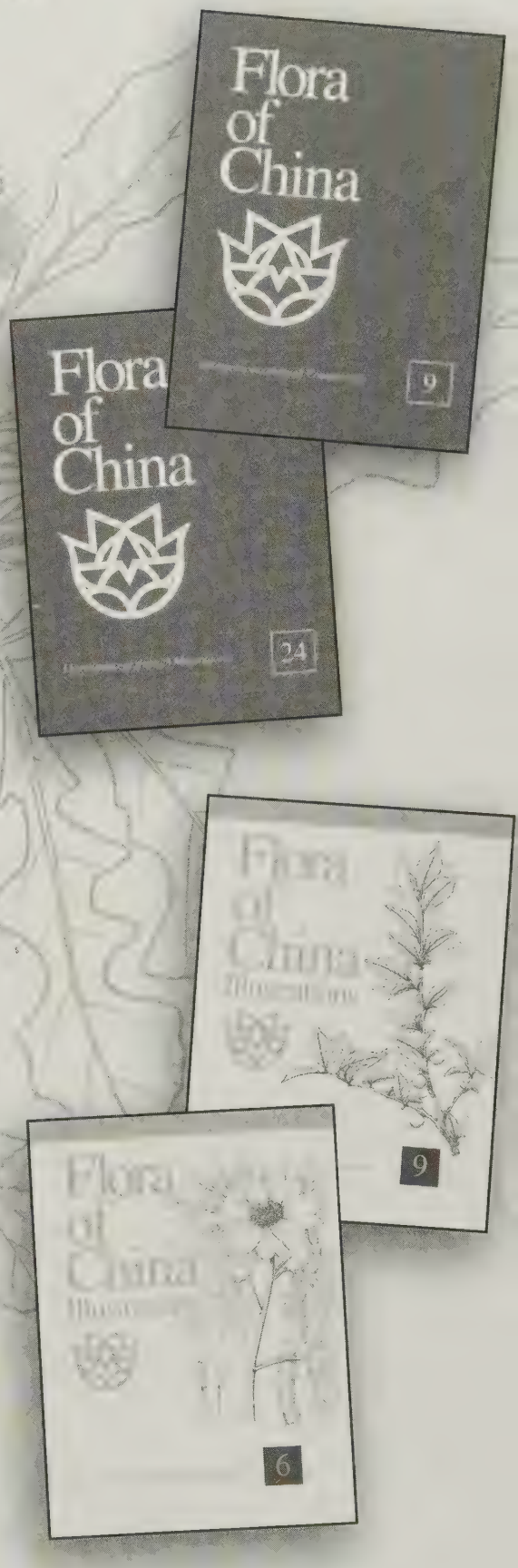
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Surianaceae	海人树科	**11**	43(3)
Symplocaceae	山矾科	**15**	60(2)
Taccaceae	蒟蒻薯科	**24**	16(1)
Taenitidaceae	竹叶蕨科	2	2
Tamaricaceae	柽柳科	**13**	50(2)
Tapisciaceae	瘿椒树科	**11**	46
Taxaceae	红豆杉科	**4**	7
Taxodiaceae	杉科	**4**	7
Tectariaceae	三叉蕨科	3	6(1)
Tetracentraceae	水青树科	**6**	1
Tetramelaceae	四数木科	**13**	52(1)
Theaceae	山茶科	**12**	49(3), 50(1)
Thelypteridaceae	金星蕨科	2	4(1)
Thymelaeaceae	瑞香科	**13**	52(1)
Tiliaceae	椴树科	**12**	49(1)
Torricelliaceae	鞘柄木科	**14**	56
Trapaceae	菱科	**13**	53(2)
Triuridaceae	霉草科	**23**	8
Trochodendraceae	昆栏树科	**6**	27
Tropaeolaceae	旱金莲科	**11**	43(1)
Typhaceae	香蒲科	**23**	8
Ulmaceae	榆科	**5**	22
Urticaceae	荨麻科	**5**	23(2)
Valerianaceae	败酱科	**19**	73(1)
Verbenaceae	马鞭草科	**17**	65(1)
Violaceae	堇菜科	**13**	51
Viscaceae	槲寄生科	**5**	24
Vitaceae	葡萄科	**12**	48(2)
Vittariaceae	书带蕨科	2	3(2)
Woodsiaceae	岩蕨科	2	4(2)
Xyridaceae	黄眼草科	**24**	13(3)
Zannichelliaceae	角果藻科	**23**	8
Zingiberaceae	姜科	**24**	16(2)
Zosteraceae	大叶藻科	**23**	8
Zygophyllaceae	蒺藜科	**11**	43(1)

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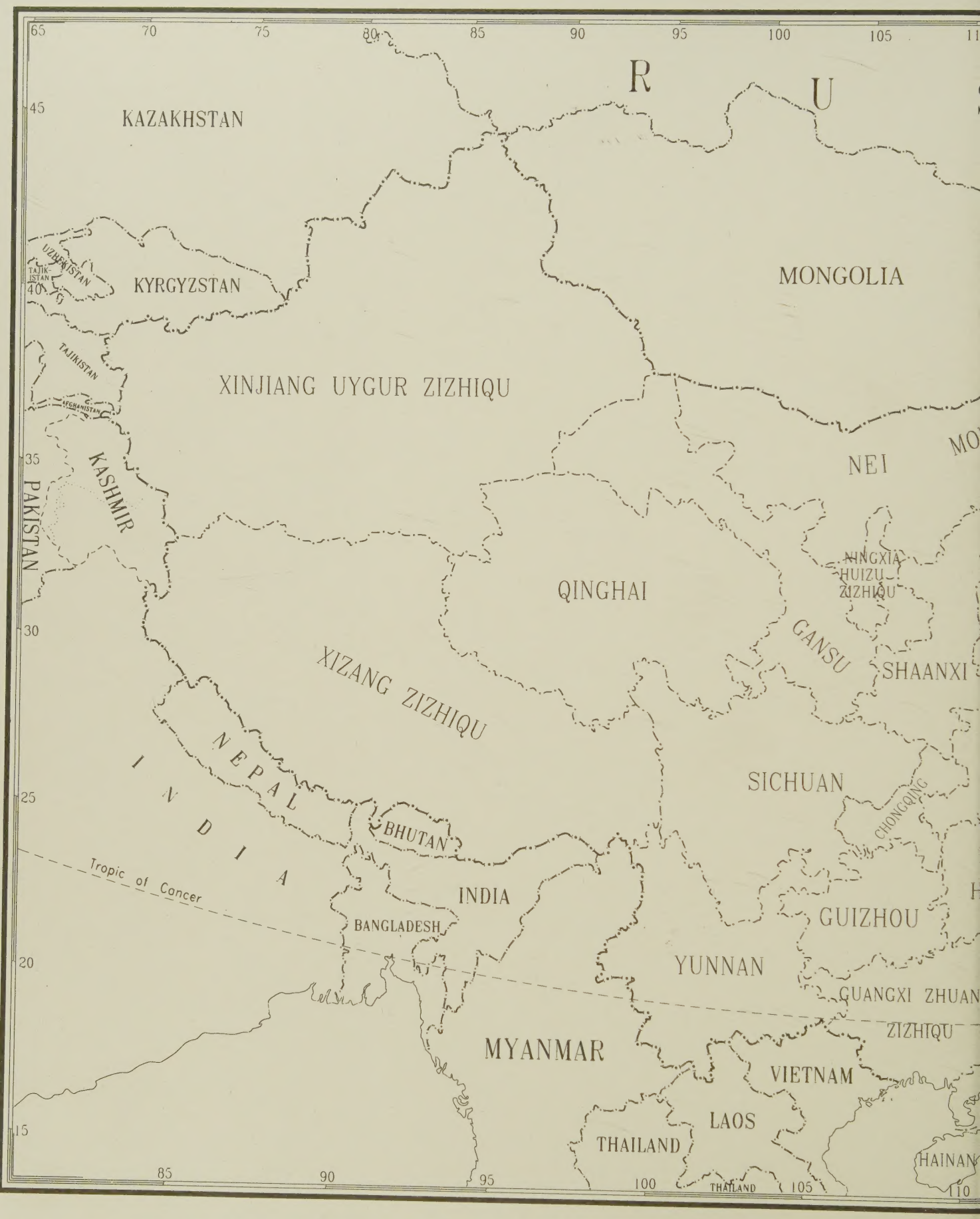
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